HISTORY OF BROADCASTING:

RADIO TO TELEVISION

U. S. Federal Communications Commission

Federal Communications Commission

Annual Reports
Volume 3
Numbers 16-21
1950-1955

ARNO PRESS and THE NEW YORK TIMES

New York • 1971

Reprint Edition 1971 by Arno Press Inc.

Reprinted from copies in The State Historical Society of Wisconsin Library, The U. S. Federal Communications Commission Library and xerox copies furnished by The Library of Congress

LC# 72-161167
ISBN 0-405-03577-2

HISTORY OF BROADCASTING: RADIO TO TELEVISION
ISBN for complete set: 0-405-03555-1
See last pages of this volume for titles.

Manufactured in the United States of America

HISTORY OF BROADCASTING: RADIO TO TELEVISION

HISTORY OF BROADCASTING: Radio to Television

SIXTEENTH ANNUAL REPORT

FEDERAL COMMUNICATIONS COMMISSION

FISCAL YEAR ENDED JUNE 30, 1950

(With notation of subsequent important developments)

UNITED STATES GOVERNMENT PRINTING OFFICE • WASHINGTON • 1951

COMMISSIONERS

MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION

(as of December 1, 1950)

CHAIRMAN
WAYNE COY
(Term expires June 30, 1951)

PAUL A. WALKER
(Term expires June 30, 1953)

ROSEL H. HYDE
(Term expires June 30, 1952)

EDWARD M. WEBSTER
(Term expires June 30, 1956)

ROBERT F. JONES
(Term expires June 30, 1954)

GEORGE E. STERLING
(Term expires June 30, 1957)

FRIEDA B. HENNOCK
(Term expires June 30, 1955)

LETTER OF TRANSMITTAL

FEDERAL COMMUNICATIONS COMMISSION,
Washington 25, D. C., December 29, 1950.

To the Congress of the United States:

The sixteenth annual report of the Federal Communications Commission is submitted herewith in compliance with section 4 (k) of the Communications Act of 1934, as amended.

By custom, this report deals primarily with Commission activities for the fiscal year ended June 30, 1950. However, telecommunications is such a fast-moving subject that it has been found appropriate to include in the introductory summary brief reference to subsequent events up to the time of going to press.

The attention of the Congress is invited, in particular, to the little-publicized yet highly important developments in the nonbroadcast field. Here new and augmented services have a material public impact in utilizing radio for the protection of life and property, as adjuncts to commerce and industry, and in furthering common carrier telephone and telegraph service.

Respectfully,

WAYNE COY, *Chairman.*

TABLE OF CONTENTS

INTRODUCTORY SUMMARY

1. HIGHLIGHTS OF THE FISCAL YEAR

GENERAL

Demands for radio that taxed the available spectrum space, coupled with a substantial increase in radio uses and facilities which posed major interference and other regulatory problems, highlighted the sixteenth year of operation of the Federal Communications Commission.

While broadcasting continued to attract the popular interest, developments in other fields of radio had equal, if not greater, public impact. Because they affected common carrier and safety and other radio services, the year's events were of vital concern to people who pay for the convenience of messages sped by improved telephone and telegraph facilities; people who travel on the ground, on the water and in the air with assurance of having the most modern radio safeguards; firms and persons who use radio for business or personal purposes; and individuals who operate transmitters for a livelihood or a hobby.

Despite the revamping of existing services and creation of new outlets, there are still not enough radio frequencies for all who want to use them. This has thrown a heavy burden on the Commission to seek refinements and economies in apportioning the limited radio spectrum in the best interests of the public. This now involves working arrangements with other nations as well as with users in our own country. Coordinating groups representative of services and industries concerned have been highly cooperative in the domestic endeavor.

The expanded use of radio in general, and increased television operation in particular, has deluged the Commission with interference complaints. Some of these cases may be resolved in a manner of minutes or hours, but many require days, even weeks, for their solution. Mounting use of low-power and other electrical devices which emit radiations that play hob with radio communication is another subject which is receiving mutual attention by the Commission, in-

dustry and others involved with a view of establishing rules to minimize this type of interference.

Some of the Commission's normal routine was delayed or foregone temporarily because of budgetary limitations and the press of more important problems requiring priority consideration. Examples of the latter were the time-consuming television proceedings, international communication matters, legislative and litigation proceedings, and special engineering and technical investigations.

The numerical extent of the Commission's supervisory and regulatory field is exemplified in the fact that, as of June 30, 1950, its records showed more than 775,000 licenses and other authorizations outstanding. This represents a net increase of about 75,000 during the year. Not included in the above total are associated portable and mobile radio transmitters, which alone exceeded 220,000.

In the radio field there were nearly 35 times as many nonbroadcast authorizations as broadcast authorizations. In round figures, these groups numbered 155,000 and 4,500 authorizations respectively. Radio operator authorizations rose to 615,000, an increase of 52,000 during the year.

In the same period the Commission received more than 220,000 applications of all kinds. Of this number, nearly 150,000 concerned radio operators, and there were about 63,000 nonbroadcast applications as compared with 6,200 dealing with broadcast. Common carrier applications numbered 3,600. In addition, common carriers filed some 23,500 tariffs and reports requiring Commission attention.

There were 595 cases on the Commission docket at the close of the year, or 60 less than for the previous year. About 90 percent of these hearing cases concerned broadcast.

COMMISSION

There was no change in membership of the Commission during the year. Commissioner George E. Sterling was reappointed and confirmed for a 7-year term.

Major steps were taken in reorganizing the operating staff on functional instead of professional lines. On March 3, 1950 a unified Common Carrier Bureau was established, effective April 3 thereafter, and on June 29, 1950, the Commission provided for a Safety and Special Radio Services Bureau, to become effective July 31, 1950.

At the close of the year the Commission's personnel numbered 1,285, which was a reduction of 55 during the year.

The Commission's appropriations for the year amounted to $6,729,345.

During the year the Commission made five legislative proposals, namely: (1) to enable it to purchase land and construct buildings for monitoring and research; (2) to authorize it to issue cease and desist

orders; (3) to provide that no broadcast station censor, alter or control broadcasts by legally qualified candidates for public office, and to relieve the stations from being liable for such broadcast material; (4) to provide for reimbursement to the Commission by the States for compensation, transportation, and subsistence expenses of Commission employees when made available as consultants or witnesses in common carrier regulatory matters pending before State commissions; and (5) to add a radio fraud statute to the United States Criminal Code.

In the Federal courts were 32 cases which involved the Commission. Of these, 9 were decided in favor of the Commission, 2 others were reversed or remanded to the Commission, 6 were dismissed by agreement, and 15 remained in litigation.

NATIONAL DEFENSE

Throughout the year the Commission cooperated with military and other Government agencies, also with civil organizations and elements of industry, in matters pertaining to the national defense. On March 23, 1950, the Commission proposed a new Disaster Communications Service which would enable Government and nongovernment radio stations to engage in emergency communication in event of armed attack as well as during times of floods, hurricanes, earthquakes, and other disasters. The Commission continued regional disaster coordination with the Coast Guard, Navy, Army, Air Force, Red Cross, radio amateurs, and State and municipal police organizations. Its established services include the Special Emergency Radio Service, for handling matters directly relating to public safety and the protection of life and property; the Civil Air Patrol, a civilian auxiliary of the Air Force, and the Amateur Radio Service, which maintains regional networks for emergency purposes.

COMMON CARRIERS

The telephone industry reached new peaks, reporting a total of over 40,000,000 telephones in service, an over-all investment of around $10,000,000,000 and more than $1,000,000,000 in new facilities added. The number of telephone calls increased to more than 45,000,000,000 and revenues reached about $3,000,000,000.

Improvement in facilities and installations of new types of plant continued at a rapid pace. The conversion of manual telephones to dial was accelerated. Facilities to provide dialing of long distance calls by operators are in general use; a transcontinental microwave radio relay system for telephone service is well under construction; and mobile radio-telephone service is expanding as rapidly as the available radio frequencies permit.

On December 21, 1949, the Commission adopted a report and order requiring the Bell system telephone companies and The Western

Union Telegraph Co., among other things, to permit interconnection of their intercity television program (video) transmission channels with private noncommon carrier intercity television relay channels authorized by the Commission pending availability of adequate common carrier service. This action was designed to encourage and expedite the development of network TV broadcasting. Hearings were also held on the question of whether Bell system companies and Western Union should be required to establish physical connections and through routes for TV program transmission service.

Domestic telegraph service, which experienced a gradual decline in revenues and volume of business for several years, reached a leveling-off point and registered some gains. Western Union completed and installed a Nation-wide uniform rate structure during the year. Modernization of facilities has continued and plans for an extensive microwave radio relay system for telegraph service are materializing. Improvement of facilities and operating efficiency, coupled with an increase in the volume of business, are producing profits, thereby bettering the earnings situation of Western Union that had been unfavorable for several years.

International telegraph business continued the downward trend of the past several years but indications of a reversal were evident at the close of fiscal 1950. A new international message service providing for direct connections between customers was inaugurated, on May 15, 1950, between New York City and The Netherlands. International radiotelegraph service was being furnished directly to 74 countries and through them indirectly to nearly every other country. International telegraph (radio and cable) traffic during the calendar year 1949 amounted to more than 400,000,000 words, of which amount nearly 260,000,000 was out-bound.

International radiotelephone service was furnished directly to 56 countries and through them to about 30 more countries. The volume of overseas telephone calls ran about 8 percent over the previous year with 675,000 calls in the calendar year 1949. A rate reduction, amounting to $280,000 a year, on telephone service between this country and Cuba was agreed to during the year to become effective July 1, 1950.

SAFETY AND SPECIAL RADIO SERVICES

Increasing interest and activity was reflected in the safety and special radio services which embrace radio aids for the protection of life and property as well as utilization of radio for business and other purposes.

Authorizations in this category (exclusive of amateurs, citizens, and special aircraft which, for the convenience of this report, are treated under "Radio Operators"), exceeded 66,000, not counting about

three times that many associated portable and mobile transmitters. The safety and special radio authorizations are almost 15 times the number of all broadcast authorizations.

The largest single classification was the marine services, in which ship and coastal stations totaled nearly 25,000. Aeronautical stations—both aircraft and ground—approximated 24,000. The public safety radio services, comprising police, fire, forestry-conservation, highway maintenance, and special emergency, numbered more than 7,600. Stations in the industrial radio services, such as power, petroleum, forest products, relay press, motion picture, etc., exceeded 6,000. Land transportation radio services held nearly 3,500 authorizations in the railroad, urban transit, intercity bus, taxicab, highway truck, and automobile emergency classifications. There were nearly 500 experimental authorizations.

However, the foregoing figures do not reflect the actual number of transmitters involved, since one authorization can cover hundreds of portable and mobile units. For example, in addition to ships and aircraft, there were nearly 60,000 portable or mobile units in the public safety services (including over 47,000 police units); nearly 52,000 in the land transportation services (including nearly 48,000 taxicabs), almost 34,000 in the industrial services (including over 23,000 in the power field), and more than 4,500 in the experimental service.

The public safety, land transportation, and industrial radio services operated their first full year under extensive rule changes which went into effect on July 1, 1949.

The mounting interest in the safety and special services is attested by the fact that more than 62,000 applications were received during the year in the groups previously mentioned, exceeding those of the previous year by over 10,000.

BROADCAST

The broadcast year witnessed mounting interest in television, a further slackening of FM authorizations and applications, but a continued growth of AM facilities, particularly in the smaller communities. Authorized AM, FM, and TV commercial broadcast stations totaled 3,144 at the close of the fiscal year, which was only 17 more than the year previous. However, the number of licensed stations rose to 2,658, an increase of 305. On June 30, 1950, there were 351 TV, 277 AM and 17 FM applications on file for new stations. The number of broadcast receivers was approaching 81,000,000.

The aggregate revenues of the aural and television broadcast industries reached $450,000,000 in 1949 or 8 percent above 1948. TV revenues were $34,300,000, or almost four times the 1948 amount. Despite this tremendous increase in TV revenues, however, aural broadcast industry revenues rose to about $415,000,000 or about 2 per-

cent above 1948. Aggregate aural and TV income (before Federal income tax) dropped to $27,300,000 in 1949, or 41 percent below the preceding year largely as a result of the $25,300,000 loss sustained by the television industry.

Hearings on color TV proposals consumed 62 days between September 1949 and May 1950, during which nearly 10,000 pages of testimony was taken and nearly 300 exhibits were introduced. This was the first phase in the Commission's TV proceeding, announced July 11, 1949, looking towards new standards to curb interference, providing additional channels, and consideration of color. Decision on the color issue was pending at the close of the year.

Despite the attendant "freeze" on new TV station construction, there were 109 previously authorized TV stations at the year's end, of which number 47 were licensed. Altogether, 106 TV stations were on the air serving 64 cities and metropolitan areas, as compared with 71 stations serving 42 cities the year previous. An estimated 7,000,000 TV receivers were in the hands of the public. More than 200 experimental TV stations were functioning, including nearly 160 auxiliary TV broadcast stations.

For the first time the number of licensed AM stations passed the 2,000 mark. They totaled 2,118, or 155 more than in 1949. AM authorizations mounted to 2,303, an increase of 103 during the year. Most of this AM expansion took place in nonmetropolitan districts, particularly in communities which previously had no local AM outlets. Decision in the clear channel proceeding was held in abeyance because of negotiations for a new North American regional broadcasting agreement.

Despite deletions which reduced FM broadcast authorizations from 865 to 732, the year closed with 493 licensed FM stations, a gain of 116. The number of FM stations on the air decreased by 46, leaving 691 in operation. However, FM programs remained available over most of the eastern half of the United States, over most of the west coast area, and in a number of cities and adjacent rural areas in the West. FM audiences were using approximately 5,500,000 receivers. A few FM stations provided facsimile service during the year.

Due, in part, to the economies of low-power operation, noncommercial educational FM broadcast stations grew from 58 to 82. During the year the Commission set aside a channel in this service for the United Nations headquarters in New York.

International broadcast stations, which operate under the auspices of the Department of State, increased from 37 to 40.

Miscellaneous auxiliary broadcast services (remote pickup, studio transmitter, and developmental) accounted for 1,038 additional authorizations, or 416 more than the year previous.

RADIO OPERATORS

The largest single group which the Commission administers comprises more than 615,000 radio operators, and over 88,000 radio stations licensed to amateurs and individual citizens. There are over 408,000 commercial operators, 120,000 private flyers holding special aircraft radiotelephone authorizations, nearly 87,000 amateur operators, and 88,000 amateur stations, and over 300 authorizations to individuals for personal radiocommunication, etc. Together these services accounted for nearly 148,000 applications during the year.

Changes made in rules affecting commercial radio operators included establishment of a third-class operator permit for nontechnical duties, definition of the qualifications of persons who adjust or test ship radar installations, and liberalization of the requirements for physically handicapped persons to obtain operator licenses.

The Commission amended its amateur rules to clarify eligibility for two-letter calls, and to provide a year of grace for renewal of licenses expiring after January 1, 1951.

Established on a regular basis as of June 1, 1949, the citizens service has been handicapped by lack of type-approved manufactured sets and inability of home constructors to meet the technical standards required for low power transmitter-receivers to operate in this personalized service.

FIELD ENGINEERING AND MONITORING

The Commission's field engineering work was conducted through 9 regional offices supervising 23 district offices, 6 suboffices, and 3 ship offices, augmented by 11 primary and 8 secondary monitoring stations.

Monitoring operations resulted in the serving of nearly 10,000 violation notices, handling over 100 requests for assistance involving lost or disabled aircraft, and helping trace sources of interference.

During the year the field staff handled more than 8,600 investigative complaints and closed down 149 illegal radio operations. Inspection of nearly 2,000 broadcast stations revealed more than 1,100 technical discrepancies. Over 10,000 ship station inspections showed more than 8,900 discrepancies. Nearly 13,000 other nonbroadcast radio-station inspections resulted in about 3,700 deficiencies being cited.

The engineering field staff also gave examinations to radio operators, and as a result, granted more than 100,000 operator authorizations of all classes.

In addition, it engaged in 128 technical engineering projects for the Commission and other Government agencies.

TECHNICAL RESEARCH AND LABORATORY

The Commission's research and technical studies were conducted by the Technical Research Division with the assistance of the Laboratory Division and the Field Engineering and Monitoring Division.

During the year emphasis was placed upon VHF (very high frequency) and UHF (ultra high frequency) propagation studies, with attention also given to restricted and incidental radiation devices, receiver radiation, single and side band suppressed carrier studies, and radiolocation, but with continuance of medium frequency projects, such as sunspot cycles and atmospheric noise.

The laboratory at Laurel, Md., investigated various methods of transmission and reception, tested transmitters and receivers, and monitoring equipment, and investigated interference produced by noncommunication use of radio-frequency energy. Its testing of equipment prior to marketing is an interference preventative because cooperating manufacturers take any remedial measures which may be necessary in order to obtain type approval prior to production and distribution of units in large number.

INTERNATIONAL

Besides its continuing regulatory work having to do with frequency allocations, the Commission was active in preparing to bring into force domestically the international table of frequency allocations below 27,500 kilocycles. The Atlantic City table of frequency allocations above 27,500 kilocycles is now in force and is reflected in part 2 of the Commission's rules.

During the year, the Commission assisted in the United States preparation and participation in 19 international meetings and conferences having to do with all types of electrical communication media. At the close of the year, it was preparing for 24 additional international sessions. It also made extensive changes in its frequency records and system of notifying the International Telecommunications Union at Geneva.

The Commission handled nearly 400 cases of international interference, and prepared approximately 3,000 reports of treaty infractions for transmittal to nearly 150 foreign countries.

2. SUBSEQUENT EVENTS

INTERNATIONAL

On August 25 the Commission released the list of proposed frequency assignments below 27,500 kilocycles, with special reference to those in the 2,000–3,500 kilocycle band to be recommended for international registration in connection with the Extraordinary Administrative Radio Conference of the International Telecommunication Union

(ITU). This conference, which had been scheduled for The Hague in September, was postponed because of world conditions.

The final protocol of the Paris International Telegraph Conference and United States adherence to the International Telegraph Regulations, with reservations, was ratified by the United States Senate on August 9, and proclaimed by the President on November 20.

The second session of the North American Regional Broadcasting Conference, in Washington on November 15, concluded an agreement relating to operating policies and procedures for AM broadcasting in that region.

NATIONAL DEFENSE

Proposed rules were issued by the Commission on August 3 for a new Disaster Communications Service which would provide emergency radio communication in time of floods, earthquakes, hurricanes, etc., as well as armed attack.

On the same date, rules were proposed to enable non-Government radio stations to use Government frequencies for intercommunication where such cooperation is required, such as the conduct of joint operations. They were finalized October 30.

Reactivation of the State Guard Radio Service was proposed September 8 and effected October 30. This service is for guard units which function in States where the National Guard has been called into Federal service. Texas received the first grant in this reactivated service (November 8).

COMMON CARRIERS

The American Telephone & Telegraph Co., on September 1, placed into service a microwave relay system between New York and Chicago to augment existing coaxial cable routes. The first microwave circuit between Los Angeles and San Francisco was opened by the Pacific Telephone & Telegraph Co. on September 15. By October the Bell System intercity coaxial cable-microwave network had extended from Boston to Jacksonville, thence to Atlanta and Birmingham; from Philadelphia westward to Omaha and Kansas City, with links to Minneapolis and St. Paul; St. Louis and Memphis; Columbus, Dayton, Cincinnati, Indianapolis, and Louisville; Cleveland to Rochester; and New York to Syracuse.

Because applications for mobile radiotelephone carrier operations in New York, Chicago, Houston, Dallas, and Los Angeles exceeded available frequencies, the Commission in the late summer and fall scheduled competitive hearings in those areas.

As of August 18, the Commission amended its rules governing preservation of records by common carriers to separate the provisions applying to telephone and telegraph companies.

On October 18 the Commission instituted an investigation into the lawfulness of the American Telephone & Telegraph Co. and certain Bell System companies tariffs governing the allocation of intercity video relay facilities (docket 9816).

The Commission on November 14 (in docket 9433) found that practices in acceptance and delivery, to and from hinterland points, of overseas and foreign telegraph messages were just and reasonable, but ordered carriers to file certain covering tariffs before December 20.

SAFETY AND SPECIAL RADIO SERVICES

On September 15 the Commission announced rule-making looking to extensive revisions of its rules governing the Maritime Radio Services—Part 7, Coastal and Marine Relay Services, and Part 8, Ship Service. They are designed to bring these rules in step with marine radio developments and to reflect new international treaties and agreements affecting these services.

As of August 21, the frequency 6210 kilocycles was made available as an international calling and working frequency for private and carrier aircraft. Establishment of Aeronautical Advisory Stations in the Aeronautical Radio Services was effected November 22. On October 13 it was proposed to transfer rules and regulations governing aeronautical services in Alaska from Part 14 to Part 9. The effective date for implementing the aeronautical VHF (very high frequency) program was postponed from July 1 until further notice.

Revision of the experimental rules, as proposed August 3, would replace the present classes 1, 2, and 3 authorizations with two new classifications—research and developmental.

On industry complaint, the Commission on August 2 withdrew its type approval of a diathermy machine produced by a New York manufacturer. The case went to hearing.

BROADCAST

As a result of the extensive hearing mentioned elsewhere in this report, the Commission on September 1 issued its first report on the color issue in the general television proceedings (dockets 8736 et al.). It found that the field sequential color system of the Columbia Broadcasting System more fully met the Commission's criteria for a TV color system. However, in view of the compatability problem and the possibility of improvements in TV color systems generally, the Commission proposed postponing a color decision and adopting monochrome "bracket standards" which would enable black-and-white TV sets incorporating those standards to receive CBS color transmissions in monochrome. This proposal was conditioned to receiver manufacturers agreeing to equip future TV sets with a manual or automatic switch for that purpose.

But the response from set makers was insufficient and, in accordance with its September 1 announcement, the Commission on October 11 issued a second report in which it adopted the field sequential color system for commercial broadcasting, effective November 20. In so doing, it held the door open for consideration of competitive systems or developments on the basis of testing and practical demonstration. At the same time, the Commission announced that at a later date it would hold a hearing on bracket standards for the present monochrome TV system.

The Radio Corp. of America and two subsidiaries litigated the Commission's color TV decision and, on November 16, the United States District Court at Chicago issued a temporary order restraining such commercial color broadcasts pending a decision by that court. Meanwhile, on October 16, Commission hearing on other phases of the TV proceedings was resumed at Washington.

On October 5 the Commission proposed temporary rule-making (docket 9807) which would maintain competition between TV network organizations during the current "freeze" period, when the number of interconnected stations in many cities is less than the number of networks available to supply programs to those cities, by limiting the number of hours a TV station could use the programs of any single network.

In November, WOR-TV, New York, was authorized to test the "Skiatron Subscriber-Vision" system. Zenith Radio Corp. postponed its "Phonevision" tests in Chicago to December 1.

The Commission announced, on July 21, that a review of the record of its hearing on the sale of national spot advertising by networks (docket 9080) was insufficient to support a finding that this practice violates the chain broadcasting regulations but was still considering whether it was in the public interest.

On October 6 the Commission dismissed its proceedings in the matter of adopting rules relating to forfeiture of broadcast construction permits if a contract for transfer or assignment is entered into prior to completion of station construction (docket 9553).

The STL (Studio-Transmitter-Link) broadcast rules were amended September 8 to permit AM as well as FM use of such facilities.

On September 27 the Commission proposed rules to permit remote control operation, under certain conditions, of low-power noncommercial educational FM broadcast stations.

As of July 21, the Commission resumed processing of AM broadcast applications in a single processing line instead of the two classifications (simple and complicated) which had been in effect since August 16, 1946.

OPERATORS

Two new classes of commercial radio operator permits—radiotelephone third class and radiotelegraph third class—became effective September 1, when the restricted radiotelegraph operator permit was discontinued. The renewal section of the amateur rules was waived for 1 year, from November 13, for applicants in the military service. At the same time, the amateur rules were clarified to permit photostating of amateur operator licenses.

COMMISSION

In the late summer the Commission completed microfilming its official minutes, and those of its predecessor Federal Radio Commission. By this means, 99 volumes (78,000 pages) were reduced to 46 small reels. The latter were offered to the National Archives for safekeeping.

As of October 31, the number of radio authorizations outstanding on the Commission's books, for the first time, exceeded the 800,000 mark. This represented a gain of nearly 30,000 since the close of the 1950 fiscal year. Comparative figures for groups and services follow:

Service	June 30, 1950	Oct. 31, 1950	Increase or (decrease)
Common Carrier Services:			
Domestic Land Mobile	551	551	----------
Fixed Public Telephone	26	26	----------
Fixed Public Telegraph	58	41	(17)
Experimental	290	315	25
Total	925	933	8
Safety and Special Services:			
Aeronautical	23,794	27,870	4,076
Marine	24,921	27,184	2,263
Public Safety	7,607	8,139	532
Industrial	6,090	7,336	1,246
Land Transportation	3,495	3,901	406
Amateur	87,967	89,739	1,772
Citizens	335	380	45
Experimental	466	480	14
Total	154,675	165,029	10,354
Broadcast:			
Standard (AM)	2,303	2,336	33
Frequency Modulation (FM)	732	711	(21)
Noncommercial Educational (FM)	82	87	5
Television (TV)	109	109	----------
Television (experimental)	206	227	21
International	40	40	----------
Remote Pickup	1,003	956	(47)
Studio Transmitter (ST)	29	29	----------
Developmental	6	6	----------
Total	4,510	4,501	(9)
Radio operators:			
Commercial	408,221	419,595	11,374
Aircraft Radiotelephone	120,550	126,692	6,142
Amateur	86,662	88,338	1,676
Total	615,433	634,625	19,192
Grand total	775,543	805,088	29,545

CHAPTER I—GENERAL

1. AUTHORITY

The Federal Communications Commission was created by and operates pursuant to the Communications Act of 1934, as amended. Its authority under this statute extends to Alaska, Hawaii, Puerto Rico, the Virgin Islands, and other possessions, but not to the Canal Zone. As an independent Federal agency established by Congress, the Commission reports directly to Congress.

2. FUNCTIONS

The Commission is, in general, charged with regulating interstate and international communication by telephone and telegraph, and broadcast and other forms of radio services.

Its duties embrace supervision of rates and services of subject common carriers; allocation of radio frequencies; licensing of nongovernment radio stations and radio operators; promoting safety through the use of radio on land, water, and in the air; encouraging more effective and widespread utilization of radio; participating in the formulation and domestic administration of wire and radio provisions of treaties and other international agreements to which the United States is a party; and helping coordinate the many forms of electrical communication with the national security effort.

The Commission's regulatory functions include the establishment and enforcement of rules and regulations, and engineering standards,

and making and carrying out policies to meet expansion and developments in this field. In so doing, it must conform to the Administrative Procedure Act which prescribes uniform rule-making practices for Federal agencies to follow.

Licensing by the Commission is limited by the Communications Act to citizens of the United States.

No fee or charge of any kind is exacted by the Commission in connection with its licensing and regulatory functions.

3. COMMISSIONERS

The Commission is administered by seven Commissioners who are appointed by the President and confirmed by the Senate. The President designates one of these Commissioners to serve as Chairman. The normal term of a Commissioner is 7 years. Terms are staggered. Not more than four Commissioners may be members of the same political party.

Throughout the fiscal year the Commissioners continued to function as a unit, directly supervising all activities of the Commission, with delegations of responsibility to boards and committees of Commissioners, individual Commissioners, and the Commission staff. Policy determinations were made by the Commission as a whole.

On June 2, 1949, the Chairman was given additional administrative responsibility by the Commission. On policy matters, such as preparation of budget requests, he was given the responsibility of developing proposals for Commission action. On nonpolicy matters he was given authority for final action with the Commission to be merely informed as to the actions he takes. At the same time, the Office of Administration was made directly responsible to the Chairman in order to aid the Chairman in carrying out his increased responsibilities.

The mounting workload and growing complexity of problems requiring policy consideration caused provision to be made early in fiscal 1950 for a legal assistant to each Commissioner.

On March 27, 1950, the Commission changed the name of its special legal and technical group to the Office of Formal Hearing Assistants. This unit, created June 2, 1949, comprises special legal and technical assistants assigned to work on hearing matters for the Commissioners as a body.

There was no change in the membership of the Commission during the year. On May 26, 1950, Commissioner George E. Sterling (who took office on January 2, 1948, under a recess appointment) was renominated by the President and, on June 20, 1950, was confirmed by the Senate for a 7-year term from June 30, 1950.

4. STAFF ORGANIZATION

During the year, the Commission began reorganizing its operating staff on functional instead of professional lines.

By orders of March 3, 1950, effective April 3 thereafter, the Offices of General Counsel, Chief Accountant and Chief Engineer were set up as major staff units with these duties:

Office of General Counsel.—Advise and represent the Commission in matters of litigation; advise and represent the Commission, and coordinate and make recommendations to the Commission on proposed legislation and international agreements with which the Commission is concerned; interpret the statutes, international agreements, and regulations affecting the Commission and advise the Commission (including the Common Carrier Bureau) as to the authority and power the Commission possesses under such statutes, agreements, and regulations; formulate and make recommendations on procedural rules of general applicability and review all rules for consistency with other rules, uniformity, and legal sufficiency; conduct research in legal matters as directed by the Commission; participate in and render advice to the Commission in proceedings and matters involving rulemaking which concern jointly the common-carrier services and any services other than common carrier; maintain liaison with other agencies of Government on common-carrier matters; provide representation for the Commission on Commission-wide and interdepartmental committees; deal with members of the public and of the industries concerned; perform such other duties as may be assigned or referred by the Commission; exercise such authority as may be assigned or referred by the Commission pursuant to section 5 (e) of the Communications Act. The Office of General Counsel functions with a Broadcast Division and a Litigation and Administration Division.

Office of Chief Accountant.—Recommend the accounting principles which shall be observed; conduct research in and advise the Commission on economic matters to be considered in policy determinations; advise the Commission and its bureaus regarding accounting, economic, and statistical matters; maintain liaison with other agencies of Government on common-carrier matters; provide representation for the Commission on Commission-wide and interdepartmental committees, and on the National Association of Railroad and Utilities Commissioners' Committees on depreciation and on accounts and statistics; deal with members of the public and of the industries concerned; perform such other duties as may be assigned or referred by the Commission; exercise such authority as may be assigned or referred by the Commission pursuant to section 5 (e) of the Communications

Act. The Office of Chief Accountant comprised three divisions—Accounting Systems, Broadcast, and Economics.

Office of Chief Engineer.—Advise the Commission and the Common Carrier Bureau on matters of applied technical research; advise and represent the Commission in the deliberations on the allocation of radio frequencies; collaborate with the Common Carrier Bureau in the formulation of standards of engineering practice and the rules and regulations related thereto, and advise the Commission on such matters; participate in and render advice to the Commission in proceedings and matters involving rule-making which concern jointly the common-carrier services and any services other than common carrier; maintain liaison with other agencies of government on common-carrier matters; provide representation for the Commission on Commission-wide and interdepartmental committees; deal with members of the public and of the industries concerned; perform such other duties as may be assigned or referred by the Commission; exercise such authority as may be assigned or referred by the Commission pursuant to section 5 (e) of the Communications Act. Divisions of the Office of Chief Engineer embrace Aural Broadcast, Television Broadcast, Field Engineering and Monitoring, Technical Research, Laboratory, and Frequency, Allocation and Treaty.

Also effective April 3, 1950, the Commission created a *Common Carrier Bureau* with four divisions—Telegraph, Telephone, International, and Statistics. This new bureau, which unifies related legal, engineering, and accounting activities, is charged with "carrying out the common-carrier regulatory program of the Commission under applicable statutes, international agreements, and rules and regulations, including the regulation of common-carrier rates, services, and accounting, and the licensing of common carrier wire and radio services."

Its duties include the initiation of rules and regulations, except as otherwise specifically provided in the functions of the Offices of the Chief Accountant, Chief Engineer, General Counsel, and the Office of Formal Hearing Assistants; collaboration with representatives of State regulatory commissions and with the National Association of Railroad and Utilities Commissioners in the conduct of cooperative studies of regulatory matters of common concern; participation on behalf of the Federal Communications Commission in international conferences involving common-carrier matters; and, further, assist, advise, and make recommendations to the Commission and represent the Commission in matters pertaining to common-carrier regulation. The Common Carrier Bureau comprises Telephone, Telegraph, Common Carrier Statistics, and International Divisions.

On June 29, 1950, the Commission established a Safety and Special Radio Services Bureau, to become effective July 31 thereafter. This new bureau will consist of five divisions—Aviation, Marine, Industry and Commerce, State-local Government and Amateur, and Authorization Analysis—supplemented by an Enforcement Unit in the Office of the Chief. It will unify the regulation of practically all the nonbroadcast and certain nonexclusive common carrier radio services. In general, it will "assist, advise and make recommendations to the Commission with respect to the development of a safety and special services regulatory program and shall be responsible for the performance of any work, function or activities to carry out that program in accordance with applicable statutes, international agreements, and rules and regulations, except insofar as functions are specifically delegated to other bureaus or staff offices of the Commission."

Its prescribed functions are to "issue authorizations for radio stations (in the safety and special services); initiate rule-making proceedings (in the safety and special services); participate in international conferences with respect to safety and special services; study frequency requirements in the safety and special services and make recommendations with respect to the allocation of frequencies and the drafting of frequency assignment plans for safety and special services; collaborate with Federal and State governmental agencies and industry groups interested in the problems of safety and special services; study technical requirements for equipment in accordance with standards established by the Office of the Chief Engineer; plan and execute a safety and special services enforcement program, including educational campaigns conducted in collaboration with Field Engineering and Monitoring Division; and perform all other functions or activities essential to regulation of safety and special services."

A survey of the Commission's broadcast administration is to be started in the fall; this will be followed by a study of the staff offices later in the fiscal year, and by a study of the field engineering and monitoring activities near the end of the 1951 fiscal year.

This functional staff reorganization, initiated by the Commission as the result of a long-range study of its administrative needs, conforms in general to certain recommendations made in the staff report of the Hoover Commission on Organization of the Executive Branch of the Government, and to like provisions contained in proposed legislation.

The Offices of the General Counsel, Chief Accountant, and Chief Engineer continued to exercise jurisdiction with respect to broadcast and field engineering and monitoring matters. In May 1950 the handling of AM, FM, noncommercial educational and facsimile engineer-

ing matters was consolidated in a new Aural Broadcast Division; auxiliary broadcast engineering was transferred to the Television Broadcast Division, and international broadcast engineering was placed in the Office of the Chief Engineer.

In October 1949 the Technical Information Division in the Office of the Chief Engineer became the Technical Research Division, with three branches—Technical Standards, Low Frequency Radio, and High Frequency Radio.

Other major staff units were:

Bureau of the Secretary.—License, Service, and Records Divisions.

Office of Administration.—Personnel, Organization and Methods, and Budget and Fiscal Divisions.

Office of Information.

Office of Formal Hearing Assistants.—(previously mentioned).

Hearing Division which, since May 28, 1947, has functioned under the direct supervision of the Commission and in accordance with the provisions of the Administrative Procedure Act. This division comprises hearing examiners who preside at hearings and prepare recommended decisions. As of June 2, 1949, the Commission provided for initial decisions to be issued by hearing examiners or Commissioners presiding at hearings, and for motions heretofore handled by motions Commissioners, with certain exceptions, to be acted upon by hearing examiners. Thus, an initial decision takes the place of and serves the same purpose as a proposed decision of the Commission. Death of the chief hearing examiner during the year reduced the number of hearing examiners to nine.

5. PERSONNEL

On June 30, 1950, a total of 1,285 persons were employed by the Commission, or 55 less than in 1949. Personnel distribution was:

Office or bureau	Washington	Field	Total
Office of chief engineer	260	401	661
Office of general counsel	82	3	85
Office of chief accountant	45	0	45
Common carrier bureau	113	38	151
Office of secretary	236	0	236
Commissioners and administrative offices	107	0	107
Total	843	442	1,285

6. APPROPRIATIONS

A breakdown of the Commission's appropriations and expenditures for the fiscal year 1950 follows:

Appropriations		Expenditures	
Regular appropriations (salaries and expenses—including printing and reproduction)	$6,600,000	Personal services	$6,124,115
Deficiency—Public Law 529	129,345	Travel	84,428
		Transportation of things	19,692
Total funds available	6,729,345	Communication services	148,533
		Rents and utilities	63,949
		Printing and reproduction	37,489
		Other contractual services	60,102
		Supplies and materials	114,876
		Equipment	74,419
		Refunds, awards and indemnities	188
		Total obligations	6,727,791
		Transfer to public health	1,540
		Savings, unobligated balance	14
		Total	6,729,345

These appropriations and expenditures were made under authority of Public Law 266, Eighty-first Congress, approved August 24, 1949, and the Deficiency Appropriation Act of 1950, Public Law 529, approved May 26, 1950.

In dollars, this was approximately $12,000 more than the appropriation for the previous year. However, when pay increases and travel allowance increases, resulting from Public Laws 92, 359, and 429 of the Eighty-first Congress, are taken into consideration, the 1950 appropriation is in effect a net decrease of approximately $145,000.

7. LITIGATION

Section 401 of the Communications Act confers upon the district courts of the United States jurisdiction to enforce the Communications Act and the orders of the Commission. Judicial review of Commission actions is provided for in section 402 of the act. Section 402 (a) gives jurisdiction to the district courts over suits to enforce, enjoin, set aside, annul, or suspend any order of the Commission with the exception of orders granting or refusing applications for licenses. Section 402 (b) provides for direct appeal from such other orders of the Commission to the United States Court of Appeals for the District of Columbia Circuit. The great majority of cases involving review of Commission action is instituted in the latter court.

During the fiscal year, there were 32 cases involving the Commission in the Federal courts. Of this total, 18 were instituted during the fiscal year—11 in the Court of Appeals for the District of Columbia Circuit; 6 in district courts, and 1 in the United States Supreme Court. The other 14 cases were pending at the start of the fiscal year.

The Supreme Court upheld the Commission in the one case brought before it. In the Court of Appeals for the District of Columbia Circuit, the Commission was upheld in 6 cases and reversed in 1 case, the court remanded 1 case to the Commission for further proceedings, and 6 cases were dismissed by agreement of the parties. In the district courts, two cases were decided, both in favor of the Commission.

As of June 30, 1950, 10 cases were pending in the Court of Appeals for the District of Columbia Circuit and 5 pending in United States district courts.

The status of litigation for the fiscal year is tabulated as follows:

Court	Total	Decisions affirming Commission	Decisions reversing or remanding case	Dismissed by agreement of parties	Cases pending June 30, 1950
Supreme court	[1] 1	1			
Court of Appeals for District of Columbia Circuit	24	6	2	6	10
District courts	7	2			5
Totals	32	9	2	6	15

[1] In *Regents of the University System of Georgia* v. *Carroll*, 338 U. S. 586, 70 S. Ct. 370, 94 L. Ed. 320 (1950), not included in the above tabulation, the Commission, though not a party, filed a brief *amicus curiae*, urging reversal of the judgment of the Court of Appeals of Georgia, 78 Georgia, App. 292, 50 S. E. (2d) 808. The Supreme Court, however, affirmed the judgment.

The following cases, decided during the fiscal year, were of particular interest:

1. In *A. J. Felman* v. *United States* 339 U. S. 973, 70 S. Ct. 1030, 94 L. Ed. 918 (1950), A. J. Felman, former owner of radio station WJOL, who had a contract with the present licensee of the station, under which certain broadcast time was reserved to him for so long as the station should be operated, challenged the authority of the Commission to adopt sections 3.109, 3.241, and 3.641 of the Commission's rules. These rules prohibit the assignor of a station license to retain any right of reversion or any right to use the facilities of the station for any period whatsoever. They also provide that where the contract, the terms of which were fully disclosed to the Commission at the time of execution, was entered into prior to the adoption of the rules, the Commission will not require the licensee to abrogate the contract, provided certain modifications are made to insure full licensee responsibility. Felman contended the rules deprived him of property without due process of law but the three-judge court, convened in the United States District Court, Northern Division Eastern District Illinois to hear the case, sustained their validity. On the Government's motion the Supreme Court, in a *per curiam* order, affirmed the judgment of the lower court without opinion.

2. In *Mansfield Journal Co.* v. *Federal Communications Commission*, 86 U. S. App. D. C. — 180 F. (2d) 28 (1950), the Commission denied the applications of Mansfield for station licenses where it was shown that Mansfield's actions as the sole owner of a newspaper in Mansfield, Ohio, were taken for the purpose of suppressing competition and of securing a monopoly of mass advertising and news dissemination and that such practices were likely to continue by its acquisition of a radio station in Mansfield. The applicant used its position as sole newspaper in the community to coerce its advertisers to

enter into exclusive advertising contracts with the newspaper and to refrain from utilizing radio station WMAN for advertising purposes. Accordingly, the applications of Mansfield for radio station licenses were rejected on the ground that a grant to it would not be in the public interest. On appeal, the court affirmed the Commission, holding that it was fully within the Commission's jurisdiction to hear evidence on the monopolistic practices of the appellant, regardless of whether or not such practices were specifically forbidden by the antitrust laws, and to deny the licenses upon its finding that such practices had taken place and were likely to carry over into the operation of the radio station. The court also ruled that the mandate of the first amendment did not preclude the Commission from considering the competitive practices of the newspaper applicant.

3. In *Edwin W. Pauley, et al d/b as Television California* v. *Federal Communications Commission*, 86 U. S. App. D. C. —, 181 F. (2d) 292 (1950), petitioner was an applicant for a construction permit for a television station in San Francisco, Calif. Since the number of available channels was smaller than the number of applicants, the Commission ordered a consolidated hearing. Petitioner objected to an order of the Commission severing from the consolidated proceeding an application which had been filed several years previously but upon which no action had been taken pending the outcome of related proceedings, concerning the qualifications of such other applicant. Petitioner sought review under section 402 (b) of the act which provides for an appeal to the Court of Appeals for the District of Columbia Circuit from an order resulting in the grant or denial of an application. The court determined that it had no jurisdiction to entertain the appeal, reasoning that the order neither granted nor denied any of the applications so that at most there was " * * * no more than a lessened statistical probability that petitioner will ultimately succeed in getting a station."

4. In *Roy L. Albertson* v. *Federal Communications Commission*, — U. S. App. D. C. 182, F [2d] 397 (1950), the court held that where the Commission entertains a motion for rehearing, filed to request the Commission to reconsider a denial of a previous motion for rehearing, consideration of the second motion on the merits suspends the running of the period for taking an appeal from the order denying the first application for rehearing. In that case, the Commission dismissed Albertson's application for rehearing, which alleged that the grant of a station license to Dunkirk Broadcasting Corp., Dunkirk, N. Y., would cause interference to it, for failure to comply with the requirements of the Commission's rules with respect to petitions for rehearing. The court did not question the validity of the rules but held that Dunkirk having admitted the interference in its re-

sponsive pleading, Albertson was entitled to a hearing despite noncompliance with the rule.

5. In *Radio Cincinnati, Inc.* v. *Federal Communications Commission*, 85 U. S. App. D. C. 292, 177 F. (2d) 92 (1949), the Court of Appeals for the District of Columbia Circuit affirmed a decision of the Commission granting the application of WJIM, Inc., for a station license in Lansing, Mich., and denying the mutually exclusive application of Radio Cincinnati, Inc., holding that the Commission had been eminently fair and diligently conscientious in complying with section 307 (b) of the act which provides that "* * * In considering applications for licenses * * * the Commission shall make such distribution of licenses * * * among the several States and communities as to provide a fair, efficient, and equitable distribution of radio service to each of the same."

8. LEGISLATION

During the fiscal year 1950 the Commission submitted five proposals to the Bureau of the Budget as part of the Commission's legislative programs. These proposals included: (1) An amendment to section 4 (g) of the Communications Act, which would authorize the Commission to purchase land and construct buildings to be used for monitoring and research purposes; (2) the addition of a new section to the act which would authorize the Commission to issue cease and desist orders; (3) an amendment to section 315 of the act, which would provide no radio station licensee has the power to censor, alter or control broadcasts by legally qualified candidates for public office and that licensees cannot be held criminally or civilly liable for material broadcast by any such candidate; (4) an amendment to section 410 (b) of the act to provide for reimbursement to the Commission by the States for the compensation, transportation, and subsistence expenses of Commission employees when they are made available to State commissions to act as consultants or witnesses in common carrier regulatory matters pending before such commissions; and (5) a proposal to add a radio fraud statute to the United State Criminal Code. All of these proposals were approved for submission to Congress.

The Commission's proposals with respect to authorizing purchasing of land for monitoring station and research activities, the issuance of cease and desist orders and enacting a radio fraud statute were included in S. 1973, introduced by Senator McFarland, which passed the Senate on August 9, 1949. These same three proposals were included in S. 1626, introduced by Senator Johnson (Colorado), and the proposals concerning cease and desist orders and political broadcasts were embodied in H. R. 6949, introduced by Mr. Sadowski. No action had been taken on either of these latter two bills. H. R. 4251, which also authorizes the Commission to purchase land to be

used for monitoring stations, was passed by the House of Representatives on May 16, 1949. The Commission's proposal to amend section 410 (b) has not been introduced in Congress, but a similar amendment to section 410, advanced by the National Association of Railroad and Utility Commissioners, was embodied in H. R. 7385. The Commission prepared and submitted detailed comments on each of these bills.

There were also numerous bills considered by the Congress which directly or indirectly concerned the Commission, and on which it was called to submit its views. The most important of these were: S. 1973 and H. R. 6949, both of which, in addition to embodying some of the Commission's legislative proposals, would extensively amend the Communications Act as well as make substantial changes in Commission organization and procedure; H. R. 5487, introduced by Mr. Hobbs, which would revise the procedure for handling appeals to the courts from Commission decisions and orders, and which was passed by the House of Representatives June 5, 1950; H. R. 7310 introduced by Mr. Sheppard, which would place restrictions on the ownership and use of radio broadcasting stations engaged in network operations; and S. 3358 and H. R. 7233, which would prohibit or restrict the transmission of certain gambling information in interstate commerce by means of communications facilities.

Members of the Commission's staff aided in the drafting of S. 3358 and the Chairman of the Commission gave extensive testimony on the bill at a hearing held before a subcommittee of the Senate Committee on Interstate and Foreign Commerce, and the committee favorably reported the bill to the Senate on May 26, 1950. The Chairman also testified on the use of interstate communications facilities in the dissemination of gambling information before the Special Senate Committee to Investigate Organized Crime in Interstate Commerce. In addition to its legislative drafting activities and the testimony presented before congressional committees, the Commission prepared comments for the Congress and the Bureau of the Budget on more than 40 proposed bills, other than those specifically mentioned above, which contained provisions concerning the Commission's functions.

9. NATIONAL DEFENSE

Use of wire and radio communication to aid the national defense, along with promotion of safety of life and property in general, is among the stated purposes of the Commission under section 1 of the Communications Act. In event of war, or public peril or disaster, or other national emergency, special powers in connection with such communication are conferred upon the President by section 606 of that act.

Under this authority, the President in 1940 created the Defense Communications Board, which later became the Board of War Communications. Headed by the then chairman of the Commission, this board coordinated electrical communication facilities in the war effort. Having served its emergency mission, the board was dissolved in 1947.

Also during World War II, the Commission cooperated with the Army Air Forces in maintaining a constant vigil on the coasts, at times closing down radio transmissions which might have furnished bearing to enemy aircraft; and, with the Office of Civilian Defense, worked to guard vital communication facilities against sabotage.

Further, during that conflict, the Commission established a Foreign Broadcast Intelligence Service which monitored and analyzed broadcast programs from overseas for military and other Government agencies. Its own Radio Intelligence Division policed domestic frequencies. The latter located nearly 400 unlicensed transmitters, most of which, fortunately, did not involve espionage. Employing the same direction-finding equipment, it was able to furnish bearings to several thousand planes and vessels in distress. The FBIS was absorbed by the armed services in 1945 and the RID was merged with the Commission's Field Engineering and Monitoring Division the following year.

Despite the necessary freeze on new construction during World War II, operating broadcast stations—including some in the then new FM and TV services—continued to function. However, amateurs were required to cease operation for the duration, and some common carrier and other nonbroadcast radio facilities were diverted to temporary military and other government use.

The Commission is, of course, unable to publicly detail its current activities relating to the national defense. This is largely due to their classified nature, plus section 4 (j) of the Communications Act which, in effect, enjoins the Commission from publicizing information affecting the national security. However, in general, it can be reported that the Commission is cooperating closely with military and other Government agencies engaged in such work and with organizations and other elements of industry.

In particular, liaison is maintained with the communications divisions of the National Security Board and the Department of State. Further Government military and civil cooperation is effected through the Interdepartment Radio Advisory Committee and the Telecommunications Coordinating Committee.

Of special national defense significance during the year was the Commission's initiation, on March 23, 1950, of a proposed new Disaster Communications Service which would enable both Government and nongovernment stations to furnish emergency communication in event

of armed attack as well as during times of floods, earthquakes, hurricanes, and other disasters.

The Commission has long maintained regional disaster emergency coordination with the Coast Guard, Navy, Army, Air Force, Red Cross, amateurs, and State and municipal police organizations. Its established services include the Special Emergency Radio Service, for handling matters directly relating to public safety and the protection of life and property; the Civil Air Patrol, a civilian auxiliary of the Air Force whose stations are licensed by the Commission, and the Amateur Radio Service, which has long provided regional networks for emergency purposes and now has a military amateur radio system affiliated with the Army and Air Force.

The country's radio and wire installations which have been greatly augmented and improved since the last war, constitute an important and speedy media for Government and mass communication in time of national emergency. Indeed, no other nation is so well equipped with civilian radio facilities—facilities which can be used to help insure our national security in war as well as contribute to our efficiency, economy, convenience, and enjoyment in peace.

10. HEARINGS

The Commission, under the provisions of the Communications Act, cannot deny an application for new facilities or modify an existing authorization without affording an opportunity for a hearing. The great bulk of Commission hearings concern broadcast and are required in order to determine which of several mutually exclusive applications should be granted, and whether the facilities applied for would interfere with the operation of stations already authorized. Standard (AM) broadcast cases continue to predominate the Commission's hearing workload.

Applications may be disposed of in three ways: First, by a decision after hearing; second, by removal from the hearing docket and grant without hearing when the application has been amended to eliminate the conflict which necessitates a hearing; and, third, by dismissal of the application at the request of the applicant.

Docket statistics for the 1950 fiscal year follow:

	Pending June 30, 1949	Designated for hearing	Disposed of without hearing	Disposed of following hearing	Pending June 30, 1950
Broadcast	599	351	239	166	545
Safety and special	19	20	10	13	16
Common carrier	28	25	18	7	27
Other	9	2	3	1	7
Total	655	398	270	187	595

11. LICENSES AND OTHER AUTHORIZATIONS

The Communications Act limits licensing by the Commission to citizens of the United States. Further, it denies the license privilege to corporations in which any officer or director is an alien, or of which more than one-fifth of the capital stock is owned or controlled by foreign interests.

At the close of the year the Commission had more than 775,000 radio licenses and other authorizations outstanding, not counting over 220,000 associated portable and mobile units. The first mentioned figure is approximately 75,000 more than in 1949. Nonbroadcast radio services held over 155,000 authorizations as compared with 4,500 for the broadcast services. Amateur, commercial, and other operator authorizations together exceeded 615,000.

12. APPLICATIONS AND OTHER FILINGS

The Commission received more than 220,000 applications of all kinds during the year, which was about 4,000 less than in 1949. Nearly 150,000 of this total concerned amateur and commercial operators, some 63,000 were in the nonbroadcast services, over 6,200 were broadcast, and over 3,600 were from common carriers. These figures do not include legal filings, periodic reports, or common carrier tariff schedules. Common carriers and holding companies filed some 1,900 annual and monthly reports. Tariff schedules numbered 21,600.

13. CORRESPONDENCE, RELEASES AND PUBLICATIONS

Nearly 1,200,000 pieces of correspondence in the form of letters, telegrams, etc., were received or handled through the Commission's Mail and Files Branch during the fiscal year. Of this number, about 860,000 involved receipt and distribution of incoming messages, while outgoing messages exceeded 332,000.

Mimeographed public notices, orders, decisions, and opinions issued during the same period required about 521,200 stencils, 7,550,000 sheets of paper, and 11,367,000 impressions.

The Commission's printed publications are processed by the Government Printing Office and sold by the Superintendent of Documents. A list of those currently available from that source appears in the appendix.

CHAPTER II—COMMON CARRIERS

1. COMMON CARRIER REGULATION

The Commission regulates interstate and foreign communication by telephone and telegraph, whether by wire; ocean cable, or radio. Such communication which is purely intrastate in character is not, in general, subject to Commission jurisdiction.

Provisions of the Communications Act affecting common carriers reflect congressional policy that the public interest in adequate public communications service and reasonable rates is to be protected and promoted by Federal regulation.

Among the regulatory provisions of the act is the requirement that every subject common carrier furnish service upon reasonable request and at reasonable charges. No carrier may construct or acquire additional facilities, or curtail or discontinue service, without Commission approval. All charges, practices, classifications, and regulations in connection with interstate and foreign communication service must be just and reasonable and nondiscriminatory. To implement this requirement, the common carriers concerned file tariff schedules with the Commission, and those schedules are subject to review and regulation by the Commission.

The Commission regulates rates for interstate telephone and telegraph services, as well as rates for such services between the United States and foreign and overseas points. At the same time, it reviews the adequacy and quality of these services.

To aid its regulation of rates and services, the Commission is empowered to prescribe the forms of records and accounts kept by the carriers. Under this authority, it has established uniform systems of accounts for them to follow. Commission regulation in this respect includes the establishment and maintenance of original cost accounting, continuing property records, pension cost records, and depreciation records.

The Commission regulates the interlocking of officers and directors of common carriers, it being unlawful for any person to hold office in more than one carrier unless specifically authorized by the Commission. The Commission also passes upon applications of domestic telephone and telegraph carriers for authority to merge or consolidate.

The Commission licenses the operation of common carrier radio stations under provisions of the act which require the licensing of all radio transmitters.

The Commission receives applications to land or operate submarine cables connecting the United States with other countries, and advises the President with respect to the granting of such licenses, after receiving the approval of the Secretary of State.

2. DOMESTIC TELEPHONE

GENERAL

The development of the telephone industry in the United States reached new peaks. During the year ended December 31, 1949, the industry installed more than 1,850,000 telephones so that at the close of that calendar year a total of 40,600,000 telephones were in service of which 33,400,000, or 82 percent, were accounted for by the Bell system. The cost of additions to telephone plant by the industry amounted to well over $1,000,000,000, with the Bell system reporting total gross telephone plant investment of more than $9,430,000,000 as of December 31, 1949, as compared to $8,610,000,000 as of December 31, 1948.

Telephone conversations also reached a record high in the calendar year 1949 with the Bell system handling 43,000,000,000 local and 2,000,000,000 toll calls. Other services furnished by telephone companies, including teletypewriter exchange service (TWX) and private line services, likewise increased. Bell system revenues reached almost $2,900,000,000, an increase of $270,000,000 over the preceding year. The growth of the Bell system is evident from the following tabulation which shows selected data of the system on a consolidated basis for the prewar year of 1940 and the calendar years 1945 through 1949, inclusive:

Year	Number of telephones	Plant investment	Revenues	Employees
1940	17,483,981	$4,701,177,364	$1,174,322,517	275,317
1945	22,445,519	5,702,056,557	1,930,889,452	387,300
1946	25,709,458	6,294,419,079	2,093,664,941	496,438
1947	28,506,795	7,348,802,865	2,224,582,932	524,120
1948	31,364,493	8,618,842,204	2,624,827,067	546,723
1949	33,388,258	9,432,749,584	2,893,273,356	515,854

During the past year the telephone carriers continued the improvement of their facilities. The proportion of dial telephones in the Bell system increased to 73 percent by December 31, 1949, as compared with 68 percent a year earlier. Facilities for dialing of long-distance toll calls by operators are in service so that more than 800 cities and towns can be reached by this means and 30 percent of long-distance toll calls are handled in this manner. The speed of service in handling toll calls has improved. Television program transmission networks had been extended to most of the larger cities in the general area from Boston southward to Norfolk, as far west as St. Louis, and northward to Milwaukee, Detroit, and Buffalo. Demands for telephone service remained at a high level. Despite an increase of over 2,000,000 telephones in the past calendar year, the Bell system still had unfilled orders for over 750,000 more.

Earnings on interstate telephone operations showed a steady rise both in amount and in return on investment. On the other hand, many telephone companies are currently seeking permission of State regulatory authorities to increase further their rates for local exchange and intrastate toll service. As indicated more fully elsewhere in this chapter, the Commission has been called upon by various State commissions and municipalities to provide assistance in matters of mutual interest that are involved in State rate proceedings and, in addition, has been cooperating with the States through the National Association of Railroad and Utilities Commissioners (NARUC) in the study of telephone regulatory problems of common concern.

DOMESTIC TELEPHONE SERVICES

Construction of facilities.—The telephone companies expended over a billion dollars for new construction in the expansion, replacement, and modernization of exchange and toll plant. The bulk of this construction consisted of central office equipment, buildings, exchange lines, and station apparatus. Most of the additions to toll lines were provided through carrier systems, with a relatively small part through additions of physical lines.

During fiscal 1950 the telephone industry requested Commission authority to construct $19,330,168 in interstate wire and cable facilities. Besides six applications carried over from the preceding year, 161 applications were received during the year requesting authority to construct, acquire, extend, and lease wire facilities. The Commission approved 153 of these, including 141 for construction. The American Telephone & Telegraph Co., and certain associated companies, filed a blanket application and a supplemental application covering most of the construction to be undertaken by the Long Lines Depart-

ment during the calendar year 1950. This construction amounted to $12,093,000, of which $6,253,000 was authorized during fiscal 1950. The following table sets forth the amount of wire and cable construction authorized by the Commission during the past 7 years:

Fiscal year	Projects	Cost	Sheath miles of cable	Tube miles of coaxial units	Conductor miles of open wire
1944	121	$9,582,239	574.8	----------	7,968
1945	210	70,091,140	2,378.3	7,902	2,963
1946	239	78,896,450	3,193.8	16,580	12,261
1947	289	126,325,771	5,587.7	23,490	15,976
1948	348	127,162,499	2,637.5	46,080	16,373
1949	313	38,638,919	1,370.5	1,323	7,278
1950	141	13,230,678	399.3	----------	3,491

No authorizations for construction of coaxial cable were requested or granted during the year; however, some of the construction authorized in previous years had not been completed. The Bell system had 8,330 route miles of coaxial cables installed, the principal routes consisting of a transcontinental link from New York to Florida and on to the west coast; a route from New York, through Philadelphia, Pittsburgh, Cleveland, Chicago, St. Louis, and Memphis to join with the transcontinental line at Jackson, Miss.; and a number of shorter routes supplementing these as well as other long-distance facilities.

During the 1950 fiscal year, the Bell system added about 1¼ million toll message circuit miles to its facilities, an increase of 6½ percent over circuit mileage in service at the beginning of the year. About 90 percent of the channels added during fiscal 1950 were provided by carrier systems. Only a few of the emergency type EB carrier systems were authorized by the Commission during the year.

Microwave relay systems.—The establishment of microwave radio relay stations for providing intercity television program transmission, telephone and telegraph services has assumed an important role in modern communication. Although the use of microwave for transmission over extensive intercity radio relay systems is still, relatively, in its infancy, telephone carriers' experience has proven the reliability of this medium.

During the latter part of the fiscal year the Commission granted construction permits to the American Telephone & Telegraph Co. for a microwave system consisting of 55 stations to be located between Omaha, Nebr., and San Francisco. This is the final link in its New York-San Francisco microwave relay route which is expected to be completed by January 1, 1952. The New York-Chicago link of the transcontinental system has been completed and scheduled to be available for television service on September 1, 1950. Construction of the links between Chicago and Omaha was well under way at the end of

fiscal 1950 and it is expected that television service between these points will be available by the end of September 1950. Construction of the link between Des Moines and Omaha was progressing with the expectation that TV service will be available on that circuit by April 1951. In addition to providing television service, the Omaha-Denver link will be used at the outset to furnish toll telephone service.

The magnitude of the project may be illustrated by the fact that the total initial cost of the transcontinental system is estimated by the A. T. & T. to be $37,590,000, and will include more than 100 microwave relay stations. The over-all facilities are capable of providing channels for both intercity television and telephone service.

At the eastern end of the transcontinental circuit, A. T. & T.'s New York to Boston microwave system was used for television relay operation throughout the year. At the western terminus, The Pacific Telephone & Telegraph Co. completed construction of its Los Angeles to San Francisco microwave system and intercity TV service over this latter system was planned for the fall of 1950. A number of additional intercity microwave relay systems of Bell system companies were in use or were under construction to supplement existing facilities or to join additional cities to the television network system. All of these facilities are being installed initially for TV service, but are expected to provide an important part of the future toll telephone network.

Channels for TV program transmission.—The fourteenth and fifteenth annual reports referred to the investigation and hearing instituted by the Commission on April 28, 1948 (docket 8963) into the lawfulness of rates, regulations, practices, and services of A. T. & T. and Western Union in furnishing intercity channels and facilities for the transmission of the video portion of TV programs. On December 23, 1949, the Commission issued its final report on the issue involving the reasonableness of the restrictions contained in the Bell tariffs regarding interconnection of its facilities with the facilities of others. It required the Bell system companies and Western Union to connect their intercity video transmission channels with private microwave relay facilities authorized by this Commission, pursuant to its policy of permitting private intercity video transmission by TV broadcasters pending availability of adequate common carrier facilities. Hearings on the remaining issues were to be held in the future.

Concurrently with the issuance of its report in docket 8963, the Commission instituted an investigation on its own motion to determine whether or not it is necessary or desirable in the public interest to require interconnection of the intercity video transmission facilities of the Bell system companies with existing and proposed intercity video transmission facilities of Western Union (docket 9539). Hearings were completed on June 30, 1950.

Speed of service.—The speed of service on telephone toll calls is a measure of the time interval from the appearance on the recording signal at the originating toll board to the start of conversation or, in the case of person-to-person calls, to a report of delay in reaching the desired party, including calls encountering such a report of delay as a "busy" or a "don't answer" at the called station. The average speed of service required to complete a toll call on the Bell system was 1.6 minutes during June 1950, compared to 1.7 minutes in June 1949 and 2.1 minutes in June 1948. The increase in the number of toll channels, additional toll board facilities, expansion and conversion to dial of the exchange plant, more efficient personnel, and dialing of toll calls by operators have had a marked effect upon the improvement in the speed of service.

Discontinuance, reduction, or impairment of service.—The Commission received four applications for authority to discontinue telephone service, of which two were granted during the year and two were pending on June 30, 1950. The two applications granted were filed by the Bell system; one to discontinue local exchange service in Kelsey, Calif., and establish toll stations and toll service stations in lieu thereof, and the other to discontinue exchange service at Clifton, Tex., where another carrier planned to provide the same service.

The joint application filed during fiscal year 1949 by Western Union to discontinue its public message toll, private line, and program telephone service; by the A. T. & T. and certain Bell system companies to acquire the telephone business and certain telephone property of Western Union located in 30 States; and by the Pacific Telephone & Telegraph Co. and the Bell Telephone Co. of Nevada to discontinue all message telegraph service rendered by them in California, Oregon, Washington, Idaho, and Nevada (docket 9235) was the subject of extensive formal proceedings during fiscal 1950.

The application represented a consummation of negotiations between the parties over a period of several years. Western Union acquired the telephone business from Postal Telegraph & Cable Co. at the time of merger of that company with Western Union in 1943. As of July 1, 1949, Western Union was furnishing message toll telephone service to 2,559 subscribers in 157 cities. The Pacific Co. and Bell of Nevada now provide message telegram service throughout their territories. On July 28, 1950, the initial decision of the hearing examiner recommending approval of the application was issued.

Domestic Public Land Mobile Radio Service.—The Domestic Public Land Mobile Radio Service provides communication service for hire. primarily between fixed points and mobile units on land. Secondarily, the service is afforded to vessels and remote fixed points, and, under some circumstances, a nontelephonic signaling service is offered. This

service is of two general classes: that furnished by land line telephone common carriers and which connects with the land line telephone system; and that furnished by others than the land line telephone companies which does not provide direct connection with the land line telephone system.

This service was established on a regular basis as of July 1, 1949, following several years of developmental experimentation. During its first year of regular operation, the service showed a steady expansion and growth with authorizations granted to cover service to nearly 24,000 mobile units. Authorizations for mobile radiotelephone systems in 158 cities had been granted to the miscellaneous or nontelephone company carriers. Telephone company carriers also received authorizations for such systems in 158 cities. However, the number of communities actually receiving mobile radiotelephone service was considerably larger because the service range of the licensed facilities often extends to additional communities beyond the physical location of the base station.

The need for additional frequencies for this service has become increasingly evident because of the widespread public acceptance of, and demand for, the service. In the larger cities, the telephone company carriers have a substantial backlog of orders for service which they are unable to provide on the available frequencies. Also, in such areas, the number of miscellaneous common-carrier applicants for facilities in this service usually exceeds the number of frequencies available for assignment.

To meet the problem of expanding frequency space for the service, two separate steps were taken during the latter part of fiscal 1950. First, in docket 8736 et al., in connection with the television proceedings, the Commission conducted hearings to determine whether an allocation of 30 megacycles of frequency space between 470 and 500 megacycles could be provided for the development of a broad band multichannel system of public mobile operation from which there might be derived as many as 150 additional two-way communications channels. No decision had been reached in this matter. The second step was the proposal, on May 12, 1950, in docket 9648, to establish a policy of effecting adjacent channel assignments (60 kilocycle separation) to the miscellaneous carriers in lieu of the present practice of making assignments on an alternate channel basis (120 kilocycle separation). No final determination had been made on that proposal.

Much interest has been manifested by the carriers in providing radio communication service to mobile stations on board vessels, on a secondary basis, through the facilities licensed for operation in the Domestic Public Land Mobile Radio Service. Thus, many of the car-

riers serving areas contiguous to navigable waters have requested authority to provide service to vessels. A number of such special authorizations have been granted where it has been shown that there is a need for this service and that it would not degrade primary service to land vehicles in the area. The grant of authority to provide service to vessels is made subject to the condition that it must be discontinued within 60 days after the establishment of a VHF [very high frequency] public maritime mobile service in the area.

A large number of nontelephone company carriers filed applications for authority to establish one-way signally or "radio-paging" operations. The receivers for this type of service vary in size from a small unit which can fit into the subscriber's pocket to a large packaged unit to be installed in vehicles. Thus, a subscriber to this service may be contacted while on the golf course, while fishing, or at other locations within communication range.

At the end of the fiscal year, the Commission proposed rule-making in docket 9732 to provide a new simplified and short annual report form to be used by the nontelephone company common carriers in this service in lieu of their use of the more comprehensive FCC annual report Form M.

Rural Subscriber and Short Haul Toll Radiotelephone Services.—There was an increase in activity in the Rural Subscriber and Short Haul Toll Radiotelephone Services. These services are designed to provide short distance radiotelephone service in areas where rugged terrain, etc., make it impracticable to construct wire lines. The communication range of such operations is generally line-of-sight or about 20 to 25 miles.

The Rural Subscriber Radiotelephone Service was intended to provide a point-to-point radiotelephone service to miners, farmers, ranchers, etc., located in remote areas where wire line facilities are not available. A substantial number of requests for such authorizations have been granted. In several instances, authorizations have been issued to provide radiotelephone service to off-shore islands.

The Short Haul Toll Radiotelephone Service is used by the telephone companies to bridge gaps in toll telephone wire lines where direct wire interconnection is not economically feasible because of the intervening terrain.

Service in Hawaiian Islands.—The Mutual Telephone Co. furnishes interisland radiotelegraph and radiotelephone service in the Territory of Hawaii. Much of its service is provided by means of point-to-point telegraph and telephone radio stations operating on frequencies in the 152–162 and 30–50 megacycle ranges. Features of these systems include simultaneous telephone and telegraph operations on a single frequency and interisland dialing.

Coastal and Alaskan service.—Coastal harbor, coastal telephone, and Alaskan radiocommunications, though largely authorized on a common carrier basis, are discussed in the separate chapter on "Safety and Special Radio Services" because of their close relationship to radio aids for the safety of life and property.

Cable landing licenses.—During the fiscal year, upon the recommendation of the Commission, the President granted two cable landing licenses. The first license covered a private telephone line across the Rio Grande River near Presidio, Tex., to connect with the Bell system. The second license authorized the Cuban American Telephone & Telegraph Co. to amend its present presidential license covering four submarine cables between Key West, Fla., and Havana, Cuba, to include the landing and operation of two additional submarine cables between these cities.

Foreign attachment cases.—Hearings on the complaint of *Hush-A-Phone Corp. et al.* v. *American Telephone and Telegraph Co., et al.* (docket 9189), which attacked as unlawful the so-called foreign attachment provisions in the defendants' tariffs insofar as such tariffs are construed by the telephone companies to prohibit the subscribers' use of the Hush-A-Phone device in interstate and foreign telephone service, were concluded January 26, 1950. The matter was awaiting issuance of an initial decision by a hearing examiner.

The complaint of *Jordaphone Corporation of America* and *Mohawk Business Machines, Inc.* v. *American Telephone & Telegraph Co., et al.* (docket 9383) requested the Commission to declare the defendants' foreign attachment tariff provisions unlawful insofar as they are construed to prevent subscribers' use of Telemagnet, an automatic telephone answering device. Other manufacturers of telephone answering devices participated in the proceeding. Hearings were held April 25 through 28, 1950, and were adjourned until October to permit laboratory and field testing of telephone answering devices. In addition, on June 8, 1950, the Commission instituted an investigation on its own motion into the use of telephone answering devices in connection with interstate and foreign telephone service under broadened issues (docket 9701). Both proceedings were designated for joint hearing.

On March 23, 1949, the Commission dismissed the complaint of *Walter S. Berkman et al.* v. *American Telephone & Telegraph Co., et al.* (docket 9100), which requested the Commission to require the defendants to furnish a call waiting indicator device to signal when another call is coming in on the line at the same time. However, the matter was being given further study in connection with a petition filed by the complainant for reconsideration.

RATES AND TARIFFS

Rate schedules.—At the close of the year, 232 telephone carriers had tariffs and concurrences on file with the Commission, an increase of 49 over the previous year. This increase is accounted for principally by new carriers in the Domestic Public Land Mobile Radio Service. During the year, a total of 15,685 tariff publications establishing or changing rates, regulations, practices, and classifications of service were filed.

Special permissions.—Thirty-five applications for special permission to make changes in the tariffs or to file new tariffs to become effective on less than statutory notice or involving waiver of certain rule requirements were received. Of these 31 were granted and four were denied.

Unlawful use of telephone facilities.—In connection with the general problems of the use of electrical communication facilities for unlawful purposes, the Commission actively cooperated with law-enforcement agencies during the year. The Commission was represented at the Attorney General's Conference on Organized Crime, and its representatives were active on the conference's committee on legislation. Members of the Commission's staff participated in the drafting of legislation aimed at prohibiting the use of communication facilities for gambling and other unlawful purposes.

Reference was made in last year's annual report to tariff regulations filed by the Bell system companies to the effect that service is furnished subject to the condition that it will not be used for an unlawful purpose, and that service will be discontinued if any law enforcement agency acting within its jurisdiction advises that such service is being or will be so used in violation of law. On November 10, 1949, a complaint was filed by Harry Katz and Bertha B. Katz against the Chesapeake & Potomac Telephone Co. and the American Telephone & Telegraph Co. alleging that such tariff provisions constitute a denial of free speech, a denial of complainants' rights without due process of law, and are unjust and unreasonable and contrary to the public interest. The matter was awaiting the issuance of an initial decision by a hearing exminer.

Studies of Long Lines operations.—In the fifteenth annual report, reference was made to the series of studies which the Commission initiated with respect to all phases of the operations of the Long Lines Department of American Telephone & Telegraph Co., with the view to developing a comprehensive report to provide a more adequate basis for determination of matters involving the earnings or revenue requirements of Long Lines. During the fiscal year, progress was made towards the completion of several important portions of the study, with particular attention being given to such matters as depreciation,

working capital requirements, Western Electric prices, license service charges, pension and benefit payments, and summaries of investment and operations.

Toll rate study.—As also noted in the previous annual report, a cooperative committee consisting of staff members of this Commission and State commissions was appointed early in 1949 to study the toll rate problem presented by the fact that rates for the intrastate message toll service are, in many instances, higher than the rates for interstate message toll service for comparable distances. The study contemplates collection and analysis of available data and information relating to the development of intrastate and interstate message toll telephone rates, and to the technical and economic ramifications of the toll rate problem. The working committee held a number of sessions extending over several weeks and a comprehensive report was in the process of preparation.

Separation of property, revenues, and expenses.—Although the joint cooperative committee composed of Commission staff members and the State regulatory commissions is still functioning to review principles and methods employed in the separation of telephone property, revenues, and expenses, there were no activities of this committee during fiscal 1950. The Bell system continues to use the separations manual prepared by the committee in 1947, for effecting separations of telephone plant investment, expenses, and revenues among exchange, interstate toll, and interstate toll telephone services in connection with its State rate cases and also in connection with the division of its interstate message toll telephone revenues among its participating operating units. A recent development was that starting early in 1950 the companies' practices were changed to make separations directly on a station-to-station basis, according to the principles and methods prescribed in the separations manual, as against the former practice of first effecting a complete board-to-board separation, which is then supplemented by a station-to-station increment based on certain selected factors. The Commission continued to study the application of the separations methods by the Bell system to the division of its interstate message toll telephone revenues, which is of particular importance in determining the level of earnings from interstate service. The matter of separations continues to be of increasing importance in rate considerations and is, of course, given added impetus by its inclusion as a factor in the cooperative study relating to rates covering intrastate and interstate toll services.

Western Electric cost and price review.—As noted in the fourteenth and fifteenth annual reports, a cooperative committee of Commission staff members and State commissions was appointed in January 1948 to review the matter of prices, costs, and profits of Western Electric

Co., Inc. This was prompted by the fact that Western Electric is the manufacturing and supply unit of the Bell system, and the prices it charges the Bell operating companies for equipment, supplies, and services exert a considerable influence on rates and charges for telephone exchange, and State and interstate toll service. Sales to Bell companies by Western Electric amounted to about a billion dollars for each of the years 1947 and 1948 and declined to about $760,000,000 in the calendar year 1949. Following its initial comprehensive report in 1948, the committee has issued supplemental periodic reports bringing the data up to date.

Since the inception of these studies, Western Electric has made several adjustments in its prices, the net effect of which has been to reduce prices on articles it manufactures by approximately 13 percent, a cumulative reduction of about $130,000,000 by the end of 1950. Besides the indicated effect of Western Electric's prices, the committee's studies have been of value to various States in connection with Bell applications for increases in intrastate telephone rates.

State telephone rate cases.—At the request of State regulatory commissions, as well as some municipalities, assistance was rendered to the extent possible and consistent with the available staff personnel and budget, on common problems in connection with State telephone rate cases. Such assistance included advice, consultation, and furnishing information concerning such matters as depreciation rates and charges, pension accrual rates and costs, procedures for allocation of telephone plant, and revenues and expenses between various services and jurisdictions. Some of these studies were conducted cooperatively with State commissions and testimony was presented by Commission staff members.

OTHER REGULATORY MATTERS

Depreciation.—On the basis of studies completed during the year, the Commission, pursuant to the requirements of section 220 (b) of the Communications Act, prescribed annual depreciation rates for the following telephone elements of the Bell system: the Long Lines Department of A. T. & T.; New Jersey Bell; and the three Chesapeake & Potomac companies serving in the District of Columbia, Maryland, and Virginia. The prescribed rates resulted in annual depreciation expense charges amounting to $61,410,000 and represented a total reduction of $7,233,000, or 10.5 percent from the annual charges based on the rates in effect prior to the Commission action. To date the Commission has prescribed depreciation rates for eight Bell companies including the Long Lines Department, out of a total of 22 Bell companies. Studies necessary for prescribing depreciation rates have been completed for one additional Bell company, and are in progress with respect to three more Bell companies.

Provision for plant depreciation by domestic telephone carriers reporting to the Commission through charges to operating expenses continued an upward trend during the year in spite of substantial reductions effected in annual depreciation rates of several of the Bell system companies. These expense charges during the 12 months ending April 30, 1950, in the case of 22 Bell companies, including the Long Lines Department of A. T. & T., aggregated over $328,660,000, an increase of $34,553,000, or 11.7 percent over the charges for the previous 12 months. During the same period, 32 other large telephone carriers (independent systems) made depreciation provisions amounting to $16,100,000, an increase of $1,452,000, or 9.9 percent over the provisions for the previous 12 months. This increase was almost entirely due to the large increase in telephone plant, including expansion of existing manual switchboard facilities scheduled for replacement by dial equipment in the near future, which require high depreciation rates for that reason.

Annual depreciation expense of the Bell system companies during the year amounted to 17 percent of their operating expenses before Federal income taxes, as compared with less than 16 percent for the previous year.

Allocation of depreciation reserves of multistate companies.—Cooperative studies by Commission and the Southeastern Association of Railroad and Utilities Commissioners, to serve as a basis for allocating the Southern Bell Telephone & Telegraph Co.'s depreciation reserve among the nine States served by it, were undertaken at the request of that association (see fifteenth annual report). Because of substantial changes in plant composition resulting from a large construction program carried on by the company during the year, the studies were continued with the view to reflecting such changes in the reserve allocation on an equitable basis.

NARUC Committee on Depreciation.—The Commission participated in the meetings and activities of this committee, whose function is to coordinate and consider the accounting, engineering, and economic aspects of depreciation as related to the various utilities subject to jurisdictions of Federal and State regulatory bodies. The committee was preparing a report on remaining life depreciation accounting, and a digest of recent State and Federal commission cases and court cases involving important phases of depreciation.

NARUC Committee on Accounts and Statistics.—The Commission also participated in the meetings and activities of this committee, whose function is to formulate proposed changes in uniform systems of accounts, annual report forms, preservation of records regulations, and related accounting regulations, as well as amendments to, and interpretations of, such regulations, in order that substantially uniform

accounting requirements may be submitted for adoption by the several State and Federal regulatory agencies. A subcommittee, whose chairman is a staff member of the Federal Communications Commission, has the task of proposing revisions of the regulations with respect to the establishment and maintenance of continuing property records by large telephone companies.

Financing and refinancing.—Collaboration has continued with the Securities and Exchange Commission in the review of prospectuses required to be filed with that commission in connection with issuance of securities by telephone companies.

Pensions and relief.—Although there was a decrease in the number of employees, raises in wages, and further liberalization of minimum pension benefits resulted in continued increases in relief and pension costs to telephone carriers. For the Bell system, including manufacturing and research activities, the number of employees declined to 593,900 as of December 31, 1949 as compared with 656,500 at the beginning of the year, and pension and other benefit costs amounted to $137,000,000, excluding social security taxes which amounted to approximately $27,000,000. Due to the substantial amount of and the continued increase in pension costs, problems of pension accounting, and the determination of the reasonableness of methods pursued and resulting amounts, are of importance. These problems received detailed attention during the year and studies were continuing.

Preservation of records.—On September 28, 1949, the Commission proposed a complete revision of its rules for the preservation of records by telephone [also telegraph] carriers. The changes are designed to improve records-management procedures and to provide reasonable retention periods for records currently maintained by the several carriers. They were developed by members of the staff in cooperation with representatives of the Bureau of Standards, Bureau of the Budget, National Archives, State and Federal regulatory commissions, and the several carriers. Recognition is given to such modern record-preservation methods as microfilming, tabulating cards, humidified storage, etc. Final action by the Commission was pending at the end of the year.

Restatement of plant accounts on basis of original cost.—Joint studies with State commissions were completed with respect to the reclassification of accounts on the basis of original cost by two of the larger independent telephone companies, and similar studies were initiated for another independent telephone company. Restatement of the present investment at original cost by telephone companies was well advanced, except for a few important instances that apply to earlier years, and an attempt is being made to complete these as rapidly as circumstances permit. Action was also taken to approve the state-

ment of a number of plant acquisitions at original cost in the case of several other carriers.

Annual report Form M (applicable to class A and class B telephone companies).—A number of more urgent revisions were made in this form for use for the calendar year 1949 by the simplification and clarification of the reporting requirement of a number of schedules, and by eliminating some schedules. A further revision of the form was being studied.

Annual report Form H (holding companies).—This report form is applicable to persons immediately controlling communication common carriers. It was revised for the calendar year 1949 by eliminating a number of schedules which were found to require information not presently needed by the Commission.

3. DOMESTIC TELEGRAPH

GENERAL

During the latter months of the fiscal year, The Western Union Telegraph Co. reported increases in revenues and volume of business, reversing the downward trend that has been experienced over the past several years. Up to that time the rate increases granted in 1946, approximating 25 percent and which might have been expected to produce revenue benefits, had been offset by declining traffic volumes. Western Union reported net income of $2,687,000 for the first 6 months of 1950 from system operations. For the calendar year 1949, it reported a net loss of $4,390,000 from operations, with extraordinary and nonrecurring income items reducing the net loss to $2,500,000. This is made up of a net loss of $3,468,249 applicable to the land line system and a profit of $968,000 applicable to the overseas cable system. The company's improved operating experience is due principally to a reduction in revenue deductions made possible by its modernization and economy programs.

In October 1949, Walter P. Marshall, president of Western Union, forwarded to Senator McFarland, chairman of the Communications Subcommittee, Committee on Interstate and Foreign Commerce, United States Senate, a recommendation for future communication policy. The program advanced to improve Western Union's position was (1) elimination of the 25 percent excise tax, (2) subject to the determination of a fair rate base, the acquisition by Western Union of the telegraph business of the telephone companies, (3) the setting up of an integrated system of domestic communications for the Government, (4) consolidation and merger of international telegraph carriers, and (5), to the extent private capital might not be available to insure accomplishment of these objectives, long-term Government financing to be provided.

SERVICES AND FACILITIES

Western Union modernization program.—Western Union's modernization program insofar as it relates to reperforator switching at relay offices, was nearing completion. The last of 15 such offices was being installed at Portland, Oreg. The improved mechanized system results in reduced handlings and permits faster over-all service between points of origin and destination. In terms of cost, Western Union had expended, as of December 31, 1949, $40,000,000, or 56 percent of the $72,000,000 estimated total cost of plant and equipment to be added under the program. The construction of the large terminal reperforator offices planned at New York, Chicago, and Washington had not yet been started. According to company estimates, the remaining $32,000,000, or 44 percent of the expected costs for completion of the modernization program, will be expended in the next 8 years as follows: Reperforator equipment, $12,000,000; carrier equipment, $9,000,000, and the microwave relay system, $11,000,000.

Deskfax and facsimile.—Western Union continued the development and use of the facsimile process for terminal handlings of telegrams. "Deskfax" instruments to the number of 1,861 were in use by customers in nine cities. These machines provide two-way transmission of messages in picture form between customers' premises and the central telegraph offices. In addition, 191 larger types of facsimile machines known as "Telefax" were in customer offices and a number of others were being used in branch and agency offices.

Construction of wire facilities.—The year brought 25 requests covering wire telegraph construction and extensions. Two such applications were carried over from the preceding year, making a total of 27. One was withdrawn and 25 granted. Those granted covered the leasing by Western Union of 198,800 telegraph channel miles of line at an annual rental of $364,954 and the construction of 30,856 telegraph channel miles of line and associated equipment at a cost of $2,133,797.

Speed of service.—The quality of domestic telegraph service rendered by Western Union showed some improvement over the preceding year. The origin to destination speed of service (the interval from the time a message is filed to the time it is delivered, or first attempt) for fiscal years 1949 and 1950 and the average time required to relay a message through a large message center is shown in the following table:

Origin to destination	Average speed in minutes	
	1949	1950
Delivered by:		
Telephone	41	41
Messenger	47	46
Private tie-line	39	37
Office relay drag	11.5	9.9

Microwave relay system.—The microwave radio triangle connecting New York, Washington, and Pittsburgh, and the link between New York and Philadelphia, were being operated on a full-time basis carrying telegraph traffic formerly transmitted over wire line facilities. Western Union plans to expand its microwave facilities and has acquired tower sites extending as far west as Kansas City and southward to Atlanta, a total of 3,527 route miles. In hearings in docket 9539, in the matter of the establishment of physical connections and through routes and charges applicable with respect to intercity video transmission service (see telephone section), Western Union introduced plans to provide TV transmission service over some of these routes. The furnishing of this service is dependent, in part, on the outcome of this proceeding.

Discontinuance or reduction of telegraph service.—During the year, 1,093 applications for reduction of office hours or closure of public offices were filed. In addition, 214 such applications were pending at the beginning of the year. With few exceptions, these applications were filed by Western Union. Of the total, 1,060 applications were granted, 16 were withdrawn, and 231 were pending at the close of fiscal 1950. Generally, where hours were reduced or offices closed, alternate service was made available. With respect to applications where the matter of employee protection was raised, the Commission, pending formulation of a general policy on the matter, reserved jurisdiction to consider the question of whether conditions should be imposed for the protection of employees who may be adversely affected.

The Commission on January 18, 1950, issued its final report and order in docket 8088 in which it granted the application of Western Union for authority to close permanently a branch office in Dallas, Tex. In so doing, the Commission reserved jurisdiction to consider whether conditions should be imposed for the protection of employees who may have been adversely affected by discontinuance of the office.

The joint application filed during fiscal 1949 by Western Union to discontinue its public message toll, private line, and program telephone service; by the American Telephone & Telegraph Co. and certain Bell system companies, for authority to acquire the telephone business and certain telephone property of Western Union located in 30 States; and by the Pacific Telephone & Telegraph Co. and the Bell Telephone Co. of Nevada, for authority to discontinue all message telegraph service rendered by them in California, Oregon, Washington, Idaho, and Nevada, was the subject of extensive formal proceedings during fiscal 1950. (See telephone section.)

RATES AND TARIFFS

Rate schedules.—At the close of the fiscal year, 70 domestic telegraph carriers had tariffs or concurrences on file with the Commission.

During the year, Western Union, the principal domestic telegraph carrier, filed 865 tariff publications establishing or changing rates, regulations, practices, and classifications of service, including concurrences.

Special permissions.—During the year, 15 applications for special permission to make changes in tariffs or file new tariffs to become effective on less than statutory notice, or involving waiver of certain requirements of the Commission's rules, were granted.

Western Union domestic rates.—Western Union revised its interstate telegraph message rate structure, effective February 1, 1950. The revised rate structure is the result of a long and intensive study made by Western Union at the suggestion of the Commission, and represents a major step toward the rationalization of interstate telegraph rates (see fourteenth and fifteenth annual reports). The new rate pattern establishes uniformity in rates for the transmission of messages over equivalent distances between points within the United States, and so eliminates the geographical inequalities in Western Union's former charges, wherein substantially different rates applied between different pairs of points the same distance apart.

Minimum message charges and additional word rates for all classes of domestic message telegraph service were revised. The establishment of a minimum message charge for any nondeferred telegraph message, including press telegrams, of 35 cents, and a minimum message charge for a deferred message or a night letter of 30 cents corrects the apparent inequalities in the former minimum message charges which, in the case of press telegrams, were as low as 12 cents. Although the new rate structure, wherein the rate steps are based on airline distances, produces increased charges in some cases and reduced charges in others, special traffic repricing studies by Western Union indicate that no material change in revenues will result.

Baseball-sports service by message and direct wire.—As reported in the fifteenth annual report, Western Union on March 1, 1949, filed new tariff schedules, effective April 18, 1949, revising charges and regulations applicable to the furnishing of baseball-sports service by message and direct wire. Following a complaint of a radio broadcaster concerning these revisions, insofar as they imposed an additional charge for service to subscribers who engage in network broadcasting, the Commission, on its own motion, entered into an investigation of the matter (docket 9286). After public hearings, the Commission on May 15, 1950, concluded that the additional charge imposed by Western Union for each station in a subscriber's network using baseball-sports service was an unlawful discrimination and charge within the meaning of the Communications Act. In compliance with the Commission's order, Western Union on May 29, 1950,

filed revised tariff provisions, effective June 1, 1950, which eliminate all restrictions and additional charges for each station in a radio network other than the subscribing station.

OTHER REGULATORY MATTERS

Depreciation.—Since prescription of depreciation rates applicable to the various classes of Western Union's land lines plant in February 1948 and April 1949, pursuant to the provisions of section 220 (b) of the Communications Act, a review was made of the application of the company's rates in its accounts. Particular attention was directed toward the manner in which the rates, which had been prescribed for plant classifications that were in existence before the current system of accounts became effective, were applied to the balance in the accounts as classified under the presently effective system of accounts.

Relief and pensions.—Western Union provides for pensions and relief on a "pay as you go" basis. Matters given consideration by the Commission during the fiscal year were, chiefly, minor changes in, or variations of, Western Union's pension plans respecting employees transferred incident to the sale of telegraph lines to the railroads.

Reclassification of plant accounts.—Western Union completed the restatement of its accounts on the basis of original cost, in accordance with the requirements of the currently effective uniform system of accounts, as to all plant and equipment not previously reclassified (principally that used in rendering international telegraph service) and the reclassification adjustments were recorded in its books of account. Examinations and investigations by the Commission's staff were undertaken, and are expected to continue into fiscal 1951, to verify the entries and to determine the reasonableness and propriety of the reclassification methods, computations, and amounts.

Continuing property records.—The completion of Western Union's restatement of its accounts on the basis of original cost and the complete establishment of continuing property records permitted the initiation of comprehensive studies for verification of the form and contents of these records and the evaluation of the effectiveness of continuing property record procedures as to both land lines and cable plant.

Uniform system of accounts.—The operating revenue accounts included in the system of accounts which became effective January 1, 1943 (part 35 of the Commission's rules), were designed to reflect the several sources of revenues of wire-telegraph and ocean-cable carriers as then existing. During fiscal 1950 these accounts were revised in order to provide changes occasioned by progress in the art of telegraph communication and to provide uniformity in the operating revenue accounts of all types of international telegraph carriers.

Retirement units.—At the time of promulgation of part 35 (Uniform System of Accounts for Wire-telegraph and Ocean-cable Carriers) the matter of prescribing a list of retirement units under section 35.1–6–1 was deferred pending a review by the carriers of the prescribed accounting and an inventory of the property as reclassified under the newly prescribed plant accounts. An amendment was adopted in 1946 which incorporated a list of retirement units for outside plant and work equipment as a part of section 35.1–6–1. Another amendment was made during fiscal 1950 which incorporated in section 35.1–6–1 a list of retirement units for inside plant. This completed the list for wire-telegraph and ocean-cable carriers.

Report forms.—Annual report Form O for wire-telegraph and ocean-cable carriers, classes A and B, was revised for filing information for the calendar year 1949. The revisions simplified and clarified the reporting requirements of a number of the schedules and deleted a substantial number of other schedules. The amendments were designed to reflect the improvements which had been developed by an interdepartmental staff committee which started functioning in 1948 for the purpose of improving the statistical program of the Commission.

Form 905A, "Monthly Report of Revenues, Expenses and Other Items," applicable to certain wire-telegraph carriers, was rescinded during the year for a new form, No. 905. A number of revisions were incorporated in the latter to bring it into conformity with other monthly report forms of the Commission.

Preservation of records.—At the end of the fiscal year final action by the Commission was pending with regard to promulgation of new preservation of record rules [see page 40].

4. INTERNATIONAL TELEGRAPH AND TELEPHONE

GENERAL

For the fourth consecutive year the volume of international telegraph traffic handled by the United States cable and radiotelegraph carriers showed a decrease. During the calendar year 1949 such carriers handled a total of 513,175,244 paid words, a decrease of 8.7 percent from the 1948 volume. Traffic out-bound from the United States decreased 8 percent for 1949 as compared with 1948, while traffic in-bound to the United States decreased 9.4 percent from the volume handled in 1948. However, during the latter part of June 1950 this downward trend was reversed.

Despite this decrease in the volume of traffic handled, the total revenues realized by the United States international telegraph carriers (after pay-out to foreign correspondents) in 1949 was $33,500,000, an increase of 0.4 percent over 1948. This was due to the increases in

out-bound rates authorized by the Commission on April 22, 1948 and January 26, 1949, in the proceedings in the international rate case (docket 8230) which resulted in an increase of approximately 9 percent over 1948 revenues from such out-bound traffic. However, revenues from in-bound traffic to the United States showed a decrease of 6.9 percent from the previous year.

International radiotelephone calls, and the revenues derived therefrom by United States telephone carriers, showed an increase for 1949 as compared to 1948. Chargeable calls reached 647,052 in 1949, an increase of 8 percent over the previous year, while revenues (including land line charges) were $7,058,321, an increase of 4.7 percent over the previous year.

INTERNATIONAL SERVICE

Telegraph circuits.—A total of 74 foreign countries and United States territorial possessions were served by direct radiotelegraph circuits from the United States, and 7 additional foreign countries were served via the Tangier, North Africa, relay stations of United States radiotelegraph carriers. In addition, a number of countries in the Far East, not reached by direct circuits, were served via relay stations operated by United States carriers at Manila, Philippine Islands. Most other points in the world were served through connections with the facilities of foreign carriers. In the past year, United States radiotelegraph carriers transmitted program material originating with the United Nations and the Department of State to approximately 30 foreign countries.

A new two-way, customer-to-customer overseas radio teleprinter exchange service (TEX) was inaugurated May 15, 1950, between teleprinter stations in New York City and The Netherlands. In rendering this service, the radiotelegraph carrier (RCA Communications, Inc.), does not undertake to transmit messages in the usual "telegram" form, but furnishes its facilities to customers for the direct exchange of telegraph dispatches. This permits the transmission of communications in each direction alternately, rather than simultaneously in both directions, at a speed of approximately 60 words of 5 characters per minute.

Telephone circuits.—Radiotelephone message toll service was in effect with 87 foreign countries and United States territorial possessions. Fifty-six of these countries were served directly, and the others were served through connecting carriers. Private line service was available to 8 foreign countries, and program transmission service was furnished by Bell system companies to 56 foreign countries.

Frequencies.—The continued demand for additional frequency assignments in the range suitable for international communications

by both Government and nongovernment users makes it increasingly difficult to clear frequencies for assignment to licensees in the fixed public service. The demand for frequencies is greatest from the radiotelephone carriers because of the increased use of such international communication.

Equipment and operating techniques.—A total of 21 new transmitters was added during the year to stations in the international fixed public service. The radiotelephone service led in plant expansion with the addition of 15 new transmitters, 8 which were of the single sideband type.

Experimental authorization was granted for the transmission of four voice channels by the use of the single sideband technique. The band width required for the four channels represents a saving in spectrum space per channel over the three channel systems presently in use. Authority was also granted on a temporary basis for the use of narrow band frequency modulation for program transmission. It is believed that a more reliable service can be rendered in this manner without increase in band width requirements over those required for the amplitude modulation presently used for this service. Another development during the year was the transmission of two telegraph channels on a single carrier frequency by means of a composite emission consisting of a simultaneous tone and frequency shift keying.

Applications.—A total of 390 applications for additional frequencies, additional transmitters, and additional points of communications, as well as renewal of current licenses and special temporary authorizations, were filed by licensees in the international fixed public service. Approximately the same number were acted on by the Commission during that period. Of these applications, 265 were filed by licensees in the radiotelegraph service and the balance by licensees in the radiotelephone service.

Docket cases.—In the fifteenth annual report, reference was made to two proceedings involving possible violations of the Communications Act. One of these, docket 9093, involved an investigation to determine whether the common ownership and consolidated operation of cable and radio facilities by the American Cable & Radio Corp. system, including All America Cables & Radio, Inc., The Commercial Cable Co., and Mackay Radio & Telegraph Co., constituted a violation of section 314 of the Communications Act. On May 11, 1950, the Commission adopted a report in which it concluded that such common ownership, control, and operation of cable and radio facilities in the A. C. & R. system does not result in a violation of section 314, and thereupon ordered the proceeding terminated and dismissed.

The other proceeding, docket 9188, was instituted to determine the facts and circumstances surrounding the installation and operation of two transmitters by Mackay Radio & Telegraph Co. prior to the

receipt of authorization from the Commission, and to determine, further, whether such transmitters should be licensed. In a final report and order in this proceeding adopted December 7, 1949, the Commission found "not only has there been an inexcusable omission of an obvious duty on the part of important and responsible company officials in ordering transmitters to be placed in operation without first making certain that they had been licensed but also that there is ample evidence that these officials wilfully and knowingly suffered things to be done which are prohibited by provisions of the Communications Act, specifically section 301 thereof." It concluded, however, that because Mackay was engaged in common carrier service to the public and had a need for the transmitters involved, the construction permits should be granted. The matter of the above-described violations was referred to the Attorney General of the United States with a recommendation for prosecution. On May 12, 1950, a complaint was filed against Mackay. The company entered a plea of *nolo contendere* and was fined $1,000.

On June 2, 1950, the Commission granted the Press Wireless, Inc., motion to dismiss without prejudice its applications for authority to handle administrative press messages and commercial messages in the deferred classification (dockets 7987 and 8057).

The Commission had pending before it the applications of Mackay to communicate with Portugal, Surinam, and The Netherlands (docket 8777). These applications involve the question of whether and to what extent the Commission will authorize a second direct radiotelegraph circuit to countries already served directly by one carrier. An initial decision looking toward the grant of Mackay's Portugal and Netherland applications and its denial of its Surinam application was issued July 29, 1949. Oral argument was held on December 16, 1949, and the matter was awaiting final decision.

The International Bank for Reconstruction and Development and the International Monetary Fund, in a complaint filed against United States telegraph carriers (docket 9362), presented for determination by the Commission the question of whether the bank and the fund should be accorded the same rates for out-bound official international telegraph communications as those accorded to the United States Government for similar communications. Hearings on this matter were scheduled to begin October 1950.

By order dated April 21, 1950, the Commission designated for hearing in docket 9638 the applications of Globe Wireless, Ltd., for construction permits to move certain of its transmitters to stations of Press Wireless, Inc. The basic issues in this proceeding are: Whether the public interest would be served by permitting one carrier to operate, at its own site and with its own employees, the transmitting equipment of a competing carrier in return for the payment of a fee;

and the nature of the provisions, if any, which should be made for the protection of those employees of the applicant who might be adversely affected by a grant of the applications.

INTERNATIONAL CONFERENCES

International Administrative Telephone and Telegraph Conference, Paris, 1949.—As was noted in the fifteenth annual report, the Commission with Chairman Coy acting as chairman of the United States delegation, was represented at this conference which convened at Paris in May 1949. The United States participated in its telegraph aspects to the end that regulations to which it could become a party might be developed. However, while it followed the work of the telephone committee carefully, the United States delegation advanced no proposals regarding telephone regulations and advised the telephone committee at the outset that the United States did not intend to sign the International Telephone Regulations. The conference revised these regulations in various respects. Among the more important changes were: Unification of rates for ordinary telegrams composed of plain language, cipher language, and code language or any mixture thereof at 75 percent of the pre-existing plain language rate; elimination of the deferred classification and the fixing of letter telegram rates at 50 percent of the new ordinary rate; the revision of regulations with respect to the counting of words in a telegram, and the establishment of a minimum charge of 5 words for ordinary telegrams, 22 words for letter telegrams, and 10 words for press telegrams.

At the close of the conference, the United States delegation signed the revised regulations with various formal reservations and unilateral declarations, it being understood that such signing did not constitute formal approval by the United States. Subsequently, on January 16, 1950, a public conference was held at the offices of the Commission to determine whether any of the reservations which had been made should be withdrawn and whether any additional reservations should be made. Representatives of interested Government agencies, certain press users, and the various international carriers attended the conference and made numerous suggestions with respect to the revised regulations. After considering the matter, the Commission informed the Department of State that it was of the opinion that the United States should become a party to these regulations with certain qualifying reservations and declarations. The Commission's recommendations were adopted by the Department of State and the regulations were subsequently forwarded by the President to the Senate for ratification.

London revision of the Bermuda Telecommunications Agreement.—The Commission was represented at the conference to revise the Bermuda Telecommunications Agreement of 1945, which convened in Lon-

don on August 8, 1949. The Bermuda agreement contained, among other things, multilateral agreements for the establishment of rate ceilings for telegraph traffic between the United States and various British Commonwealth countries. At London, this agreement was revised to make it more flexible. Thus, the rate ceilings were increased and, in addition, each party to the agreement was authorized to raise its rates above the specified ceilings upon 90 days' notice to the other parties. Furthermore, the matter of retaining existing circuits or establishing new circuits between any two parties to the agreement was left to the discretion of the governments involved, thereby making possible additional radiotelegraph circuits between the United States and the various commonwealth countries through bilateral agreement. The London agreement has been formally accepted by all parties thereto and is now in effect.

Other conferences.—The Commission is participating in the preparatory work for the meetings of the International Telegraph Consultative Committee (CCIT) and the International Radio Consultative Committee (CCIR), which are to be held during the spring of 1951 in The Netherlands and in Czechoslovakia, respectively. These committees study technical telegraph and radio problems and submit appropriate recommendations to the various participating nations which are members of the ITU. These nations then study the recommendations and may use them as a basis for proposals to be submitted for consideration at the next international Administrative Telegraph and Radio Conference at Buenos Aires in 1952.

The Commission was also engaged in preparatory work for the Extraordinary Administrative Radio Conference, scheduled for The Hague beginning in September 1950. This conference will be concerned with implementing the table of frequency allocations adopted at Atlantic City in 1947. In this connection, the Commission continued to cooperate with other Government agencies and representatives of the commercial carriers in studies looking toward proposals for implementation of that table.

INTERNATIONAL MERGER

During the year the Commission devoted considerable time and attention to studying the matter of the merger of United States international telegraph companies and facilities. It developed and is maintaining on a current basis detailed records with respect to the more important phases of the facilities, operations, traffic loads, and revenues, and financial problems of the various international telegraph carriers. The Commission cooperated with and supplied detailed information to the subcommittee of the Senate Committee on Interstate and Foreign Commerce which is studying various aspects of the problem of international merger. The Commission likewise supplied

relevant data on the matter of international merger to the President's Communications Policy Board which, among other things, is considering this problem.

RATES AND TARIFFS

Rate schedules.—At the close of the year international telegraph carriers had 111 tariffs and concurrences on file with the Commission. During the year they filed 4,610 tariff publications establishing or changing rates, regulations, practices, and classifications of services, including concurrences.

Special permissions.—International telegraph carriers filed 90 applications for special permission to make changes in tariffs or file new tariffs. Of these, 86 were granted and 4 were retired to the files.

Telephone rates between United States and Cuba.—As a result of action initiated by the Commission, the Cuban American Telephone & Telegraph Co. reduced its rates for telephone service between the United States and Cuba, effective July 1, 1950, by about 17 percent, resulting in an estimated annual savings to telephone users of $280,000. Telephone service between the United States and Cuba is furnished jointly by the Bell system which performs the portion of the service within the United States, the Cuban American Telephone & Telegraph Co. which owns the ocean cables between Key West, Fla., and Havana, Cuba, and the Cuban Telephone Co. which performs the portion of the service within Cuba. At the same time the rate structure for the service, formerly made up of the separate charges of each of these three companies for its own portion of the service, was improved by establishing joint through rates for message toll telephone service between the two countries at a lower level than the former separate rates; reducing the rate for the Key West-Havana portion of the various private line services; and establishing joint through rates for a new short period private line telephone service.

International rate case.—As was stated in the fifteenth annual report, the Commission in its third interim decision in docket 8230 (international rate case) issued January 26, 1949, noted that there was scheduled to convene in Paris, in May 1949, an International Administrative Telephone and Telegraph Conference at which revision of the international rate structure would be considered. The Commission then indicated that, after the close of this conference, it would review, in the light of current traffic experience, the revenue effect of any rate structure revision agreed to at Paris, and their impact upon the general rate matters at issue in docket 8230. The Commission explained in its 1949 report that the ceiling rates fixed by the Bermuda telecommunications agreement prevented it from authorizing rates in excess of 30 cents for full rate words and 6½ cents per ordinary press word for traffic to the British Commonwealth countries and indicated that it would institute procedures to remove these rate limitations.

As already mentioned, the London revision of the Bermuda agreement lifted the rate ceiling to 40 cents per full rate word and 10 cents per press word and further made it possible for any country to exceed the newly established ceiling on 90 days' notice.

Further proceedings were held in docket 8230 in December 1949 to determine what changes, if any, should be made in charges for telegraph communications service between the United States and foreign and overseas points in the light of the decisions reached at the Paris and London conferences and in the light of the most recent experience of the carriers with respect to traffic and earnings. On January 27, 1950, the Commission issued a fourth interim report wherein, because of special circumstances, it authorized increased rates for message telegraph service from the continental United States to most of the Central American countries. It was estimated that the increases in out-bound rates would produce about $99,000 additional annual gross revenue to the carriers and that increases in in-bound rates would produce an additional $89,000. The Commission stated, however, that it would defer a final decision with respect to general rate adjustments and other matters at issue in this proceeding until after there had been a period of actual experience under the new rate structure agred to at the Paris conference, which rate structure would become effective July 1, 1950.

Elimination of special reduced Government rates.—Also in its fourth interim report in docket 8230, the Commission authorized the international carriers to eliminate special Government rates, provided such special rates were eliminated for messages of all governments and all international organizations, and over all routes, direct and indirect, and in both directions, between the particular two countries or points involved in each case. Pursuant to this authority the carriers eliminated, in fiscal 1950, such special reduced Government rates between the United States and its possessions, also between United States territory and Japan. The carriers also filed revised tariff schadules eliminating special Government rates between the United States and its possessions and 30 overseas and foreign points, effective July 1, 1950.

Multiple address press rates.—As noted in the fifteenth annual report, the Commission had held hearings in December 1948 and January 1949 with respect to charges, regulations, practices, and services of the three international telegraph carriers engaged in rendering multiple address press service. These hearings were an outgrowth of the investigation in docket 8230 into international telegraph rates generally. On Mar. 21, 1950, the Commission adopted a report and order which stated that, in view of the limitations of the evidence adduced by each carrier as to its costs of rendering this service, the Commission reached no conclusions with respect to the over-all justness and reason-

ableness of the rates of the carriers for the service. The Commission did conclude, however, that Mackay's existing rate structure for this service contained within itself an unjust and unreasonable discrimination for or in connection with like communication service by reason of the extent of the differential maintained between the rate for a primary transmitter and the rate for each auxiliary transmitter. Mackay was, therefore, ordered to revise its rate structure so as to eliminate such discrimination. Pursuant to this order, Mackay on May 1, 1950, filed revised tariff schedules for its multiple address press service wherein the differential for charges for primary and auxiliary transmitters was considerably narrowed. The Commission permitted these tariff schedules to become effective June 1, 1950.

Acceptance and delivery practices.—Under revised tariff schedules filed by All America Cables & Radio, Inc., the Commercial Cable Co. and Mackay Radio & Telegraph Co., Inc., which became effective December 3, 1949, overseas telegraph users located outside gateway cities, and marine service users located outside coast station cities, may forward outbound messages to the carriers by telephone, teletypewriter exchange service (TWX), or otherwise. The tariffs also provide that in-bound messages addressed to points beyond the carriers' office and coast station cities will, upon specific request of the addressee, be delivered by telephone, TWX, or otherwise. Charges for such facilities used in filing or delivery will be borne and paid for by the user selecting or specifying this means of forwarding. In acting upon a complaint filed by Western Union on behalf of its land line system, the Commission instituted an investigation into the acceptance and delivery regulations and practices of all international and marine carriers (docket 9433). Hearing was held and the matter was pending initial decision by the hearing examiner.

Distribution of international traffic.—In connection with its authorization for the merger of domestic telegraph carriers in 1943, the Commission approved a formula which specified, in general, the manner in which Western Union, the merged domestic carrier, should distribute unrouted international traffic filed at its offices among the various international telegraph carriers, including the Western Union cable system. Various problems have arisen in connection with the interpretation and administration of the formula. In the past year the Commission considered proposals by the various interested telegraph carriers for modification of several provisions of the formula. There was also pending before the Commission a formal complaint alleging that Western Union was erroneously interpreting various provisions of the formula and was engaging in traffic distribution practices which violate the provisions thereof (docket 9369).

In addition, interpretation of certain provisions of the formula is involved in the proceedings in docket 9292. This matter, which arose

out of formal complaints, involves the legality, under the formula and the Communications Act, of agreements for the exchange of certain international telegraph traffic between Western Union on the one hand and Globe Wireless Ltd., and Tropical Radio Telegraph Co. on the other hand. Extensive public hearings were held during the year and additional hearings were scheduled for September 1950.

OTHER REGULATORY MATTERS

Depreciation.—Studies to determine the reasonableness of annual depreciation rates and charges, and the recorded depreciation reserves, and to determine the propriety of the depreciation practices of the international telegraph carriers were continued. Progress was made on a comprehensive study, initiated in 1949, relative to one large carrier, and similar studies were contemplated with respect to the other international carriers. During the year one cable carrier was authorized to reduce its depreciation reserve by $2,500,000 to reverse an accounting entry of a prior year. Near the close of the year, another cable carrier submitted a proposal to revise and reduce its depreciation-expense rates.

Continuous property records.—Verification of the form and contents of continuous property records and evaluation of the effectiveness of continuous-property-records procedures of radiotelegraph and ocean-cable carriers were continued.

Pensions and relief.—The Commission pursued its general studies of the carriers' pension arrangements. Several changes in pension plans introduced during the year were analyzed to determine their effect upon the operating expenses of the companies.

Reclassification of plant.—Except for minor adjustments which are still under investigation, the plants of the international radiotelegraph and cable carriers have been reclassified in accordance with the respective uniform systems of accounts.

Part 34 (Uniform System of Accounts for Radiotelegraph Carriers).—The operating revenue accounts prescribed in this system, which became effective January 1, 1940, were designed to reflect the several sources of revenue of radiotelegraph carriers then existing. Progress in the art of radiotelegraph communication, the withdrawal of the radiotelegraph carriers from the field of domestic telegraph communication, changes in the types of services rendered, and other developments within the past decade have occasioned the need for substantial revision of these rules. Consequently, in order to provide for these changes and secure uniformity in the operating revenue accounts of all types of international telegraph carriers, the operating revenue accounts were revised during the year.

Annual report Form R (applicable to class A and class B radiotelegraph carriers).—This form was amended for use for the calendar

year 1949. The amendments were designed to reflect improvements and simplification of annual reports which had been developed by an interdepartmental staff committee, organized in 1948, for the purpose of improving the statistical program of the Commission.

Monthly report forms.—Section 43.31 of the Commission's rules and regulations provides for the filing of monthly financial reports by all common carriers whose average annual operating revenue exceed $250,000. These reports were previously filed on F. C. C. Form No. 903 by radiotelegraph carriers, and on F. C. C. Form No. 905B by ocean-cable carriers. A review of the two aforementioned forms indicated the feasibility and desirability of combining them. Accordingly, Form No. 905B was rescinded and Form No. 903 was made applicable to both classes of carriers. The latter form also was revised in order, among other things, to give effect to the new operating revenue accounts provided for by revisions of part 34 (Uniform System of Accounts for Radiotelegraph Carriers) and part 35 (Uniform System of Accounts for Wire-telegraph and Ocean-cable Carriers).

Preservation of records.—At the end of the fiscal year final action by the Commission was pending with regard to promulgation of new preservation of record rules [see page 40].

5. STATISTICS

TELEPHONE CARRIERS

Annual reports for the calendar year 1949 were filed by 24 controlling companies and 132 common carriers, of which latter figure 105 were telephone carriers. The following table shows financial and operating data relating to these telephone carriers for the calendar year 1949 in comparison with 1948:

Item	1948	1949	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$9,109,408,570	$9,986,086,460	9.64
Depreciation and amortization reserves	$2,665,101,862	$2,796,221,835	4.92
Net investment in plant and equipment	$6,443,306,708	$7,189,864,625	11.59
Local service revenues	$1,598,952,274	$1,801,126,866	12.64
Toll service revenues	$1,061,661,716	$1,126,496,490	6.11
Total operating revenues [1]	$2,820,088,577	$3,096,309,900	9.79
Operating expenses [1]	$2,235,184,804	$2,407,442,713	7.71
Taxes	$310,718,568	$366,731,809	18.03
Net operating income after all taxes	$274,186,145	$322,135,485	17.49
Net income	$228,596,769	$252,325,062	10.38
Dividends declared	$218,806,027	$234,294,968	7.08
Company telephones:			
Business	11,146,019	12,101,347	8.57
Residence	22,609,910	23,851,862	5.49
Average number of calls originating per month:			
Local [2]	4,835,601,447	5,087,024,778	5.20
Toll [2]	181,995,982	179,346,751	(1.46)
Number of employees at end of October	585,702	559,979	(4.39)
Male	198,841	195,524	(1.67)
Female	386,861	364,455	(5.79)
Total payroll for the year	$1,667,054,353	$1,754,640,079	5.25

[1] Intercompany general service and license fees and rents, amounting to approximately $48,500,000 for 1949, and $45,000,000 for 1948 have not been eliminated.
[2] Partly estimated by reporting carriers.

LAND-LINE TELEGRAPH

Financial and operating reports for the calendar year 1949 were filed by 27 wire-telegraph, ocean-cable and radiotelegraph carriers. Statistical data covering land-line operations of Western Union for that calendar year as compared with 1948 are included in the table shown below. Data applicable to its cable operations are shown in a subsequent table concerning ocean-cable carriers:

The Western Union Telegraph Co.[1]

Item	1948	1949	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$310, 295, 071	$306, 316, 463	(1. 28)
Depreciation and amortization reserves	$136, 267, 016	$133, 978, 693	(1. 68)
Net investment in plant and equipment	$174, 028, 055	$172, 337, 770	(. 97)
Transmission revenues	$165, 595, 812	$151, 739, 815	(8. 37)
Total operating revenues	$183, 429, 431	$171, 393, 408	(6. 56)
Operating expenses, depreciation, and other operating revenue deductions	$185, 362, 154	$173, 504, 919	(6. 40)
Net operating revenues	($1, 932, 723)	($2, 111, 511)	
Net income	$1, 264, 578	($3, 468, 249)	(374. 26)
Dividends declared	$1, 228, 428		(100. 00)
Revenue messages handled	[2] 197, 915, 842	[2] 182, 069, 952	(8. 01)
Number of employees at end of October	48, 967	41, 660	(14. 92)
Total payroll for the year	$140, 900, 964	$125, 871, 207	(10. 67)

[1] Represents data for land line operations. Figures covering cable are included in another table.
[2] Includes domestic haul of cable and radio messages (8,896,985 in 1948 and 7,997,626 in 1949).

RADIOTELEGAPH AND OCEAN-CABLE CARRIERS

The financial and operating data contained in the accompanying tables were compiled from the annual reports received from radiotelegraph and cable carriers engaged in international service for the calendar year 1949 in comparison with 1948:

Radiotelegraph carriers

Item	1948	1949	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$37, 369, 829	$38, 042, 579	1. 80
Depreciation and amortization reserves	$17, 472, 888	$18, 207, 637	4. 21
Net investment in plant and equipment	$19, 896, 941	$19, 834, 942	(. 31)
Message and other transmission revenues	$21, 186, 729	$22, 174, 840	4. 66
Total operating revenues	$22, 423, 542	$23, 440, 539	4. 54
Operating expenses, depreciation, and other operating revenue deductions	$23, 009, 343	$22, 696, 908	(1. 36)
Net operating revenues	($585, 801)	$743, 631	
Income taxes	$624, 709	$500, 989	(19. 80)
Net income	($453, 748)	$430, 506	
Dividends declared	$2, 000	$5, 000	150. 00
Revenue messages handled:[1]			
Domestic service classification [2]	59, 998	52, 784	(12. 02)
Foreign service classification [2]	10, 148, 439	9, 588, 339	(5. 52)
Marine	905, 332	920, 044	1. 71
Number of employees at end of October	5, 782	5, 483	(5. 17)
Total payroll for the year	$18, 452, 422	$18, 231, 825	(1. 20)

[1] Excludes domestic haul of foreign, insular, and marine messages to avoid duplications.
[2] International messages (primarily Canadian and Mexican) transmitted in accordance with carriers' rules governing domestic traffic are included under domestic service classification. Insular messages are included under foreign service classification.

Ocean cable carriers (including cable operations of the Western Union Telegraph Co.)

Item	1948	1949	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$98,256,204	$96,289,405	(2.00)
Depreciation and amortization reserves	$64,614,333	$64,688,689	.12
Net investment in plant and equipment	$33,641,871	$31,600,716	(6.07)
Transmission revenues:			
Domestic service classification	$606,664	$254,266	(58.23)
Foreign service classification	$20,896,317	$20,389,931	(2.42)
Total operating revenues	$23,856,903	$23,154,138	(2.95)
Operating expenses, depreciation, and other operating revenue deductions	$23,024,993	$22,169,301	(3.72)
Net operating revenues	$831,910	$984,837	18.38
Income taxes	$211,219	$117,888	(44.19)
Net income	($324,288)	$187,916	
Dividends declared	$706,936	$353,468	(50.00)
Revenue messages handled:			
Domestic service classification	535,089	217,691	(59.32)
Foreign service classification	10,487,041	10,172,458	(3.00)
Number of employees at end of October	5,973	5,667	(5.12)
Total payroll for the year	$13,265,006	$13,036,719	(1.72)

INTERNATIONAL TELEGRAPH TRAFFIC

Reports filed by cable and radiotelegraph carriers concerning international traffic with the United States show that more than 513,000,000 paid words were handled during the calendar year 1949. Outbound traffic during the year amounted to nearly 260,000,000 words, and inbound over 253,000,000 words. An analysis of this United States traffic with the principal countries of the world is shown in the following table:

International telegraph (radio and cable) traffic, 1949

Country	Number of words		Country	Number of words	
	Outbound from the United States	Inbound to the United States		Outbound from the United States	Inbound to the United States
Europe, Africa, and the Near East:			Europe, Africa, and the Near East—Continued		
Arabia	895,145	709,890	Liberia	419,871	467,823
Austria	1,633,812	1,997,518	Netherlands	6,718,002	6,657,716
Belgian Congo	356,639	296,626	Norway	2,885,136	2,127,120
Belgium	5,500,796	4,951,618	Persian Gulf	469,384	563,634
Czechoslovakia	1,087,205	1,411,711	Poland	647,391	564,051
Denmark	1,967,212	1,434,405	Portugal	1,303,540	952,951
Egypt	1,987,523	1,694,797	Spain	3,068,842	2,179,894
Finland	546,288	589,702	Sweden	3,334,117	2,964,293
France	19,883,086	13,202,650	Switzerland	7,342,368	5,813,865
French Morocco	390,747	287,975	Syria	373,143	246,532
Germany	6,641,504	9,477,893	Tangier	652,128	754,097
Greece	2,612,210	2,931,071	Turkey	1,249,318	905,546
Hungary	380,067	393,506	Union of South Africa	3,226,465	3,367,461
Iceland	307,753	286,607	U. S. S. R.	6,944,280	3,377,296
Iran	1,268,496	1,266,982	United Kingdom	47,357,472	45,272,549
Ireland	924,830	1,084,652	Yugoslavia	1,153,348	894,058
Israel	3,564,425	3,864,949	All other countries	3,535,488	3,975,283
Italy	9,692,377	8,122,921			
Lebanon	812,556	844,114	Total	151,132,964	135,933,746

International telegraph (radio and cable) traffic, 1949—Continued

Country	Number of words		Country	Number of words	
	Outbound from the United States	Inbound to the United States		Outbound from the United States	Inbound to the United States
West Indies, Central, North and South America:			Asia and Oceania:		
Argentina	6,997,879	7,935,910	Australia	3,100,981	2,945,584
Bahamas	494,040	615,257	Ceylon	517,800	419,565
Bermuda	845,587	908,512	China (excluding Hongkong)	3,108,703	3,899,577
Bolivia	874,262	661,512	Guam	388,754	484,639
Brazil	9,267,949	10,024,687	Hawaii	4,665,809	4,812,677
British West Indies [1]	657,267	151,832	Hongkong	3,905,348	2,963,711
Canada	6,530,890	8,537,342	India	5,189,732	4,785,912
Canal Zone	643,271	672,224	Indonesia	1,653,131	1,841,720
Chile	2,211,550	2,469,589	Japan	4,775,746	6,381,259
Colombia	4,288,591	4,258,316	Korea	281,512	581,784
Costa Rica	857,896	716,886	Malay States	1,003,937	1,138,328
Cuba	7,304,278	9,255,455	New Zealand	838,294	889,589
Dominican Republic	1,178,001	1,239,073	Okinawa	193,923	449,672
Ecuador	1,296,519	893,823	Pakistan	1,081,413	985,977
Guatemala	1,223,388	1,258,429	Philippines	7,119,555	8,381,885
Haiti	761,421	744,796	Siam	1,164,270	1,159,682
Honduras	604,904	558,199	All other countries	1,050,439	876,821
Jamaica	508,001	462,469	Total	40,039,347	42,898,382
Mexico	1,748,274	1,708,858			
Netherlands West Indies	1,164,848	1,188,876	Unknown destination or origin	1,072,229	2,605,580
Nicaragua	585,658	574,610			
Panama	1,302,810	1,022,907	Grand total	259,789,522	253,385,722
Peru	1,924,347	1,836,305			
Puerto Rico	3,284,438	3,008,415			
Salvador	708,145	527,799			
Trinidad	434,628	434,589			
Uruguay	1,771,114	1,431,434			
Venezuela	6,951,517	7,828,618			
All other countries	1,123,509	1,021,242			
Total	67,544,982	71,948,014			

[1] Points not listed separately.

BUSINESS AND RESIDENCE TELEPHONES BY STATES

Of the more than 40,000,000 telephones in the continental United States, over 28,000,000 are in homes and more than 12,000,000 are in business establishments. The following compilation by States was made on the basis of American Telephone & Telegraph Co. estimates as of January 1, 1950:

State	Business	Residence	Total
Alabama	114,100	282,600	396,700
Arizona	56,900	92,000	148,900
Arkansas	76,400	165,500	241,900
California	1,233,500	2,355,600	3,589,100
Colorado	129,600	284,300	413,900
Connecticut	207,600	536,100	743,700
Delaware	32,700	76,800	109,500
District of Columbia	211,600	255,000	466,600
Florida	252,100	349,600	601,700
Georgia	169,100	372,500	541,600
Idaho	37,700	94,300	132,000
Illinois	945,800	1,990,100	2,935,900
Indiana	270,600	818,200	1,088,800
Iowa	161,400	635,400	796,800
Kansas	131,000	438,900	569,900
Kentucky	119,900	322,700	442,600
Louisiana	143,200	332,000	475,200
Maine	56,700	170,000	226,700
Maryland	182,500	438,400	620,900
Massachusetts	448,300	1,081,200	1,529,500
Michigan	506,200	1,427,700	1,933,900

State	Business	Residence	Total
Minnesota	213,400	660,600	874,000
Mississippi	64,800	145,800	210,600
Missouri	318,800	790,300	1,109,100
Montana	41,400	93,600	135,000
Nebraska	92,100	292,200	384,300
Nevada	19,800	27,200	47,000
New Hampshire	36,800	112,100	148,900
New Jersey	453,100	1,089,700	1,542,800
New Mexico	44,900	61,100	106,000
New York	1,929,400	3,238,800	5,168,200
North Carolina	155,300	351,800	507,100
North Dakota	30,300	89,100	119,400
Ohio	629,400	1,847,300	2,476,700
Oklahoma	159,900	385,400	545,300
Oregon	126,500	286,400	412,900
Pennsylvania	814,800	2,154,900	2,969,700
Rhode Island	68,300	165,400	233,700
South Carolina	70,800	158,000	228,800
South Dakota	34,400	114,000	148,400
Tennessee	166,300	439,600	605,900
Texas	558,700	1,152,300	1,711,000
Utah	54,000	133,700	187,700
Vermont	23,900	71,500	95,400
Virginia	202,900	446,600	649,500
Washington	213,500	508,300	721,800
West Virginia	93,300	250,200	343,500
Wisconsin	253,700	693,300	947,000
Wyoming	23,600	48,900	72,500
United States total	12,381,000	28,327,000	40,708,000

COMMON CARRIER RADIO AUTHORIZATIONS

Base radio stations authorized to the common carrier services fluctuate around 1,000 in number. At the close of the last fiscal year there were 925 such authorizations as compared with 1,052 of the year previous. The following figures do not include associated mobile units:

Class of station	June 30, 1949	June 30, 1950	Increase or decrease
Fixed public telephone	26	26	----------
Fixed public telegraph	57	58	1
Domestic land mobile	795	551	(−244)
Experimental	174	290	116
Total	1,052	925	(−127

COMMON CARRIER APPLICATIONS

The Commission received more than 3,600 applications from common carriers during the year, which was nearly 500 more than for the previous fiscal period. Comparative figures follow:

Class of station	Pending June 30, 1949	Received	Disposed	Pending June 30, 1950
Fixed public telephone	57	118	159	6
Fixed public telegraph	59	199	203	41
Domestic land mobile	46	1,342	1,012	289
Experimental	62	445	483	8
Wire service extensions	12	205	193	3
Wire service reductions	158	1,342	1,301	62
Total	394	3,651	3,351	409

CHAPTER III—SAFETY AND SPECIAL RADIO SERVICES

1. GENERAL

For administrative purposes, the many radio services which are neither broadcast nor common carrier are grouped in what is known as the Safety and Special Radio Services. They comprise a broad field of radio utilization by commerce, industry, and individuals.

These services fall into five categories:

Safety services.—Aeronautical, Marine, Police, Fire, Forestry-conservation, Highway Maintenance, and Special Emergency.

Land transportation services.—Railroad, Urban Transit, Intercity Bus, Highway Truck, Taxicab, and Automobile Emergency.

Industrial services.—Power, Petroleum, Forest Products, Motion Picture, Relay Press, Special Industrial, and Low-power Industrial.

Developmental services.—Industrial, Scientific and Medical; Experimental, and Low-power Radio Devices.

Operator services.—Commercial radio operators, Amateur, and Citizens.

Included in the aviation, marine, special emergency, and experimental services are certain radio stations whose operations cut across both the common carrier and safety and special services. For convenience, radio operators are treated in a separate chapter.

Until comparatively recent years, the employment of radio for purposes other than broadcast and common carrier communication was by circumstances restricted to operations contributing to the public safety. It was later extended on a relatively small scale to activities involving the conservation of natural resources, protection of public property,

and a few industrial enterprises of a particularly hazardous character, such as bridge construction, oil exploration, and the maintenance of power transmission lines. The knowledge acquired and the equipment developed during and since the war years made it possible to further expand the public use of radio. Commission rules which became effective July 1, 1949, established new services on a regular basis and realigned and modified the regulations respecting existing services.

However, with the growth of radio stations and increasing demand for new services, it became necessary to eliminate many of the convenience or luxury operations from the new rules, particularly in populous areas where common carrier facilities are available. The operations of some existing services had to be curtailed or restricted. This does not mean that there is no room for expansion in the nonbroadcast field but rather that the potential uses for radio have become so great that eligibility must remain on a highly competitive basis. Public safety radio necessarily continues to have the highest priority, but as the factor of safety decreases in importance the other principles governing a comparative determination in the public interest become very complex.

2. MARINE RADIO SERVICES

GENERAL

As the title implies, the Marine Radio Services involve the use of radio for the safety, navigation and communication needs of ships. Of the many safety radio services in existence today, the application of radio for the safety of ships is by far the oldest. Through the use of radio, many dramatic rescues have been made at sea, and an unknown but large number of diseasters have undoubtedly been averted through the use of safety radio systems developed on broad international bases.

Radio, as an aid to navigation, has also proved its worth over the years. It assists in navigating safely, avoidance of grounding, foundering, and collision. The normal radio installation aboard ship also provides means for exchanging operational and public correspondence with coast stations, other ships, and, in some cases, with aircraft.

Under the Communications Act, the Commission is required to license all compulsory and voluntary radio stations on board ships of the United States (including certain United States Government ships) whether radiotelegraph, radiotelephone, radar, or other systems involving the transmission of radio energy.

With respect to the installation of shipboard radio equipment, ships are classified as compulsorily-equipped and voluntarily-equipped. This classification is necessitated by the fact that specific national and international obligations require the mandatory installation of

radio for safety purposes on board certain vessels. Title III, part II of the Communications Act (for the oceans) and the Ship Act of 1910 (for the Great Lakes) embody the national law on this subject; while the International Convention for the Safety of Life at Sea (London, 1929), still in force, and that of London, 1948, which is not yet in force, contain the international law with respect to the high seas. The Commission has the responsibility for the domestic administration and enforcement of these laws and treaties.

Because ships travel internationally, because the radio waves they use travel internationally, and because they serve as common international media for radiocommunication, the Commission is obligated to participate actively in any international conferences or meetings related to the regulation, control, or improvement of the equipment, facilities, methods of operation, and the radio operators for marine radio communication.

SAFETY ON THE GREAT LAKES

Of outstanding significance during the year was a series of meetings in Washington, attended by representatives of Government and industry, which discussed a proposed safety radio treaty between the United States and Canada applicable to certain vessels operating on the Great Lakes. One purpose of the proposed treaty is to enlarge the safety base from seven ships now required to be equipped with radio apparatus to several hundred.

The statutory requirement for the installation of radio equipment and the carrying of qualified radio operators for safety purposes on certain United States ships has been in effect since about 1910. An act of Congress approved May 20, 1937, is the most recent domestic law covering the subject. It prescribes the requirements for radio installations for safety purposes on ships of the United States on the ocean and is in general accord with treaty and practice.

Previous radio statutes had included certain ships on the Great Lakes. At hearings before Congressional committees which considered the 1937 legislation, Great Lakes' interests claimed that though past policy treated the Lakes on a par with the high seas the factors to be considered on the Lakes were so different from those on the ocean that separate consideration was warranted. They also contended that radiotelephony should be recognized as the medium for marine safety communications on the Great Lakes instead of radiotelegraphy as previously required. Consequently, the act of 1937 which, as a practical matter requires the use of radiotelegraphy only, was not made applicable to the Great Lakes.

In their reports the Congressional committees observed that no drastic change in the policy affecting radio on ships on the Great

Lakes should be undertaken without consultation with Canada; that the Federal Communications Commission make a study of marine radio requirements in that area; and that it was hoped and expected that the Department of State would reach an agreement with Canada. The legislation, as finally passed, requested and directed the Commission to make a special study of the radio requirements necessary or desirable for ships navigating the Great Lakes and the inland waters of the United States.

An exhaustive study and an investigation made by the Commission was reported to Congress on December 16, 1940. In 1941 the Department of State called a meeting of representatives of interested Government agencies to consider the question of an agreement with Canada. Because of the war, the two Governments agreed to delay consultation looking toward a treaty. By a recent (1949) exchange of letters with Canada, the United States agreed to give early consideration to the holding of meetings between the two governments on the subject.

In order to develop a representative United States position and proposal, informal meetings of representatives of Government and industry agencies, under the chairmanship of FCC Commissioner Webster for the Department of State, began a series of meetings on February 7, 1950, in Washington. As of June 30, 1950, work on the language and format of the proposed treaty was being completed. The matter will probably be discussed formally with representatives of the Canadian Government early in the next fiscal year.

SAFETY OF LIFE AT SEA

Administration of title III, part II of the Communications Act, requiring the compulsory fitting of radio apparatus on board ocean-going vessels, involved, as of June 30, 1950, approximately 1,300 ships of United States registry. When navigated in the open sea these ships must carry qualified radio operators and maintain safety watches.

In administering the Communications Act, the Commission is empowered to and does occasionally impose fines and forfeitures, as well as apply corrective measures of a less stringent nature for violation of its provisions. During the year 40 violations of the compulsory radio provisions of the Communications Act were dealt with by the Commission. Of these 35 were satisfactorily cleared after a warning to the offender concerned; in two cases forfeitures were imposed and the remaining three were pending. Investigation is being made of two cases involving ship radio stations being operated in a service for which they are not licensed.

There were five instances in which foreign vessels were not in compliance with the provisions of the International Convention for the

Safety of Life at Sea, 1929, and, although due notice was given, these vessels sailed without informing the Commission that corrective action had been taken. In addition, notices for noncompliance were served on foreign vessels belonging to countries which are not party to this Convention and which are, in consequence, subject to domestic law, in this case the Communications Act.

The Commission's records reveal that the international radio distress signal was used 167 times during the year. Studies of distress communications, made pursuant to section 4 (o) of the act, are used to strengthen the rules of the Commission to ensure the maximum use of radio for the safety of life and property at sea.

The Commission is authorized by the Communications Act and the 1929 Safety of Life at Sea Convention to exempt ships in certain categories from radiotelegraph installation requirements, if it finds that the route or the conditions of the voyage or other circumstances are such as to render a radio installation unnecessary or unreasonable. Under this authority, the Commission renewed for 1 year blanket exemptions for passenger vessels of 15 or less gross tons when navigated not more than 20 nautical miles from the nearest land or more than 200 nautical miles between two consecutive ports, and also for passenger vessels of less than 100 gross tons when navigated within certain designated coastal areas.

Individual applications for exemption received during the year numbered 79. Exemptions were granted to several cargo vessels used as tenders and moored most of the time to oil well drilling platforms located in relatively shallow water within 15 miles of the coast of Louisiana in the Gulf of Mexico. These vessels are, however, equipped with two-way radiotelephone installations capable of communicating with nearby coast stations, with ships similarly equipped, and with United States Coast Guard stations.

RADIO AIDS TO NAVIGATION

Shore-based harbor radar (radionavigation land) stations are authorized on an experimental basis in the cities of Long Beach and San Francisco, Calif., and Baltimore, Md., for the purpose of assisting ships entering or leaving the harbor. However, since the Coast Guard has the responsibility of providing and supervising public aids to marine navigation, licensees who operate "private" aids must also obtain permission from the Coast Guard. Very high frequency maritime communications systems are being used experimentally by the radar stations, in some cases to communicate with the pilots aboard the ships to furnish navigational information.

An authorization was granted to Marine Exchange, Inc., of San Francisco, Calif., for an experimental harbor radar (radio location

land) station for the sole purpose of observing ship movements in San Francisco harbor.

Nine experimental radar authorizations (radionavigation land stations) are held by various members of the petroleum industry engaged in off-shore oil drilling activities in the Gulf of Mexico. These stations are used in the navigation of ships of the licensee in his particular operations.

At the close of the fiscal year there were 1,125 United States merchant ships authorized to use radar on a regular basis, representing a 30 percent increase in the number of radar-equipped ships over the preceding year.

Several experimental authorizations cover shore-based radar stations for training of merchant marine deck officers in shipboard radar operation on both the great Lakes and the seaboard. The need for this type of station is partly the result of its being a relatively new device for merchant ship navigation and the fact that its use is not yet sufficiently widespread to provide normal means of training navigators.

On May 11, 1950, the Commission reached a final decision, after public hearing, with respect to the question of whether licensed operators are required for ship radar stations. New rules, effective January 2, 1951, in effect waive the legal license requirement for the normal operation of ship radar stations, such as that performed by a ship's navigating officer, but require that adjustments or tests coincident with the installation, servicing and maintenance of the radar equipment while it is radiating energy be performed by or under the supervision and responsibility of properly licensed persons. The minimum grade of license specified for this purpose is a commercial second class license, either radiotelephone or radiotelegraph, with a "radar" indorsement.

An additional period of time was needed in the case of certain wartime ship radar installations, the licenses for which terminated July 1, 1950, to either modify such equipment for type approval purposes or replace the equipment. To provide for this and avoid any interruption of service, the Commission modified its rules to permit appropriate extension of the licenses on an individual basis.

RADIO TECHNICAL COMMISSION FOR MARINE SERVICES

The Radio Technical Commission for Marine Services, of which Commissioner Webster is vice chairman, was organized early in 1947 as a cooperative association of United States Government-industry telecommunications agencies. Its principal objective is the resolution of technical problems in the marine radio field by mutual agreement. Its findings are in the nature of coordinated recommendations to all United States organizations concerned. The Commission has found

its recommendations very useful, and its work a savings to the Commission since it would otherwise have to be done by the Commission itself.

The RTCM achieves its technical results through temporary special committees organized to develop solutions to particular problems. Commission marine specialists are invariably members of these committees, sometimes chairmen. Fourteen such special committees have thus far been set up and three of them are still at work.

From the inception of the RTCM and until January 1, 1950, the United States Coast Guard furnished an executive secretary for this organization. Upon withdrawal by the Coast Guard of this assistance, a Commission engineer was appointed to perform this work until such time as the RTCM is able to make some permanent provision. It is expected that this will take place during the next fiscal year, and that both Government and industry members will contribute toward the financial upkeep of the organization.

INTERNATIONAL FREQUENCY COORDINATION

The marine radio services cannot function efficiently without international coordination. Universality and systematization of marine communication on a world-wide basis have been developed over the years through periodic international conference decisions.

The latest and most far-reaching of these conferences was held under the auspices of the International Telecommunications Union at Atlantic City in 1947. Although some of these revised radio regulations came into force on January 1, 1949, the remainder, mainly involving the assignment of frequencies between 10 and 27,500 kilocycles, are to come into force on a date or dates to be determined by an extraordinary administrative radio conference to be convened at The Hague, Netherlands, on September 1, 1950.

Growing out of the Atlantic City decisions were the international Provisional Frequency Board; three regional radio conferences (region 1—Europe and Africa; region 2—Western Hemisphere; and region 3—Asia); and a number of service conferences, all of which were held, wholly or in part, during fiscal 1950 to develop, among other things, internationally coordinated lists of frequency assignments to radio stations. In preparation for region 2 planning it was necessary to prepare lists of frequencies which the United States proposes to assign to coastal and ship stations which operate in the regional bands. These lists are being coordinated with neighboring countries.

The lists as currently proposed provide reassignments of frequencies in the present coast and ship radiotelegraph band 365 to 515 kilocycles, in order that such stations may operate in the smaller spectrum space 415 to 515 kilocycles allocated by the Atlantic City conference.

However, provision has been made for coastal telegraph and ship telegraph frequencies of the order of 2,000 kilocycles to compensate for the loss of spectrum space in the lower band.

With respect to radiotelephone communication between ship and coastal harbor stations, the proposed list provides for additional channels at major ports where the present channels are overloaded. These additional channels, insofar as possible, are in accordance with recommendations of the Radio Technical Commission for Marine Services. Implementation of the frequency list with respect to coastal harbor and ship telephone stations would involve the shifting of the presently assigned frequencies in only a few areas.

The work of the Provisional Frequency Board and the three regional radio conferences in the marine field was directed toward the more orderly assignment of frequencies to coast and ship stations of the maritime mobile service in accordance with the allocation table groupings of coast and ship stations in separate frequency bands to meet the technical and engineering principles governing the service, along with certain aspects of operating practices.

The results expected to be achieved at the forthcoming Hague conference must necessarily be translated into detailed rules and regulations by the various Government administrative agencies concerned. As far as the Commission is concerned, it means that its rules and regulations governing maritime services must be extensively revised and that the frequencies now assigned to some 470 coast stations and 22,600 ship stations would be subject to change in order to achieve the main purpose of the new table, that is, a more orderly and equable utilization of the radio spectrum throughout the world.

INTERNATIONAL TECHNICAL STANDARDS

Another international activity in which Commission marine personnel participated is preparatory work for the sixth meeting of the International Radio Consultative Committee (CCIR) to be held in Europe in 1951. This committee is an organ of the International Telecommunications Union and its principal concern is the study of world technical radio problems and standardization of solutions and the submission of recommendations to the 78 member countries. For example, one of its studies concerns automatic monitoring devices for maintaining watch on the new international distress frequency of 2,182 kilocycles for maritime mobile radiotelephone stations and a suitable signal which may be used universally to actuate the automatic devices.

Further progress was made in the development of an automatic alarm system and an associated alarm signal for use on that frequency. During the past year the Commission conducted additional field and lab-

oratory tests employing auto alarm devices proposed by the United States and those furnished by the British administration for comparative demonstration. United States models have been sent to England, France, and Sweden to permit tests by these interested countries. Similarly, France expects to furnish the United States with models of its auto alarm devices.

VOLUNTARILY EQUIPPED RADIOTELEPHONE SHIPS

Records of the Commission show that there are approximately 21,000 vessels licensed to use radiotelephone equipment in the 2,000–3,000 kilocycle band. The heavy congestion in this band has emphasized the need for more strict enforcement of regulations in order that the safety factor not be jeopardized.

The Commission by amending its rules, effective August 1, 1949, allocated the frequency 2,003 kilocycles for ship stations on the Great Lakes as an intership working frequency in place of the frequency 2,738 kilocycles which they shared with stations in other areas. The former furnished some relief from delays previously experienced since it is not used in other areas and does not have the objectionable inter-area interference so noticeable at night on 2,738 kilocycles. The Commission set January 1, 1950, as the final date for relinquishing 2,738 kilocycles on the Great Lakes. It also authorized use of safety and calling frequency 2,182 kilocycles as a common working frequency for ship-to-ship communication during this change-over period.

The Commission collaborated in a plan of the Department of the Army for the systematized use of the intership frequency 2,738 kilocycles by radiotelephone stations at lock 19, Keokuk, Iowa, and at each of 46 dams on the Ohio River to facilitate the movement of tows through locks and to promote safety. When a ship approaches the locks, radio contact is established with the Army stations for the purpose of obtaining instructions preparatory to passage through the locks. If the ship cannot proceed through the locks immediately, it is instructed by radio to wait until further radio orders are received.

COMMERCIAL COAST STATIONS

The use of high frequencies for long-distance communication between coastal telegraph and coastal telephone stations and ocean-going vessels continues to be important. The fact that ships on the high seas can communicate by radio with United States coast stations has increased the use of high frequencies.

Several applications were pending for authority to discontinue or reduce service at coastal telegraph stations. On the seaboard, this trend to curtailment is due in part to ship stations being equipped with high frequency radiotelegraph installations in addition to medium

frequency installations required by law and treaty, thus allowing communication with more distant stations. On the Great Lakes, the curtailment is because most of the ships which formerly carried radiotelegraph apparatus have changed to radiotelephone. Only 16 licensed ship radiotelegraph stations remain. Eleven of these ships also have radiotelephone installations.

A new public coastal harbor (telephone) station was authorized at Lake Dallas, Tex., an inland lake, for daytime operation only. A considerable number of applications were pending for additional frequencies for existing stations of this class, and for permission to construct new stations in the 2–3 megacycle band. These applications have not been acted upon because there is an acute shortage of maritime frequencies and further assignments involve the implementation of the final acts of the Fourth Inter-American Radio Conference and the evolution of a new frequency assignment plan for the maritime service in the continental United States and contiguous areas.

Numerous applications for VHF [very high frequency] coast stations and associated ships were received. These stations are expected to provide communication for a large number of small vessels in harbors and nearby areas and thus relieve, to some extent, the overcrowding of 2–3 megacycle marine frequencies in certain areas.

Since deciding to establish the VHF Specialized Operational Radiotelephone Maritime Mobile Service in April 1948, the Commission has authorized on an experimental basis 63 land stations and 716 associated ship units. Such short-range communication is expected to play an important part in piloting and docking ships by providing direct radiotelephone service between the pilot or master of the ship, the dockmaster, and tugs. Rules and regulations to establish the VHF maritime mobile service on a regular basis were under preparation at the end of the fiscal year.

Interest has been shown in, and a need expressed for, an integrated maritime communication system using VHF which would provide communication in a basically maritime operation between land vehicles, ships, and coast stations. The Commission is studying the problems posed in this connection in consonance with the provision of the Communications Act relating to encouragement of new and more effective use of radio in the public interest.

There were 42 licensed public coastal telegraph stations in the United States, including island possessions, at the end of the year. The number of coastal harbor stations, exclusive of Alaska, was 50. Five domestic coastal telephone stations employed high frequencies for long distance public service with ocean-going vessels. In addition, three mobile press stations operated for ship-shore radiotelegraph press traffic exclusively.

ALASKA FIXED PUBLIC AND PUBLIC COASTAL SERVICES

Because of the many isolated communities in Alaska and the various industries there, such as fishing, mining, logging, etc., requiring speedy communication, the Commission has established a special category of fixed public and public coastal radio services to serve those needs. These services provide communication between communities, between communities and the Alaska Communication System, and between the coast and ships in Alaskan waters. In emergencies, any station in Alaska, regardless of the class in which licensed, and subject to certain limitations, may transmit messages relating to safety of life and property. The ACS, under the Department of National Defense, operates the main intra-Alaska communication routes and makes its service available as a connecting carrier to nongovernment stations. The Commission maintains liaison with the ACS for the coordination of communications facilities in Alaska in order to best serve the public.

INTERFERENCE PROBLEMS

Numerous reports of interference involving the maritime mobile service were received during the year. Most of them came from Alaska where commercial ship, point-to-point and coast station operations were reported to be causing serious interference to reception of aircraft stations on 3,105 kilocycles by Civil Aeronautics Administration stations. The interference was so severe in two localities that the use of the interfering commercial frequency was discontinued. Investigation, with the cooperation of the CAA, disclosed that in some cases the interference was caused by improper adjustment or use of the commercial stations' equipment and indicated a possible need for stricter technical standards. Licensing of new coast and point-to-point operations in Alaska for use of the interfering frequency in the vicinity of CAA receiving locations was discontinued.

EQUIPMENT DEVELOPMENTS, PROBLEMS, AND APPROVALS

There was considerable activity in the commercial marine radar equipment field during the year. The Commission granted type approval, after commercial laboratory and shipboard tests witnessed by Commission engineers, to a total of 18 basic types of ship radar equipment. Included were six types of modified wartime radar equipment and two types of Canadian radar equipment. Some of the new radar equipment includes such features as "bifocal" presentation, which permits simultaneous observation of both "close-in" objects and a more distant over-all picture; compact, relatively light weight, less expensive small vessel radar sets with performance features comparable to the large types; multiple indicators for special applications, such as

ferryboat installations, and the use of larger cathode ray tubes in the indicators.

A new, compact, medium frequency radiotelegraph transmitter of 500 watts capacity for use primarily aboard ships was approved after laboratory tests. One type of radiotelegraph receiver was approved with respect to the Commission's rules imposing a limitation on the radiation of energy from shipboard receiving equipment. A number of new medium frequency radiotelephone transmitters, which in general are not subject to prior laboratory tests, were accepted for licensing in the ship service.

A nickel-cadium type of storage battery has been introduced for use on board ships which have to carry an emergency power supply. Although this kind of battery is not new, its use in American ships is a recent development. It may offer certain advantages over the lead-acid type commonly used in the United States Merchant Marine. However, its introduction has brought about new administrative problems in connection with determination of the state of charge and capacity of battery installations, and certain other considerations.

Commission engineers participated in studies by the Radio Technical Commission for Marine Services. They covered such subjects as the intermodulation problem in the VHF region, the solution to which bears directly upon equipment design and frequency utilization and, accordingly, has a direct bearing upon regulatory procedures; the relative merit of FM and AM in the VHF spectrum for marine radiotelephone equipment, looking to eventual international standardization; effective standardization of ship radiotelephone selective ringing systems which would offer economic advantages and better frequency utilization; and the problem of improving marine radiotelephone communication in the 2,000–3,500 kilocycle band in portions of which extreme congestion has been experienced.

3. AERONAUTICAL RADIO SERVICES

GENERAL

The year witnessed a continued increase in civil aviation activities under the Commission's jurisdiction. Radio communications have become vital for the operation of aircraft under all weather conditions both from the standpoint of safety of life and property as well as for the efficient, expeditious, and economical operation of aircraft in general. Navigational aids, traffic control operations, approach and instrument landing systems, special devices such as radio altimeters and distance measuring equipment and public correspondence systems all involve the use of radio in the aviation services.

There were nearly 24,000 air and ground aviation station authorizations outstanding at the close of the fiscal year. Though this is almost

3,500 less than in 1949, the decrease is due at least in part to the fact that a number of private aircraft owners have not been prompt in filing application for renewal. An enforcement program presently being conducted by the Field Engineering and Monitoring Division resulted in a large increase in the number of applications for private aircraft during the month of June, and an increase is expected to continue during the next 6 months. This delay in filing application for renewal was not apparent previous to 1950 since the rapid expansion in new aircraft stations more than offset these cases.

The fiscal year 1950 was the first major renewal year since the 2 year license term was inaugurated for private aircraft, hence the Commission deleted from its active files a large number of stations whose licenses had expired. Over 4,000 such stations were deleted during June 1950.

AVIATION ORGANIZATIONS AND CONFERENCES

The Commission has increased its participation in the various interagency coordinating and policy groups, both on a domestic and international scale, in order to solve the many new problems which are occurring as a result of increasing telecommunications developments. The most important of these groups are the International Administrative Aeronautical Radio Conference, the Air Coordinating Committee, the Radio Technical Commission for Aeronautics and the International Civil Aviation Organization.

The International Administrative Aeronautical Radio Conference convened in Geneva in July 1949 for its second session in order to complete a world assignment plan for the allotment of frequencies for the aeronautical mobile route services in accordance with the Atlantic City table of frequency allocation. The recommendations and plan, when adopted, will be used as a basis not only for the international allocation of frequencies but also for a high frequency plan for the continental United States.

A major and continuing function of the Commission is participation in the work of the Air Coordinating Committee. The ACC recommends proposed United States policy on aviation to the President, and acts as a vehicle for coordinating aviation matters between the various departments of the Government and industry. The Commission is active in the ACC through its membership on the Technical Division and the following subcommittees of that division: Aeronautical Communications and Electronic Aids; Airspace—Rules of the Air and Air Traffic Control; Search and Rescue; and Airmen Qualifications.

In addition, the Commission is represented on the Air Traffic Control and Navigational Panel which was established by the Air Coordinating Committee for the guidance and implementation of the "National All-

weather Air Navigation and Traffic Control Program." This panel also established an operational policy working group to formulate the operational programs and procedures for use during the period which the interim system of air navigation and traffic control is in effect.

The Radio Technical Commission for Aeronautics is a cooperative association of the United States Government-industry aeronautical telecommunication agencies. It conducts studies of aeronautical telecommunications problems and related matters for the purpose of providing guidance to, and coordinating the efforts of, the organizations concerned. One of the major and continuing activities of the Commission involves participation in the executive committee and special technical committees of the RTCA. During the past year, the RTCA has studied and is making recommendations on such problems as: (1) television interference to radio marker beacon receivers, (2) test standards and procedures for VHF radio equipment, (3) operational requirements and evaluation of long distance aids to navigation, (4) protection ratios for carrier current broadcast systems operating in the band 200–400 kilocycles, (5) reevaluation of the operational requirements for air-ground communications and equipment to fill these requirements for control of air traffic, and (6) development of a high altitude grid plan for omnidirectional radio range and distance-measuring equipment frequency pairing.

The International Civil Aviation Organization was established to develop the standards and recommended practices for international civil aviation through the process of regional and divisional agreements among the nations of the world. Representation at these meetings insures that the established policies of the Commission will be reflected in the deliberations of the meetings and further insures that the Commission will be kept informed on current trends and developments in international civil aviation telecommunications requirements which, because of the nature of aviation operations, affect and, in many instances, become a part of United States domestic requirements.

During fiscal 1950 the Commission assisted in the preparation for and participated in the following ICAO meetings: European-Mediterranean fixed telecommunication meeting, African-Indian Ocean fixed and Middle East fixed telecommunication meetings, African-Indian Ocean and Middle East frequency planning meeting, and European-Mediterranean frequency planning meeting, all held in Paris; the south east Asia frequency planning meeting at New Delhi, India, and the Caribbean RAN and frequency planning meeting held in Havana. The Commission furnished one chairman of a United States delegation, two vice chairmen and one United States spokesman to these meetings.

AIRCRAFT RADIO

The utility of radio in connection with aircraft operation is shown not only by the fact that it is legally required for the operation of an airline, but also by the great growth in the number of voluntary installations in private aircraft. There were over 20,000 authorized aircraft radio stations at the close of the fiscal year, of which number nearly 18,000 were private aircraft.

Rapid expansion in the aviation industry has called for correspondingly, far-reaching changes in the scope and nature of the services rendered by radio to aircraft operators. To meet the congestion of communication channels which resulted from expansion of civil aviation activities, the aviation communication systems have been undergoing a process of reengineering. Very high frequencies have been placed in service, new communication and traffic control procedures are being adopted, and every effort is being made to bring aviation communications to a peak in engineering efficiency.

AERONAUTICAL LAND AND AERONAUTICAL FIXED RADIO STATIONS

The aeronautical land and aeronautical fixed stations provide nongovernment communication service necessary for the safe, expeditious, and economical operation of aircraft. Aeronautical land stations communicate between the ground and aircraft, whereas aeronautical fixed stations furnish point-to-point communication to enable the airline to carry on its business more efficiently. In the United States the fixed service stations are used primarily as "backup" circuits for land line facilities; however, in international operations, and operations in areas where land line facilities are not adequate, radio provides the primary service. Domestic air carriers are required to maintain two-way ground-to-air radiotelephone communication at terminal and at such other points as may be deemed necessary by the Government to insure satisfactory communication over the entire aircraft route.

The growing importance of air travel in Alaska has necessitated major changes in aeronautical communications. An Alaska communications plan is being formulated, and will require considerable coordination between Government agencies and industry because of the diversified nature of Alaskan operations before it can be fully implemented.

In previous years the aeronautical land and aeronautical fixed stations included Civil Air Patrol radio stations. The Commission has recently amended its rules and is authorizing these facilities as Civil Air Patrol land and Civil Air Patrol mobile stations. Accordingly, the number of aeronautical land and fixed facilities decreased to slightly more than 1,400 at the year's close.

CIVIL AIR PATROL STATIONS

These stations provide the necessary communication for Civil Air Patrol activities and emergencies pertaining to the protection of life and property. Air shows, missing aircraft search missions, training missions, and communication systems at encampments, bases, and meetings are examples of official activities. To aid in the furtherance of Civil Air Patrol activities the United States Air Force has made certain frequencies available for assignment to the CAP.

There are nearly 2,000 ground stations licensed in this service as compared to some 1,600 last year. The increase in the number of authorized stations is not as slight as it would appear from the foregoing figures due to the fact that one application for construction permit or license may be submitted to the Commission for a Civil Air Patrol land station together with the associated number of Civil Air Patrol mobile stations required. In order to consolidate the files and lessen the workload in keeping records, the application is considered as one station. Due to this consolidation the license records for 1950 indicate that the number of units authorized for CAP in 1950 exceeds 7,000.

AIRDROME CONTROL STATIONS

This type of station provides communication between an airdrome control tower and arriving and departing aircraft for the purpose of regulating the separation of aircraft to avoid collisions and maintaining an efficient flow of traffic into and out of an airport. An airdrome control station also communicates with aeronautical mobile utility stations aboard essential vehicles of an airport. Airdrome control stations, for the most part, are operated by the Civil Aeronautics Administration; however, the number of such stations licensed by the Commission is continuing to increase.

AERONAUTICAL MOBILE UTILITY STATIONS

This class of station is installed aboard crash, maintenance, fire, and other vehicles which operate on an airdrome in order that the airdrome control operators may direct the movements of the vehicles as necessary. This service is used by many municipalities and individuals concerned with the care and upkeep of airports.

AERONAUTICAL NAVIGATION RADIO STATIONS

These stations involve the transmission of special radio signals to enable an aircraft to determine its position with reference to the navigational facility. Included are radio beacons, radio direction finders, radio ranges, localizers, glide paths, markers, and ground control approach stations.

This service, for the most part, is operated by the Civil Aeronautics Administration. The stations licensed by the Commission are installed at locations not served by the Government stations. The number of stations is expected to increase as the combined civil and military system of air navigation and air traffic control becomes further implemented.

FLYING SCHOOL RADIO STATIONS

Flying school stations aboard aircraft and on the ground are used for communication pertaining to instructions to flight students or pilots while actually operating an aircraft.

FLIGHT TEST RADIO STATIONS

A flight test radio station is a station aboard an aircraft or on the ground used for the transmission of communications in connection with the test of aircraft and major components of such aircraft.

AERONAUTICAL PUBLIC SERVICE RADIO STATIONS

The public service type of aircraft station has been provided for private communications between individuals aboard aircraft in flight and persons on the ground, and affords communication similar to those available by use of the public telephone. The aeronautical public service station connects to the Nation-wide land line telephone system through the facilities of the coastal harbor radiotelephone or coastal telephone stations. This service has increased each year largely due to the fact that operators of the "executive" type aircraft consider telephone communication to be essential in their business.

4. PUBLIC SAFETY RADIO SERVICES

The Public Safety Radio Services consisting of the Police, Fire, Forestry-conservation, Highway Maintenance, and Special Emergency Services have been operating for a full year under the major revision to part 10 of the Commission's rules effective July 1, 1949.

The extensive shift in frequency assignments necessary to bring existing operations into compliance with the revised frequency allocations has progressed satisfactorily. Out of the thousands of stations affected, approximately 100 licensees failed to meet the July 1, 1950 deadline. The Commission authorized an additional period of 3 months to enable the delinquent licensees to change to the new frequencies.

During the year a major improvement in the capabilities of the standard types of equipment employed in these services made it possible to assign adjacent channels to licensees in the same area. This, in effect, doubled the number of channel assignments that could be

made. The types of equipment in use at the time the adjacent channel equipment was developed will continue to be used for a few years before it will need to be replaced; consequently a short period of time must elapse before full advantage may be taken of the capabilities of the improved equipment.

Except for a few minor changes, the rules contained in part 10 have proved adequate. Some of these changes are undergoing proposed rule making while others are being studied.

The establishment and expansion of a network of police radio stations by the Territory of Alaska has required an extended survey of the frequency allocation and assignment plans of both the Federal departments and other nongovernmental agencies so that adequate channels may be made available. One frequency in the 2 megacycle band and 1 frequency in the 7 megacycle band have provided for police highway patrol.

It is proposed to authorize operation of stations with a maximum input power of 10 kilowatts in the Police Radio Service on frequencies now allocated primarily by State police licensees. With this increase in power many States hope to operate with fewer base stations and still obtain equal or better service. It is thought that considerable savings in operating expense may be gained.

During the past year all public safety services continued to expand. Indeed, radio systems in these services are being augmented at a rate that is taxing the manufacturers' ability to supply the equipment demanded, particularly certain components such as crystals.

POLICE RADIO SERVICE

Police radio station authorizations are issued to States, Territories, possessions, and other governmental subdivisions including counties, cities, and towns. Governmental institutions charged with the responsibility for providing police protection are also eligible. Networks covering entire States have been established on the radiotelephone channels, and these networks are linked into still larger networks embracing groups of States by means of the radiotelegraph channels which have been made available for long distance fixed operations.

FIRE RADIO SERVICE

Eligibility for licensees in the Fire Radio Service is restricted to governmental agencies and organizations such as the volunteer fire departments which are responsible for providing local fire protection. Expansion in this service is occurring principally in the heavily populated urban areas where the need for separate communication facilities is necesary because the police radio system is unable to provide fire protection service. In the rural areas the volunteer fire

departments are establishing radio systems very slowly due to the limited funds available for radio equipment. Unless funds can be provided, it appears that these areas where there is a great need for radio communication due to the lack or inadequacy of public telephone facilities must continue to operate without the assistance of radio.

FORESTRY-CONSERVATION RADIO SERVICE

Stations in the Forestry-conservation Radio Service are authorized to transmit communications directly relating to public safety and the protection of life and property including those essential to the prevention, detection, and suppression of forest fires, and official forestry-conservation activities. Eligibility for this class of station is restricted to States, Territories, possessions, and other governmental subdivisions including counties, cities, and towns and similar governmental entities, and persons or organizations charged with specific forestry-conservation activities.

The forestry portion of this service has been established for many years and most of the eligibles have established radio communication systems. Consequently, the number of forestry systems did not increase much during the past year. However, most of these systems have been greatly expanded to provide a more complete coverage. During the year several States added conservation communication systems which are independent of their forestry operation.

HIGHWAY MAINTENANCE RADIO SERVICE

The Highway Maintenance Radio Service completed its first full year of operations. Eligibility for this service is likewise restricted to States, territories, possessions, and other governmental subdivisions, including counties, cities, towns, and similar governmental entities. The scope of service provides primarily for the transmission of messages directly relating to public safety and the protection of life and property; and secondarily provides for intercommunication with other stations in the Public Safety Services. It is anticipated that this particular service will continue a steady growth, particularly among the State and county eligibles.

SPECIAL EMERGENCY RADIO SERVICE

Communications in the Special Emergency Radio Service are restricted to matters directly relating to public safety and the protection of life and property. The eligibility provisions include physicians normally operating in remote areas where other communication facilities are not available, ambulance services, beach patrols responsible for life-saving activities, school bus operators having regular routes into rural areas where other communication facilities are not available; in

addition to the previously recognized eligible groups, namely: persons having establishment in remote locations lacking other communication facilities, and organizations established for relief purposes in emergencies and communication common carriers.

During the year, many members of the medical profession obtained licenses to intercommunicate between their homes and offices and their automobiles. And ambulance services, too, have been issued licenses to equip their ambulances with radio.

5. LAND TRANSPORTATION RADIO SERVICES

The Land Transportation Radio Services provide radio facilities for commercial activities closely connected with the Nation's transportation industries. This group includes the Railroad, Urban Transit, Taxicab, Intercity Bus, Highway Truck, and Automobile Emergency Radio Services.

The year marked a continuation of rapid expansion in radio facilities authorized for these transportation services. This growth can be attributed to several major factors, one of which is the adoption of part 16 of the Commission's rules, effective July 1, 1949, which made it possible for numerous transportation carriers to invest in communication equipment with assurance that the facilities to be installed would be protected by firm frequency allocations. By virtue of this Commission action, the trucking, taxicab and intercity bus transportation carriers and the operators of vehicles providing emergency road service were authorized, for the first time, to operate in an established radio service. Prior to this date, authorizations for these operations were permitted only on an experimental basis, consequently industry was reluctant to invest in radio facilities wherein no assurance existed that their use could be continued. Considerable credit is also due manufacturers for their part in expediting the development of radio equipment capable of operating on adjacent channel frequency assignments without undue interference. Without this improved equipment the present and future expansion of these services would be seriously handicapped.

The rules reflect, to a large extent, the experience gained during the years since the war, particularly in the general mobile experimental program. The rules are designed to permit the maximum utilization of frequencies allocated with a minimum of interference. They cover technical specifications for the equipment to be used, transmitter operation practices and licensing procedures. Frequency allocation and the requirements relative to determining eligibility are set forth for each of the various service categories.

The scope of eligibility was broadened during the past year. Heretofore, the service rules required that an association be composed of

members who were themselves, as individuals, eligible for authorizations in the respective service in which the association was rendering a communication service. Under the revised rules, the eligibility requirement of the association's members has been changed so as to permit establishment of radio systems financed on a cost-sharing basis and thus enable companies to make use of an economical arrangement of common communication facilities.

Notwithstanding equipment improvements made during the year, the one major problem still hindering the full development of these services is frequency spectrum congestion. The ever expanding use of radio has created service problems requiring constant study on the part of the Commission and industry. Education in the use of this new communication expedient is essential to obtain maximum benefits for all concerned. Industry has been encouraged to organize local, regional, or national frequency advisory committees for the purpose of formulating frequency assignment plans which reflect a coordinated effort on the part of the users to obtain maximum frequency utilization with a minimum of interference. Committee participation in these frequency assignment matters is of great value to the Commission in the discharging of its regulatory obligations to the public of making effective use of the available radio frequency spectrum.

RAILROAD RADIO SERVICE

The Railroad Radio Service is available to all railroads providing a passenger or freight transportation service on a common carrier basis. Communications are limited to those relating directly to the protection of life or property and messages essential to the maintenance, supervision, and efficient operation of the railroad systems.

Radio has provided these carriers with an economical and dependable means of communication between cab and caboose, between trains within range of each other, between moving trains and wayside stations, and between adjacent wayside stations. It has made possible the efficient and safe operation of yards and terminals under conditions of heavy weather and fog. The performance of the extensive railroad radio communication systems in use throughout the country under diverse climatic conditions and terrain has successfully demonstrated that radio has become an integral and effective factor in safe, efficient, and dependable railroad transportation. It has been of material aid in preventing accidents and in practically all cases its use has saved considerable time in effecting repairs.

In its administrative functions regulating this service, the Commission has given considerable study to operational and other related problems unique to the railroad industry. The service showed a healthy development during the year and it is anticipated that ex-

pansion will continue. Numerous new applications of radio are continually arising which give promise of even further advantages from the users standpoint. Such new usages, in numerous cases, require extensive study to determine the over-all effect, not only in the railroad service, but in other services sharing the radio frequency spectrum, to insure that extending the service will be beneficial to all concerned.

The expansion of the service has been sound and its radio communication systems are being installed on a carefully engineered basis. This has worked to the advantage of the user as well as the Commission and its regulatory responsibilities. A gratifying interest is being shown in the automatic repeater type of installation used in yard and terminal operations where direct communication is essential between yard and train dispatchers moving about in the yard and the switchmen and engineers engaged in classification movement of cars. Microwave installations have also proved valuable along railroad right-of-ways during periods when wire lines are subject to disruption by ice, sleet, or wind storms, and also to supplement wire line systems for control circuits, telemetering, and voice channels. Developmental work in this portion of the radio spectrum is being encouraged and it is expected that microwave operation will expand as experience is gained on its use and advantages. Microwave systems presently in operation have given firm evidence of the economic and operational advantages over wire line facilities.

As of June 30, 1950, in addition to base stations, over 2,400 radio-equipped mobile units were authorized in this service. Approximately 30 percent of the class I railroads are using radio facilities in their operation.

URBAN TRANSIT RADIO SERVICE

This service makes radio communications facilities available for street railway systems and city and urban bus lines. Its use has been of value in providing prompt aid to streetcars and transit buses in periods of emergency occasioned by power failures, collisions, or breakdown of equipment. In addition, the use of radio communication facilities provides efficient dispatching of passenger-carrying vehicles during rush hours and other critical traffic periods. To date most authorizations in this service have been granted for transit operations in the larger cities. It is expected that the service will continue its steady growth and that more use will be made of its potentialities in smaller cities.

TAXICAB RADIO SERVICE

This particular service is used in connection with the dispatching and other operation of taxicabs. It should not be confused with radiotelephone service available to passengers in public vehicles, which is

separately treated in the chapter on common carriers. In the 5 years the taxicab radio service has been authorized, 4 of which were on an experimental basis, it has expanded at a remarkable rate and at the close of the year approximately 50,000 taxicabs were linked to base stations for operational purposes.

In accordance with rules which went into effect on July 1, 1949, a total of eight frequencies in the 152–162 megacycle band were opened to this service. In addition, 10 frequencies in the 450–460 megacycle band were allocated for developmental operation looking towards the eventual establishment of these frequencies for regular taxicab service assignment. Although equipment is presently being developed for those higher frequencies, their use will be curtailed until such time as economical and efficient apparatus is available. Tests conducted on 450–460 megacles indicate that for localized taxicab radio-communication needs use of these frequencies will materially reduce the interference currently caused by the simultaneous operation of several taxicab systems on the same frequency in congested or thickly populated areas. Every effort is being made to encourage the manufacture of equipment for operation in these bands and it is felt the continued healthy expansion of this service rests on the ultimate use of these higher frequency assignments.

In the taxicab radio service, more than any other, the coordinated assignment of frequencies is of primary importance if all users are to obtain maximum benefits from their investments. During the year the Commission actively encouraged cooperation and coordination of frequency assignments among the various taxicab operators, In many communities committees of operators have been formed for the purpose of selecting particular frequencies to be used by each individual system. This coordination has resulted in improvement of the service, and it is anticipated that the coming year will see the taxicab interests expanding their cooperative effort to include more segments of the industry. This is of prime importance to a service which is expanding at such a rapid rate that a critical shortage of frequency assignments will occur, and has already occurred in numerous areas, unless prompt steps are taken to obtain the maximum possible use from the available frequencies. Careful coordination in the selection and assignment of frequencies is imperative if maximum frequency utilization is to be obtained and, further, to prevent degrading the service.

The year also saw the widespread installation of equipment which will operate satisfactorily on adjacent frequency channel assignments. This development is of major importance to this industry where adjacent channel operation is a necessity. Taxicab radio users are urged to consider carefully the planning of their systems to assure

the equipment to be used has been designed to permit adjacent channel operation between stations in the same geographical area.

INTERCITY BUS RADIO SERVICE

This service provides for the operation of radio-communication facilities by carriers regularly engaged in passenger transportation over public highways between cities. The use of radio for this purpose assists bus operators in providing efficient, safe, and dependable bus service. Communications are often necessary to expedite warnings to drivers of dangerous road conditions likely to be encountered. Mechanical trouble can often be speedily rectified by the bus driver calling the dispatcher to facilitate the dispatch of repair trucks or an additional bus as needed. Schedules can be more readily adjusted to fit the traffic demands. Radio is also valuable in emergencies requiring medical assistance.

The Intercity Bus Radio Service has, since its inception, experienced a slow but steady growth. Radio installations in this service, to be effective, must provide an extensive area of coverage. Such systems require detailed coordinated planning and normally involve a number of highway transmitter installations. This is costly and operators are proceeding cautiously before making extensive commitments. It is expected, however, that the experience gained from the satisfactory operation of the systems already installed will influence other operators to participate on a progressively larger scale than heretofore. As the larger bus companies install radio systems along highways, smaller operators may find it desirable to integrate their communication needs into the radio system of the larger companies by the cooperative use of the base station facilities. The rules governing this service provide for such cooperative operation.

HIGHWAY TRUCK RADIO SERVICE

This service provides radio-communication facilities to persons engaged in trucking operations on an intercity basis, or on a route basis outside of metropolitan areas. Stations in this service are authorized to transmit messages relating directly to the safety of life or property and communications essential to the maintenance, supervision, and efficient operation of trucks.

The year witnessed a marked increase in the number of systems installed, including authorizations for a number of extensive networks covering several States. It is anticipated that the operation of such extensive radio systems will induce others to follow as experience reveals the needs and advantages of an integrated radio-communications system as an aid to increasing the efficiency of trucking. In addition to normal interstate and intercity type of truck operations,

Common Carrier Applications

The number of applications filed with the Commission by common carriers during the fiscal year totaled nearly 5,000 (exclusive of Alaskan and marine mobile). They were in the following categories:

Class	Pending June 30 1954	Received	Disposed	Pending June 30, 1955
RADIO FACILITIES				
Domestic public land mobile	74	1,298	1,274	98
Fixed public telephone (domestic)	0	10	10	0
Fixed public telephone (international)	10	57	64	3
Fixed public telegraph (domestic)	0	4	4	0
Fixed public telegraph (international)	26	207	228	5
Canadian registration	0	16	16	0
Developmental	0	35	33	2
Subtotal	110	1,627	1,629	108
WIRE FACILITIES				
Telephone extensions	0	139	133	6
Telegraph extensions	0	26	26	0
Telephone reductions	2	9	7	4
Telegraph reductions	109	927	951	85
Subtotal	111	1,101	1,117	95
MISCELLANEOUS				
Interlocking directorates	1	11	12	0
Jurisdictional determination	0	0	0	0
Submarine cable landing licenses	1	1	2	0
Petitions or motions (nondocket)	1	1	2	0
Experimental common carrier	64	2,218	2,216	66
Subtotal	67	2,231	2,232	66
Total	288	4,959	4,978	269

Safety and Special Radio Services

GENERAL

The Safety and Special Radio Services comprise all of the varied and extensive radio activities administered by the Commission with the exception of broadcast, common carrier and experimental operations. They constitute the largest number of radio stations authorized by the Commission.

These services may be grouped into the following general classes:

Safety services.—Marine, Aviation, Police, Fire, Forestry-Conservation, Highway Maintenance, Special Emergency, and State Guard.

Industrial services.—Power, Petroleum, Forest Products, Special Industrial, Low Power Industrial, Relay Press, Motion Picture, Agriculture, and Industrial Radiolocation.

Land Transportation services.—Automobile Emergency, Highway Truck, Interurban Passenger, Interurban Property, Railroad Taxicab, Urban Passenger, and Urban Property.

Miscellaneous serivces.—Amateur, Disaster Communications, and Citizens.

These groups represent the private use of radio communication facilities by the general public for business and safety purposes as distinguished from the direct public service rendered by common carriers and broadcasters. The privilege of giving localized radio service in this category is not exclusive, but is granted for shared use of frequencies on the basis of the applicant's eligibility.

They provide communication by ship and marine shore stations; aircraft and aeronautical ground stations; state and municipal police, fire and highway departments; disaster organizations; public utilities; for petroleum exploration, drilling, and production; pipelines; by many types of manufacturing enterprises; in railroad, bus, truck, and taxicab operations; by amateurs and other individuals.

The most extensive employment of radio has been in the fields of industry and commerce. The adaptation of radio techniques to industrial and transport operations has developed rapidly and ranges from the employment of small portable equipment for directing warehouse crews or steam-shovel operators to complex radio facilities and million-dollar systems for controlling big pipeline operations.

The number of stations is one index to the activity and regulatory workload in these services. In 1940 their number (exclusive of commercial and amateur operators) was less than 10,000. At the outbreak of World War II it was under 13,000. In 1949 the total had increased to 143,000, and to 262,000 in 1954. Today these authorizations exceed 300,000, representing the use of more than 767,000 fixed and mobile transmitters.

MARINE RADIO SERVICES

Safety at Sea

International Convention for Safety of Life at Sea and Title III, Part II, of Communications Act.—On August 13, 1954, Public Law 584, 83d Congress (S. 2453), which was based on recommendations of the Commission, was adopted by Congress to implement the radio provisions of the International Convention for the Safety of Life at Sea (1948). Its principal effect was to add to the compulsory ship radio requirements of the Communications Act provision that (1) cargo ships between 500 and 1,600 gross tons must carry prescribed radiotelephone or radiotelegraph installations; (2) vessels of 1,600 or more gross tons must be equipped with a radio direction finder; and (3) United States coastwise vessels and foreign nonconvention ships in our ports must meet radiotelegraph requirements applicable to ships subject to the convention.

It is estimated that the first requirement added about 175 ships to those compulsorily equipped with a radio installation, while the second requirement increased from approximately 50 to 1,200 the number of United States vessels that are compulsorily equipped with radio direction finders. To implement these changes to the act, the Commission on April 14, 1955, amended its rules to provide detailed requirements for compulsorily installed radiotelephone equipment and, on June 22 thereafter, with respect to compulsorily installed radiotelegraph equipment.

New Great Lakes Agreement.—On November 13, 1954, the Agreement for the Promotion of Safety on the Great Lakes by Means of Radio (a treaty between the United States and Canada) came into force and a related section of the Ship Act of 1910 was simultaneously repealed by Public Law 590, 83d Congress. This statute was also sponsored by the Commission. The agreement compels several hundred United States ships, as well as ships of Canada and other countries, to carry radiotelephone installations for safety purposes and establishes an international radiotelephone safety system on the Great Lakes. The repealed act section provided a radiotelegraph

safety system for only a few Great Lakes passenger ships. The Commission amended its rules, effective November 13, 1954, to implement the Great Lakes agreement. Public Law 590 also made certain changes to facilitate the administration of the agreement. Among other matters, the principle of the Title III, Part II, forfeiture provisions was extended to cover Great Lakes violations.

Proposed safety at sea legislation.—A bill (H. R. 4090), introduced February 16, 1955, would amend Part II of Title III of the Communications Act to require the installation of an automatic radio call selector on United States cargo ships carrying less than two qualified operators. The Commission submitted comments to the House Committee on Interstate and Foreign Commerce, after testing at its laboratory a specimen device offered by one manufacturer. The Commission did not support adoption of the bill.

Another bill (H. R. 3111), introduced January 26, 1955, would amend Part II of Title III of the Communications Act to require that vessels compulsorily equipped with radio installations report their positions once every 24 hours. The Commission's comments called attention, among other matters, to the lack of a United States system or an international system for effective use of the position reports required by the bill.

Exemptions from compulsory requirements.—The Commission is authorized by law to grant exemption from the ship radio requirements of the Safety Convention, the Communications Act, and the Great Lakes Agreement. Under this authority, it renewed blanket exemptions for one year to all passenger vessels of 15 gross tons and under which are navigated in the open sea within 20 nautical miles of the nearest land, and to all passenger vessels of less than 100 gross tons when navigated within prescribed areas along the United States coasts.

Three applications for extension were received during the year for Great Lakes vessels and 48 for other vessels navigated on ocean voyages or on international voyages in Puget Sound. Original or renewal exemption from compulsory radiotelegraph requirements was granted to 7 passenger ferries navigated in Puget Sound, 2 vessels (each approximately 1,800 gross tons) navigated on short coastal voyages, 8 vessels engaged in oil well drilling operations in the Gulf of Mexico, and 2 small sport-fishing passenger vessels of less than 100 gross tons. All of these vessels were equipped with radiotelephone intallations. Applications filed in behalf of 6 coastwise lumber-carrying cargo vessels and 3 Great Lakes vessels were denied. As yet, no exemption from the Great Lakes Agreement has been granted to any United

States ship. The remainder of the applications were either covered by existing blanket exemptions or were pending at the end of the fiscal year.

The telegraph alarm signal, transmited by the distress signal (to actuate an auto alarm on vessels not maintaining a continuous listening watch) for the purpose of alerting operators to receive the subsequent distress message, was used effectively in many cases. Radiotelephony also was used extensively to summon aíd, particularly by small vessels in need of Coast Guard assistance.

Distress studies.—Studies of distress communication are used to strengthen the Commision rules and to otherwise promote use of marine radio for safety of life and property. These studies showed that the international radiotelegraph distress signal (SOS) was used throughout the world, not less than 216 times during the year. This was by or on behalf of 160 foreign ships, 26 United States ships, 16 foreign aircraft and 14 United States aircraft.

The telegraph alarm signal, transmitted before the distress signal (to actuate an auto alarm on vessels not maintaining a continuous listening watch) for the purpose of alerting operators to receive the subsequent distress message, was used effectively in many cases. Radiotelephony also was used extensively to summon aid, particularly by small vessels in need of Coast Guard assistance.

The distress studies also showed a considerable amount of actual and potential interference to distress calls. This was due to misuse of the radiotelegraph and radiotelephone distress frequencies by vessels not in distress or not rendering distress assistance. A corrective program included dissemination of instructional material through publications and radiotelegraph broadcasts to ship station operators.

Improved auto alarms.—Two new types of auto alarms, developed to meet revised standards of the Safety Convention, were tested and type-approved by the Commission.

Shore-based radar stations are being used on a developmental basis (1) for the piloting of ships entering and leaving major harbors, and (2) to assist in the navigation of vessels in connection with construction projects and oil well drilling in the Gulf of Mexico area.

Three stations remain in the first group. These are at Long Beach, Los Angeles harbor, and San Francisco. While developmental reports show that these stations reduce delay to ships entering and leaving port during bad weather, the absence of such stations at other major ports appears to be due to economic factors. The number of stations in the second group continued to increase during the year.

As of June 30, 1955, more than 2,600 United States ships were authorized to use radar.

Radio Aids to Navigation

Marine radio communication systems.—The following figures (as of June 30, 1955) reflect the more important categories of stations which provide general marine radio communication:

	Public coast	Limited coast
Telephony in 2-3 megacycle band	48	3
VHF telephony	39	148
HF long-distance telephony	5	0
Telegraphy (various frequencies)	28	2

Great Lakes weather transmissions.—Because of a need on the Great Lakes for more ship-shore use of the 2–3 megacycle frequency band for commercial radiotelephone messages, the Commission confined scheduled marine weather transmissions from shore stations on those lakes to 2514 kilocycles and discontinued weather transmissions on the other 2-megacycle channel previously used for this service. Public ship-shore service is improved since more time is available for handling messages in this band. Ship stations may communicate with coast stations on other 2-megacycle frequencies at the same time that weather schedules are being transmitted. Transmission of marine weather schedules by Great Lakes stations on frequencies having long distance characteristics has not been changed.

Implementation of Geneva frequency plan.—Progress continued to be made in implementing the 1947 international frequency allocations for the maritime mobile service in the frequency bands below 27 megacycles in accordance with the Geneva Agreement of 1951. All the new ship high frequency radiotelegraph bands have been inaugurated—the ship calling bands in 1954, and the cargo and passenger ship working bands on January 1, 1955 and January 15, 1955, respectively. All licensed coast telegraph stations are now operating on their new internationally approved frequencies. Full time (instead of day only) use of the exclusive telegraph frequencies by coast and ship stations in the band 2035–2107 kilocycles was authorized on June 1, 1955. Internationally approved radiotelephone frequencies between 4000 and 23,000 kilocycles for United States stations high seas ship-shore service are virtually implemented.

Intership frequencies.—The Commission made a new intership frequency, 2830 kilocycles, available in the Gulf of Mexico area in lieu of 2738 kilocycles. As a result, congestion on 2738 kilocycles in the Atlantic and Pacific coast areas was relieved to some extent.

Certain stations in the aeronautical service experienced harmful interference on 5476.5 kilocycles caused by the second harmonic emis-

sions of ship stations operating on 2738 kilocycles. To remedy this, the Commission requires a certification that the equipment for transmitting on 2738 kilocycles meets certain second harmonic attenuation levels. To preclude a like situation from occurring with respect to the aeronautical frequency 5656.5 kilocycles, a similar certification is also required for transmitters on 2830 kilocycles.

Ship-Shore radiotelephone public correspondence.—Various rule-making proceedings and authorizations resulted in the activation, in accordance with the Geneva Agreement, of new 2-megacycle frequencies for public correspondence radiotelephone service at several ports. Improvements in ship-shore service have resulted or will soon occur at Boston, Miami, Mobile, New Orleans, Galveston, San Francisco, Eureka (California); Seattle; The Dalles, Umatilla (Oregon), and Pasco (Washington).

New VHF public coast stations.—Two new VHF (very high frequency limited range) public coast stations were established, one at Bodkin Point (near Baltimore), and the other at Grand Isle, Louisiana. The Commission authorized VHF public coast stations on the Great Lakes at Hancock, Port Huron, Escanaba, East Tawas, and Marquette, Michigan; and Green Bay, Wisconsin, and set for hearing similar applications for Toledo, Milwaukee, and Cleveland because of duplication of service aspects. Certain competing common carriers protested, and the Commission postponed the effective dates of the protested grants pending a consolidated hearing with respect to all of the applications.

Operation in 152–162 megacycle band.—Following rule-making proceedings in 1954, the Commission prohibited assignment of certain of these VHF frequencies to persons not operating the vessels on which the ship stations would be located. The Lake Carriers' Association petitioned to repeal the rule, alleging that the rule has a detrimental effect on the full development of a Great Lakes VHF system because most vessels whose radio stations are licensed in the name of a communication company are not taking advantage of the availability of the business and operational frequency— 156.5 megacycles— due to licensing complexities arising out of the rule. The petition was the subject of a rule-making proceeding which was pending as of June 30, 1955.

Multichannel and type acceptance in 152–162 megacycle band.—In accordance with rules promulgated some years previous, all ship stations operating in the 152–162 VHF megacycle band were to comply by January 1, 1955, with regulations requiring multichannel and type-accepted VHF equipment. A number of vessel owners indicated involuntary noncompliance as of that date and were given

limited additional time to permit modification or delivery of equipment accordingly. However, as of June 30, 1955, the requirements were applicable to all stations affected.

Interim licenses.—The Commission, realizing the need of many boat owners to obtain immediate licensing of their ship radio installation for safety and other purposes, provided for the granting of interim radiotelephone ship station licenses by FCC field engineering offices pending action at Washington on formal application for a regular term license.

Public Fixed and Maritime Stations in Alaska

Because of the scarcity of wire line facilities, Alaskan communities depend largely on radiotelephone and radiotelegraph for safety and business communication. Frequencies are allocated for communication between communities, between communities and the Alaska Communication System (ACS), and between coast and ship stations. The main intra-Alaska communication trunklines are operated by ACS under the Department of Defense. The ACS routes message traffic to all parts of the world. The Commission maintains liaison with it in coordinating communications facilities in Alaska to serve the public interest.

Following an on-the-spot survey and informal conferences with Alaskan interests during the early part of fiscal 1955, the Commission proposed a comprehensive revision of Part 14, Rules Governing Public Fixed Stations and Stations of the Maritime Services in Alaska. Subject to these rules are several hundred Alaskan radio stations furnishing public service between communities, between ships and shore stations, and between ships. Although these rules are not applicable to United States Government stations, they do regulate, to some extent, communication between non-Government stations and, public service stations of the ACS.

After rule-making proceedings in which pertinent comments, mostly from Alaskan licensees, were considered, the rules were finalized, effective June 20, 1955. They are expected to bring about more effective communication through improved techniques for using the limited number of available frequencies, and by the employment of a new zone plan of frequency assignments. The zone plan is based upon division of the Alaska area into six specific zones and is designed to facilitate sharing of frequencies by geographical separation between zones allotted the same frequencies. The rules also reflect the establishment of a 4-year station license term instead of the present 2-year term, and provide for a change-over period until May 1, 1957, for those stations licensed prior to the effective date of the new rules. Enforcement of the new regulations is expected to require con-

siderably increased inspection and monitoring by the Commission's field offices.

Although the revised rules go a long way toward modernizing the regulation of radio communications in Alaska, there are still questions of policy to be resolved regarding the historical requirements that all non-Government stations in these services must be open to public correspondence and the relationship between such stations and public service stations of the ACS.

At the close of the fiscal year there were, exclusive of Government stations, 466 public fixed stations and 320 public coast stations authorized in Alaska.

Radio Technical Commission for Marine Services

The Radio Technical Commission for Marine Services (RTCM) is a cooperative association of Government-industry marine telecommunication agencies. Seven Government departments and approximately 130 industry agencies are represented. It conducts studies through special committees of experts. Its objective is the resolution of marine telecommunications problems by mutual agreement. Its findings are in the nature of recommendations to all organizations concerned.

The FCC, along with the other member organizations, has requested the RTCM to make certain technical studies in order to have coordinated Government and industry recommendations as a guide.

The RTCM, at the request of the Commission, conducted a study and issued a report on May 17, 1955, on a plan for the standardization of marine r· diotelephone channel designators.

The RTCM on March 15, 1955 reported the result of special committee study of a commercially adaptable rapid and positive all-weather marine identification device to aid in the reduction of marine casualties and facilitate the safe movement of vessels in congested and restricted areas.

The RTCM organized special committees to study four marine problems at the request of the U. S. Study Group XIII of the International Radio Consultative Committee (CCIR). The RTCM has, accordingly, submitted recommendations concerning a marine identification device, bearing and position classification for HF and VHF direction finding, technical characteristics of frequency modulated VHF maritime equipments, and testing of 500-kilocycle radiotelegraph auto-alarm receiving equipment on board ships. Its recommendations, if acceptable to the Department of State, will formulate the basis for the United States position at the eighth plenary meeting of the CCIR at Warsaw in 1956.

Another special RTCM committee was established this past year to conduct studies on a broad basis for a future developmental program for the marine radio services.

Two other special committees have continued their studies of reliable short-range radiotelephone system for bridge-to-bridge communication on all types of vessels; and minimum specifications for 2-megacycle radiotelephone equipment.

The Treasury and State Departments requested and received the RTCM's recommendation on the question whether the United States should extend an invitation to have another International Meeting on Marine Radio Aids to Navigation (IMMRAN) in the United States.

An RTCM Committee prepared material for the guidance of the members of the United States observer delegation sent by the Department of State to the Baltic and North Sea Radiotelephone Conference at Goteborg, Sweden, which convened in September 1955.

The Commission assists in the support of the RTCM by furnishing office space and the full-time services of an electronics engineer as the Executive Secretary. FCC Commissioner Webster is the Vice Chairman of the RTCM, as well as the FCC member of the executive committee.

AVIATION SERVICES

General

The Aviation Services provide radio facilities for communication essential to aircraft operation and safety of life and property in the air. They operate Aircraft radio stations, Aeronautical Enroute and Aeronautical Fixed radio stations, Operational Fixed stations, Aeronautical Utility mobile stations, Flight Test stations, Flying School stations, Aeronautical Advisory stations, Aeronautical Public Service stations, Civil Air Patrol land and mobile stations, and Radionavigation stations which comprise radio beacons, radar services, direction finding systems, traffic control operations, approach and instrument landing systems, radio altimeters, and distance measuring devices.

Aviation Organizations and Conferences

During fiscal 1955 the Commission continued active participation in various interagency radio coordinating and policy groups, both on a domestic and international scale, in order to deal with the many new problems which arise as a result of increasing telecommunications developments. These groups include, but are not limited to, the Air Coordinating Committee (ACC), the International Civil Aviation Organization (ICAO), and the Radio Technical Commission for Aeronautics (RTCA).

Air Coordinating Committee.—The ACC is a Federal interdepartmental committee responsible for coordinating United States policy

interest was manifested by many business concerns engaged in the distribution of various commodities such as butane gas, fuel oil, milk, etc.

A nation-wide plan of frequency allocations was recently prepared by the traffic section of the American Trucking Associations, Inc., which will assist the Commission in frequency assignment problems associated with this expanding radio service. The plan has been carefully engineered to take into account wave propagation characteristics as well as the rate territories and the major traffic patterns. It parallels closely the previous plan established by the Commission, dividing the country into six major areas for frequency assignments. The areas are formed so that boundary lines cross areas of minimum traffic density; also, taking into consideration distribution centers and points served to permit maximum use of radio with single frequency equipment in the respective areas. It is anticipated that such an assignment of frequencies in accordance with the traffic needs of the industry will greatly aid trucking operations obtain reliable, interference-free radio communication.

AUTOMOBILE EMERGENCY RADIO SERVICE

This service was established to provide persons or organizations rendering emergency automobile road service to the general public with radio facilities to expedite the dispatching of service cars and trucks. Considerable interest has been shown in this service by both automobile associations and operators of public garages. It has proved especially effective in getting emergency road-service trucks to stalled vehicles, which materially contributes towards public safety by the prompt removal of traffic hazards.

A continued steady growth is anticipated for this service. During those periods of adverse weather conditions in which the need for such service is greatest, the single channel presently in use has not proven adequate in heavily congested metropolitan areas to handle the large volume of message traffic. It is hoped that future availability of equipment in the 450-megacycle band will materially lessen congestion and permit this important service to provide reliable service in all areas.

6. INDUSTRIAL RADIO SERVICES

The year saw the services in the industrial radio group grow in the manner that had been expected. These services, which include power, petroleum, forest products, motion picture, relay press, special industrial, and low-power industrial radio, were by rules effective July 1, 1949, either created or carried over from services already established.

in the field of aviation. The committee was established primarily to examine and make recommendations on aviation problems affecting more than one participating agency. It is composed of standing committees, panels, subcommittees, ad hoc committees, and working groups. Inasmuch as many of the problems submitted to the ACC relate to aeronautical telecommunications, the Commission participates as a member of the following committees: Technical Division; Airspace—Rules of the Air and Air Traffic Control; Aeronautical Communications and Electronic Aids; Search and Rescue; Aerodrome, Air Route, and Ground Aids; and Airmen Qualification.

The Commission is also represented on the Air Traffic Control and Navigation Panel which was established by the ACC on recommendation of the Congressional Aviation Policy Board and the President's Air Policy Commission to guide the program for providing all-weather air navigation and traffic-control facilities as well as a national air defense system.

Some of the current activities of the ACC in which the Commission participates are: studies of applications for the construction of antenna towers which may be a hazard to air navigation, and the effect of tall antenna towers to air navigation; formulating policy for the guidance of the United States representative to the ICAO on international aeronautical telecommunications problems; preparation of positions for the guidance of the United States representatives to ICAO conferences and meetings; preparation of a national plan to integrate available search and rescue facilities in a cooperative network to offer greater protection of life and property of citizens; and consideration of a report of the Air Navigation Development Board on evaluation of the VOR/DME and TACAN air navigation systems and the probable effect on the future air navigation common system.

By continuing to participate actively in the affairs of the ACC, the Commission has been successful in furthering industry's advancement in aeronautical communication and in coordinating the requirements of the aviation industry with the policies of the United States.

International Civil Aviation Organization.—The Commission took an active part in the preparation of United States positions for four international communications meetings held under the sponsorship of the ICAO, and furnished a representative who participated in two of the meetings; i. e., the Third North Atlantic Regional, held at Montreal, October 5–29, 1954, and the Special European-Mediterranean, held at Paris, November 16–27, 1954.

The year's end found Commission helping to prepare the United States position for the First Pacific Regional Air Navigation meeting scheduled to convene at Manila, October 27, 1955; the Third Carib-

bean Regional Air Navigation meeting, tentatively scheduled for April 4, 1956, at Cuidad, Trujillo; and the Second Air Navigation Conference, at Montreal, beginning August 30, 1955.

The Extraordinary Administrative Radio Conference (EARC) of the International Telecommunication Union (ITU) Geneva, 1951, concluded an agreement which allocated exclusive frequencies for the Aeronautical Mobile Route (R) service. Commission implementation of the new frequencies for this service was virtually completed during fiscal 1955 on both a national and international basis.

Radio Technical Commission for Aeronautics.—The RTCA is a nonprofit cooperative association comprising United States aeronautical and areonautical-communication agencies both industrial and governmental. It functions under a joint agreement by the Government and non-Government agencies represented on its executive committee.

The general membership of RTCA, known as the Assembly, is composed of over 100 aeronautical telecommunication agencies. Membership in the assembly is wholly voluntary and is open to any domestic organization actively identified with any phase of aeronautical telecommunications.

During the past year the RTCA had under study such problems as: Implementation of the VHF Utilization plan and review of transition period communication requirements; high altitude grid plan for VOR/DME frequency pairing; minimum performance standards for airborne electronic equipment for the transition period common system; re-evaluation of VOR airways lateral separation procedures; helicopter air navigation, communication, and traffic control; committee organizations and functions; and study of possible interference from TV in the UHF band.

Aircraft Radio Stations

These stations are installed on both aircarrier and private aircraft. More than 2,600 aircarrier stations and 27,300 private aircraft stations are authorized.

En Route and Fixed Aeronautical Radio Stations

The facilities, of which nearly 1,400 are authorized, provide the necessary communication for the safe, expeditious, and economical operation of aircraft. Aeronautical land stations are used for communicating with aircraft whereas aeronautical fixed stations engage in point-to-point communication.

In the domestic United States, aeronautical fixed stations are used primarily as "back up" circuits for land-line facilities; however, in international operations they provide a primary service.

Civil Air Patrol Radio Stations

These stations are used in connection with Civil Air Patrol activities and emergencies pertaining to the protection of life and property. They are also used by members of the CAP in connection with air shows, missing aircraft search missions, training missions, and communication systems at encampments, bases, and official meetings. There are over 11,100 authorized CAP stations.

Airdrome Control Stations

These stations, numbering over 500, are used for transmitting necessary control instructions to aircraft arriving at and departing from airports. Such control is necessary in maintaining safe separation of aircraft to prevent collision and to provide an efficient flow of air traffic into and out of airports. These stations also may communicate with aeronautical mobile utility stations installed aboard vehicles essential to the operation of an airport.

Aeronautical Mobile Utility Stations

These stations are installed aboard crash, maintenance, fire, and other vehicles which operate on an airdrome in order that the airdrome control operators may direct the movements of such vehicles as necessary. There are 150 of these stations.

Aeronautical Navigational Aid Radio Stations

These stations transmit special radio signals for enabling an aircraft to determine its position with reference to the navigational facility involved. Included are radio beacons, radio direction finders, radio ranges, localizers, glide paths, marker beacons, and ground control approach stations. There are nearly 300 of these stations.

Flying School Radio Stations

Flying school radio stations aboard aircraft and on the ground are used for communicating instructions to flight students or pilots while actually operating an aircraft. They number 14.

Flight Test Radio Stations

A flight test radio station, of which there are 159, is a station aboard an aircraft or on the ground used for the transmission of communications in connection with the test of aircraft or major components of an aircraft.

Aeronautical Advisory Radio Stations

These ground radio stations, now more than 460, provide advisory communication service to aircraft regarding the condition of runways, types of fuel available, wind conditions, available weather data or other information which may be necessary in connection with their safe and expeditious operation. They also may be used for com-

municating with private aircraft engaged in organized civil defense activities in event of enemy attack.

Aeronautical Public Service Radio Stations

Public service aircraft stations, over 300 in number, provide a means for public correspondence between private individuals aboard aircraft in flight and persons on the ground, affording communication similar to that available by use of the public telephone. These stations connect to the land-line telephone system through the facilities of public coast stations.

PUBLIC SAFETY RADIO SERVICES

The Public Safety Radio Services consist of the Police Radio Service, Fire Radio Service, Forestry-Conservation Radio Service, Highway Maintenance Radio Service, Special Emergency Radio Service and the State Guard Radio Service. Except for a few eligible groups in the Special Emergency Radio Service and volunteer fire departments or other private organizations which provide fire protection service, these services are available only to governmental subdivisions such as states, counties, cities, towns, etc.

The public safety services have continued to grow to the point where extensive networks joining cities, counties and states extend from one end of the country to the other. Aided by matching funds furnished by the Federal Government for civil defense measures, many governmental licensees in these services have expanded their systems, and installed additional facilities including independent power supplies for use in the event the power systems may be damaged or otherwise become inoperative. Also, many smaller communities which otherwise would not be in a financial position to install radio have done so with matching Government funds and now are operating radio systems on a day-to-day basis for emergency communication in connection with their official duties and at the same time are joining in mutual aid plans to cover not only the day-to-day business but also to be prepared to cope with the problems which would arise from a civil defense emergency.

The public safety services showed an increase of over 2,700 new systems for the fiscal year. The magnitude of this increase is apparent when it is appreciated that many stations can be covered by a single license. For example, some of the licenses held by state government departments include over 600 transmitters. On an average there are approximately 15 radio transmitters licensed per system. Consequently the nearly 18,500 public safety authorizations reflect the use of more than 201,000 transmitters.

During the year the Commission proposed rule making which would reduce the channel separations in the 30–50 and 152–162 megacycle bands applying to the land mobile services including the public safety

group. Accompanied by a general tightening of technical equipment standards, this move is designed to permit more frequency assignments in a given area and greater utilization of the frequency spectrum for services experiencing a frequency shortage.

Police Radio Service

The Police Radio Service, with over 9,700 authorizations, is the largest public safety service. In addition to the many mobile systems and radiotelegraph networks that cover large parts of the country, there is an ever-increasing use of microwave equipment to improve communication systems and to expand radiotelephone communication between cities which are linked into ever expanding networks for mutual assistance. Police departments are continuing to experiment with closed circuit television, radar, traffic devices, and other electronic apparatus to enhance the safety of life and property. This service is available only to instrumentalities of government and governmental institutions which are authorized to maintain their own police departments.

Fire Radio Service

The Fire Radio Service not only is available to governmental agencies, but also to volunteer fire departments. In this service, too, there is stress on preparation to meet the demands that arise in connection with civil defense duties. There are over 3,300 authorizations.

Forestry-Conservation Radio Service

The Forestry-Conservation Radio Service is available only to states, territories, possessions, and other governmental subdivisions such as counties, cities, towns and similar governmental entities, and persons or organizations charged with specific forestry-conservation activities. It has nearly 3,000 authorizations.

Radio is an indispensable tool in coordinating the activities of a forestry-conservation endeavor. The areas to be protected are extensive and isolated. Wire line communication is not only limited but unreliable due to storms, falling trees, etc. It is imperative that prompt aid be dispatched to the scene of a forest fire. Every minute's delay adds to the danger.

To cope with this situation radio-equipped forest rangers in fire observation towers can locate a fire by triangulation, advise headquarters which may then dispatch a few men and some light equipment including a portable radio transmitter oftentimes by airplane to the scene. Men and equipment can be parachuted to the ground where an immediate appraisal of the fire can be made and reported by radio. Fortunately, many of these fires can be controlled quickly by the initial task groups as a result of rapid radio communications and prompt coordination of activities.

Highway Maintenance Radio Service

The Highway Maintenance Radio Service is available only to instrumentalities of government such as cities, towns, counties, and state governments for the purpose of transmitting communications directly relating to public safety and the protection of life and property and those essential to official activities relating to the maintenance, supervision, and operation of public highways. The more than 1,300 authorizations reflect increased use of this service by city and county governments. More users are expected as soon as the Commission makes a final decision on the channel spacing for the 30-50 and 152–162 megacycle bands.

Special Emergency Radio Service

The Special Emergency Radio Service is available to disaster relief organizations, physicians, and veterinarians having a regular practice in a rural area, ambulance operators, beach patrols, persons or organizations operating school buses having regular routes into rural areas, communication common carriers for standby facilities, emergency repair of public communications facilities, and persons or organizations maintaining establishments in remote areas.

This service has shown a steady increase concentrated primarily in the disaster relief category. It is being utilized to provide liaison communication between the other public safety radio services and other civil defense communications. There are over 1,500 special emergency authorizations.

State Guard Radio Service

Licenses in this service are issued only to the official state guard or comparable organizations, and only where such organization has been created by law and is subject to the control of the Governor or highest official of the creating governmental entity. This service, with 188 authorizations, is relatively inactive inasmuch as its principal need does not arise until the National Guard is inducted into active service and the state guard begins to discharge duties normally performed by the National Guard.

DISASTER COMMUNICATIONS SERVICE

The frequency band 1750 to 1800 kilocycles is allocated to the Disaster Communications Service to be used to replace or supplement regular communication facilities disrupted or overburdened by the occurrence of disaster, war, or other emergency.

Eligibility in this service requires a showing that the station is a part of an organized local or regional disaster communications plan. United States Government stations may be authorized to operate disaster stations.

During an emergency or disaster, all communications necessary to relief work or to the civil defense, including personal messages concerning people directly affected, may be transmitted. At other times, communications are limited to drills and tests necessary to assure the proper functioning of the equipment and the system.

Over 300 disaster communications stations are now licensed under 31 approved disaster communications plans. They employ nearly 1,200 transmitters.

INDUSTRIAL RADIO SERVICES

Various groups of industrial users of radio are provided for in subparts of Part 11 of the rules governing the Industrial Radio Services. They embrace the Power, Petroleum, Forest Products, Motion Picture, Relay Press, Special Industrial, Low Power Industrial, and Industrial Radiolocation Radio Services. They represent nearly 25,000 authorizations covering the use of over 180,000 transmitters.

During the fiscal year much time and effort was devoted to a proceeding looking toward amending the Special Industrial Radio Service rules. After evaluating the more than 100 comments, the Commission in October of 1954 adopted a Proposed Report and Order which gave interested persons an opportunity to file exceptions and to request oral argument. More than 80 exceptions were received and virtually all were accompanied by request for an oral argument. A number of the exceptions were satisfactorily eliminated in a conference between the Commission and the interested parties. The remaining exceptions were argued before the Commission in February 1955.

As a result, the Commission on September 7 revised the special industrial rules, effective November 1. They spell out in detail eligibility in this service for those engaged in agriculture, heavy construction, building construction, manufacturing and mining; also a number of particular activities such as those incidental to petroleum operations; delivery of fuel oil, butane gas and ice; servicing and repairing of heavy machinery, etc.

Those eligible in the Special Industrial Radio Service may normally operate only outside of standard metropolitan areas of 500,000 or more population. However, some exceptions are made. First, there is a general exception on showing that the transmitter will be used in an area of low population removed from the urbanized section of the metropolitan area involved. Also, there are exceptions to permit persons engaged in construction activities to use radio within metropolitan areas for on-the-job communication. Similarly, persons engaged in manufacturing activities may employ radio within the yard area. The new rules liberalize the old concept of "yard area". Licensing of microwave systems will continue on a case-by-case basis pending the formulation of regular rules.

The Commission realizes that, in order to deal with the increasing need for industrial radio, a general study and evaluation of the entire field will have to be undertaken. In the light of radio's advances, the Commission is exploring all available means of augmenting the number of frequencies in order to make fuller use of the radio spectrum.

An amendment to the power radio service rules clarified the eligibility status of persons operating irrigation systems, making definite provisions for their licensing in that service. A proposed amendment would provide for the use of power radio by communications common carriers in connection with their installation, construction, and maintenance activities.

LAND TRANSPORTATION RADIO SERVICES

During the year a major revision of the rules governing the Land Transportation Radio Services was completed, after an extensive rule making proceeding. It combined into a new Motor Carrier Radio Service the previous Intercity Bus, Urban Transit and Highway Truck Radio Services. No appreciable changes were made in the Railroad, Taxicab and Auto Emergency Radio Services.

The new motor carrier rules embody basic changes in policies governing the use of radio by carriers of property operating on the public streets or highways. Under the old highway truck rules, all persons transporting property on a route basis were eligible to use radio outside of standard metropolitan areas of 500,000 or more population. Included in this group were common and contract carriers and private truckers. The Commission recognized that private truckers who engage in trucking activities in connection with other businesses more properly belonged in one of the industrial services or the citizens service than in the land transportation services. Accordingly, these persons were severed from the new motor carrier service and provisions were made for most of them in the pending revision of the special industrial rules.

The Commission also recognized that under certain conditions common and contract carriers of property for hire should be allowed to use radio in connection with their operations within urban areas. The new motor carrier rules provide for such operation on frequencies in the 450–460 megacycle band. Frequencies in the 40-megacycle band have been made available to carriers of property for use solely in connection with their interurban operations.

The provisions for the use of radio by the carriers of passengers (railroad, street car, bus, and taxi) remain substantially unchanged in the Motor Carrier Radio Service. However, the former designation of urban transit has been changed to urban passenger, and intercity bus to interurban passenger.

359964—55——7

At the year end the land transportation services (exclusive of citizens) totaled nearly 7,700 authorizations with nearly 140,000 transmitters.

CITIZENS RADIO SERVICE

Due to the changing complexion of the Citizens Radio Service as increasing numbers of business organizations seek its facilities, several problems have arisen which may lead to rule revisions. One stems from the fact that, at present, an applicant is not required to submit detailed information on the intended use of radio in connection with the operation of a business. Another is the matter of station location differing from the applicant's mailing address, and also the proposed area of operation of mobile units. A third consideration is the establishment of a policy regarding authorizations for remote control of stations within this service. The questions are presently under study by the Commission.

At the year end the citizens service had over 12,300 authorizations with 21,300 transmitters.

AMATEUR RADIO SERVICE

The radio amateur is truly a pioneer in radio. Many fundamental radio discoveries and refinements are attributed to him. A great number of the electronics and communications specialists of today were in the beginning, and many still are, licensed "hams".

The amateur may enjoy activity in many phases of radio communication. He may experiment with complicated electronic equipment, or promote international goodwill by exchanging greetings and making friends with amateurs in all parts of the world. He is continually striving to improve his equipment and to improve his operating skill. Where international regulations permit, he transmits messages free of charge to and from members of the Armed Forces and their families at home. Traditionally, he is always available to furnish much needed, and often the only means of, communication at the scene of an emergency or disaster. He furnishes radio equipment, and he plans and practices for civil defense communications.

For the "ham" beginner, the 1-year Novice Class license is available to those who can send and receive code at 5 words per minute and successfully answer simple questions about radio and regulation. While operation is limited in scope, the experience and knowledge gained as a Novice often enables the amateur to obtain a General Class license with its greatly expanded operating privileges and 5-year term. A Technician Class license is available to those interested in experimental operation above 50 megacycles.

The number of amateur operator licenses has grown from more than 80,000 in 1949 to over 136,000 to date. At the end of the fiscal year more than 136,700 amateur operator licenses of different classes and

more than 139,000 amateur station licenses were on the Commission's books. Included in these are an estimated 4,000 authorizations which have expired but are renewable because they are within the one-year grace period.

Amateurs effectively police their own service. Of their large group, few were cited for technical and operational infractions. The licenses of five amateurs were suspended for more serious violations.

Amateurs are continuing to render much needed communication service during emergencies. Since its inception in 1952, the Radio Amateur Civil Emergency Service (RACES) has grown steadily. The RACES is the means whereby "hams" may serve their communities and their country in providing communication for civil defense. In recognition of their importance to defense, amateurs authorized in RACES may continue certain operation in time of war or other national emergency when normal peacetime amateur activity is shut down.

During the year 164 RACES plans were approved, making a total of 281 such plans with 2,077 stations and 3,800 transmitters authorized in that service.

More than 57 instances of amateurs furnishing emergency communication at the scene of natural disasters in fiscal 1955 are known to the Commission. During the 1954 Carol, Edna and Hazel hurricanes, more than a thousand amateurs manned fixed, portable and mobile amateur radio stations and often were the sole means of communication to a stricken area. Many others, unreported, provided needed emergency contact.

During the year amateur rules were amended to permit operation in the 3.5 megacycle frequency band from Pacific island possessions. Operation with AØ omission, permitting duplex telephony, was provided in the 50-megacycle amateur band. The Technician Class operator was given operating privileges in that band. A 25 kilocycle expansion of a Novice frequency band provided operation from 7150 to 7200 kilocycles. The required 30-day wait for an amateur operator examination after a failure was removed in the case of an examination given under Commission supervision following an examination given by a volunteer examiner. Examination credit for the amateur operator code element was extended to holders of commercial third class telegraph permits, and applications for renewal of RACES station authorizations were required to be submiteed on Form 481.

In rule making status at the year's close was the matter of amending the amateur rules to make ineligible persons who are members of the Communist Party or allied organizations, and persons who are not of good moral character.

Two pending petitions propose to amend the rules to remove the 50-watt power limit on amateur operation in the 420–450 megacycle band.

A major problem developing during the year was that of administering the expanding industrial services without a corresponding increase in Commission personnel. The principal difficulty has been in processing the increasing number of applications; at one time the backlog of pending applications reached 2,500, resulting in processing delays of up to 6 months. Adding to this problem is the increasing complexity of the applications handled, along with a temporary emergency due to reclassification of licenses formerly issued for services deleted by the 1949 rule making.

In an effort to minimize processing delays, the whole licensing procedure is to be simplified. To reduce the number of applications filed, it is proposed to allow the licensee to make minor changes to his facilities without prior authorization.

It is hoped that the simplification and time saving resulting from the foregoing, and from other administrative changes, such as departmental reorganizations within the Commission, will afford the Commission staff opportunity for further study and action in the year to come relative to other needed rule revisions.

One important rule amendment, effective July 31, 1950, was the provision for use by fixed stations of frequencies in the band 456–458 megacycles formerly designated only for mobile use. Although subject to certain limitations, including the condition of noninterference to mobile stations, this relaxation of the rules will permit licensees of mobile systems requiring fixed point-to-point radio circuits adjuncts to establish the necessary fixed circuits in areas where proximity of television channel allocations precludes use of frequencies in the band 72–76 megacycles. Equipment for the 456–458 megacycle frequencies is less costly and complicated than for the next available band of fixed service frequencies, which begins at 952 megacycles.

Regional industry advisory committees now functioning in the power, petroleum, and forest products industries have rendered substantial aid to the Commission in the matter of frequency assignment by supplying applicants with information as to which frequencies may be expected to remain largely free from interference in the applicants' proposed areas of operation. The committees likewise provide liaison with their industries, informing the Commission of their particular needs at the local level and, in turn, keeping their own members informed as to regulatory changes, rule interpretations, and licensing procedures. Such cooperative educational and informational functions relieve the Commission of answering many inquiries, as well as reducing the occurrence of illegal operation and involuntary violation of operating rules and administrative requirements.

PRIVATE MICROWAVE RADIO SYSTEMS

Action was initiated during the year looking toward establishing a permanent license policy for private microwave systems. At the request of the Commission, surveys of manufacturers and users of microwave communications equipment were conducted by the Radio-Electronics-Television Manufacturers Association and the American Petroleum Institute, respectively. These surveys produced helpful background information on both the technical characteristics of microwave systems operating on frequencies above 890 megacycles and the present and planned operational usages of private systems.

Based on this data, a preliminary working draft was prepared and a series of Government-industry conferences was held. As a result, revisions of the proposed rules are contemplated.

CONSTRUCTION PERMITS WAIVED

On August 31, 1955, the Commission amended its rules to waive construction permit requirements in the Safety and Special Radio Services with certain exceptions. This was done because equipment used in most of these services is of the "package" variety and does not involve any substantial construction. It was authorized by amendments to the act in 1954.

Excepted are operational fixed, land radiopositioning, public coast and limited Class I and Class II coast, shore radiolocation, radio navigation, radar and Alaskan fixed public stations, all of which involve engineering considerations; also all stations erecting new antennas or changing existing antennas above a certain height.

LAW AND ENFORCEMENT UNIT

The name of this unit was changed from Law Enforcement Unit to Law and Enforcement Unit to reflect more adequately its functions which include advising the bureau chief on legal and legislative matters, centralization of the bureau's enforcement and compliance activities, and consultation with bureau units on legal problems.

Enforcement efforts have centered on achieving compliance with the Communications Act and the Commission's rules by educating licensees to their responsibilities. When this process fails, or in case of willful or flagrant violations, official warnings are issued, and when these prove insufficient, revocation proceedings have been instituted.

The elimination of harmful interference to the aviation services caused by second harmonic radiations emitted by marine radio stations has continued to be a major effort involving numerous modifications of licenses. This program has begun to show results in terms of reduced interference, and it is anticipated that the time required to be devoted to this particular enforcement activity will now decline.

It is believed that passage of proposed legislation to permit the imposition of small monetary penalties for rule infractions would be a very effective tool in the safety and special services enforcement program.

STATISTICS

Stations in Safety and Special Radio Services

Stations in the Safety and Special Radio Services (exclusive of experimental, which are treated in a separate chapter) exceeded 300,000 at the close of the fiscal year. This represents a net increase of about 38,000 during the year. The numbers of authorized stations in the various services are shown in the following table.

Each separate license, construction permit, or combination construction permit and license is counted as one station. For example, a station might include a base transmitter and many mobile units.

Class of station	June 30, 1954	June 30, 1955	Increase or (decrease)
Amateur and disaster services:			
Amateur	123,287	[1] 139,993	16,706
Disaster	283	317	34
RACES	754	2,077	1,323
Total	124,324	142,387	18,063
Aviation services:			
Aeronautical and fixed group	1,966	2,062	96
Aircraft group	28,392	30,228	1,836
Aviation auxiliary group	125	150	25
Aviation radionavigation land	255	287	32
Civil air patrol	9,396	11,108	1,712
Total	40,154	43,855	3,701
Industrial services:			
Agriculture	9	9	0
Forest products	1,034	1,144	110
Industrial radiolocation	128	143	15
Low power industrial	673	933	260
Motion picture	32	43	11
Petroleum	5,505	6,178	673
Power	7,562	8,132	570
Relay press	68	82	14
Special industrial	6,587	8,190	1,603
Total	21,598	24,854	3,256
Land transportation services:			
Automobile emergency	305	411	106
Citizens	7,054	12,334	5,280
Highway truck	832	1,084	252
Interurban passenger	76	64	(12)
Interurban property		42	42
Railroad	1,219	1,405	186
Taxicab	4,361	4,526	165
Urban passenger	98	105	7
Urban property	66	31	31
Total	13,945	20,002	6,057
Marine services:			
Alaskan group	963	786	(177)
Coastal group	210	243	33
Marine auxiliary group	59	74	15
Marine radiolocation land	17	17	0
Ship group	45,050	49,594	4,544
Total	46,299	50,714	4,415
Public safety services:			
Fire	1,627	2,337	710
Forestry conservation	2,686	2,967	281
Highway maintenance	1,088	1,330	242
Police	8,728	9,725	997
Public safety (combined)		29	29
Special emergency	1,429	1,839	410
State guard	139	188	49
Total	15,697	18,415	2,718
Grand total	262,017	300,227	38,210

[1] The number of amateur authorizations shown above includes an estimated 4,000 authorizations which have expired but are renewable because they are within the one year "grace" period.

Applications in Safety and Special Radio Services

More than 151,000 applications for stations in the Safety and Special Radio Services were received during 1955. This represents an increase of 10,587 applications compared to the previous year. The number of applications received in each service is shown below:

Class of station	Received 1954	Received 1955	Increase or (decrease)
Amateur and disaster services:			
Amateur	64,051	77,263	13,212
Disaster	173	40	(133)
RACES	769	1,568	799
Total	64,993	78,871	13,878
Aviation services:			
Aeronautical and fixed group	3,156	2,121	(1,035)
Aircraft group	19,998	17,438	(2,570)
Aviation auxiliary group	150	107	(43)
Aviation radionavigation land	155	180	25
Civil air patrol	3,161	3,037	(124)
Total	26,620	22,873	(3,747)
Industrial services:			
Agriculture	17	10	(7)
Forest products	633	538	(95)
Industrial radiolocation	158	155	(3)
Low power industrial	445	524	79
Motion picture	12	29	17
Petroleum	3,232	3,482	250
Power	4,126	3,964	(162)
Relay press	43	48	5
Special industrial	4,579	5,419	840
Total	13,245	14,169	924
Land transportation services:			
Automobile emergency	260	289	29
Citizens	928	1,280	352
Highway truck	669	645	(24)
Interurban passenger	50	20	(30)
Interurban property		271	271
Railroad	790	562	(228)
Taxicab	2,576	2,248	(328)
Urban passenger	60	54	(6)
Urban property		74	74
Total	5,333	5,443	110
Marine services:			
Alaskan group	529	1,130	601
Coastal group	344	448	104
Marine auxiliary group	85	72	(13)
Marine radiolocation land	17	20	(3)
Ship group	19,906	18,331	(1,575)
Total	20,881	20,001	(880)
Public safety services:			
Fire	1,152	1,434	282
Forestry conservation	1,362	1,110	(252)
Highway maintenance	734	1,000	266
Police	5,454	5,200	(254)
Public safety (combined)		37	37
Special emergency	927	1,119	192
State guard	42	73	31
Total	9,671	9,973	302
Grand total	140,743	151,330	10,587

Of 9,353 pending applications at the close of fiscal 1955, only 248 were 3 months or more old, and 22 of these were in hearing. The pending total includes 837 renewals filed prematurely.

Transmitters in Safety and Special Radio Services

Approximately 768,000 transmitters were authorized to operate in the Safety and Special Radio Services as of January 1, 1955. Of these, 172,000 land and fixed stations represent an increase of 19,000, and 595,000 mobile units represent an increase of about 96,000, or a total increase of 115,000 transmitters during the calendar year.

Class of station	Land or fixed transmitters	Mobile station transmitters	Total transmitters
Amateur and disaster services:			
Amateur	127,257		127,257
Disaster	531	641	1,172
RACES	1,241	2,482	3,723
Total	129,029	3,123	132,152
Aviation services:			
Aeronautical and fixed group	2,114		2,114
Aircraft group		28,758	28,758
Aviation auxiliary group	21	842	863
Aviation radionavigation land	265		265
Civil air patrol	2,973	6,995	9,968
Total	5,373	36,595	41,968
Industrial services:			
Agriculture	9		9
Forest products	758	8,935	9,693
Industrial radiolocation	83	140	223
Low power industrial		8,469	8,469
Motion picture	19	351	370
Petroleum	4,772	24,607	29,379
Power	5,849	69,706	75,555
Relay press	40	918	958
Special industrial	4,479	51,136	55,615
Total	16,009	164,262	180,271
Land transportation services:			
Automobile emergency	317	3,499	3,816
Citizens		21,300	21,300
Highway truck	728	10,941	11,669
Intercity bus	50	918	968
Railroad	1,125	22,780	23,905
Taxicab	4,314	92,572	96,885
Urban transit	82	2,348	2,430
Total	6,616	154,358	160,974
Marine services:			
Alaskan group	1,057		1,075
Coastal group	239		239
Marine auxiliary group	71	7	78
Marine radiolocation land	18		18
Ship group		49,735	49,735
Total	1,385	49,742	51,127
Public safety services:			
Fire	1,590	28,916	30,506
Forestry conservation	2,675	23,281	25,956
Highway maintenance	894	11,170	12,064
Police	6,929	118,682	125,611
Special emergency	1,477	5,424	6,901
State guard	166	197	363
Total	13,731	187,670	201,401
Grand total	172,143	595,750	767,893

Broadcast Services

REGULATION

The Communications Act gives the Commission more limited control of broadcasting than of common carrier operation. Broadcasting regulation is largely technical in nature and is in two phases.

The first phase deals with the allocation of spectrum space to the different types of broadcast services in accordance with Commission policies and rules to carry out the intent of international agreements, the act and other domestic laws.

The second phase concerns individual stations and embraces consideration of applications to build and operate; the assignment of specific frequencies, power, time of operation and call letters; the periodic inspection of equipment and the engineering aspects of operation; passing upon transfers and assignments of facilities; also the many varied changes in existing authorizations; modifying and renewing construction permits and licenses; reviewing applications for renewal of licenses; licensing radio operators, and otherwise discharging domestic regulatory responsibilities and obligations imposed by international agreements.

Broadcast stations are licensed to serve the public interest, convenience and necessity. Because radio channels are limited and are a part of the public domain, it is important that they be entrusted to licensees who have a high sense of public responsibility.

The Communications Act sets up certain basic requirements which must be met by broadcast applicants. In general, applicants must be legally, technically, and financially qualified, and show that their proposed operation will be in the public interest.

The act precludes Commission censorship of programs, also control over rates charged for air time, salaries paid artists or personnel, accounting methods and, in general, the day-by-day functioning of broadcast stations. There are some exceptions—such as provision in the act relating to equal opportunity for broadcasts by political candidates, and certain law injunctions against lotteries, obscenity and fraud over the air.

Under the act, it is the duty of the individual broadcaster to operate in the public interest. That means, in addition to living up to technical requirements, he should give a well-rounded program service, with

opportunity for local expression and discussion of matters of local concern.

The Commission does not prescribe any percentages of time which should be devoted to particular subjects, such as news, education, religion, music, public issue, etc. That is something which can vary with the locality. However, the Commission does periodically review the overall performance of a station—engineeringly and otherwise—when it applies for renewal of its license, to determine whether it has lived up to its obligations and the promises it made in obtaining permission to use the public's airwaves.

TELEVISION (TV) BROADCAST SERVICE

Development of TV

Since the lifting of the "freeze" on construction of new television stations on April 11, 1952, the number of TV stations in operation has jumped from 108 to 458.

In 1952, 63 markets had 1 or more local stations—in most cases 1; today there are over 4 times as many communities with their own video facilities. Two hundred and fifty-two communities have at least 1 TV outlet, and 100 communities have 2 or more.

The number of TV receivers in use has grown from 20 to 35 million, and it is estimated that over 90 percent of the people are now within service range of at least one station. A large portion of the public—perhaps as much as 75 percent—is served by 2 or more stations. The public has already invested over 10 billion dollars in TV receiving equipment, and the annual volume of TV advertising, set sales, servicing and operating combined runs close to four billion dollars a year.

In view of TV's record in the short span of three years, the Commission's concern today is not, as it was in 1952, whether an adequate TV service can be developed—for it is already big business—but, rather, how to develop more fully the industry's potentialities and the abilities and ingenuity of the American broadcasters to meet the needs and desires of the American public.

TV Problems

Any new rapidly expanding industry has problems. Television is no exception. Its startling growth has created many complexities. Today there are substantial obstacles, such as economic difficulties, in bringing a first local outlet to hundreds of smaller communities as well as in expanding the number of competing services in the larger communities. A major barrier is the high cost of programing at this stage, which makes the securing of a substantial amount of network and other paying programming a prerequisite to successful station

operation. Of even greater importance is the failure, thus far, of UHF stations to become integrated with established VHF stations into an economically sound nationwide service.

During the past year the Commission has been studying and analyzing the current TV situation to determine what should be done to aid its further growth. A number of specific actions have been taken and others are contemplated.

The Commission has given particular attention to the plight of UHF broadcasters and to devising ways and means for assisting them to operate on a comparable basis with VHF stations. The inability of UHF to compete with VHF is evidenced by the fact that of 325 UHF station grants, only about one-third are in operation. Many authorized UHF stations were not constructed, or quit operations, and many of the operating stations are in a precarious financial condition.

In March of 1955 the Commission submitted a preliminary report to the Senate Interstate and Foreign Commerce Committee, which is studying VHF-UHF and television network problems, outlining the steps the Commission has and is taking to promote TV's growth within the structure of the existing allocation system.

Meanwhile, outstanding construction permits for UHF stations have been extended to January 16, 1956.

The Commission was almost current on its TV processing line. Applications for new stations which did not raise legal, financial or technical questions were acted upon within 4 to 6 weeks after being filed. Applications for major modifications were acted upon within 2 to 3 weeks. Because of personnel limitations, there were delays in processing license applications; however, the operations of these applicants were not delayed since their program test authority enables them to give service pending action on their requests for regular licenses.

At the year's close, there were 582 commercial TV station authorizations, which was 9 more than in 1954. The net gain in operating stations was 46.

Deintermixture

A number of petitions requested deintermixture of UHF and VHF channels in certain cities where UHF stations find it difficult to compete with existing VHF stations. These proposals suggested that the commercial VHF channel assignments in certain areas be deleted so that only UHF stations could operate. Some wanted the VHF commercial assignment in a community exchanged with the UHF educational reservation; others proposed that the VHF assignment be deleted or assigned elsewhere. They argued that this would provide more balanced competition in the various communities, and would

strengthen UHF by enabling it to go forward in a number of markets until combination UHF-VHF receivers are generally available.

On November 10, 1955, the Commission denied 35 such petitions pending a general rule-making proceeding to consider possible solutions, on a nationwide basis, to the difficulties hindering expansion of TV service. It invited proposals for changes in standards concerning station separations, power, antenna height, directional antennas, etc., and their effect on existing stations, educational reservations, and receivers.

Booster Operation

One of the problems of UHF broadcasters competing with VHF is unequal coverage. As compared with VHF, the signals from UHF transmitters have less tendency to fill in areas which are not in direct line of sight with the transmitting antenna. Consequently, there are places which although lying within the area that would normally be served by a UHF station, are "shadowed" by intervening terrain and so deprived of service.

A "booster" operation contemplates the use of amplifying transmitters operating on the same channel as the main transmitter and dependent upon the latter for the generation of carrier frequencies and modulation. Booster operation has been permitted on an experimental basis, but the Commission's rules do not now authorize it as a regular service. The Commission instituted rulemaking on March 30, 1955, to determine whether UHF booster operation would be a feasible means for filling in such shadow areas.

"Satellite" Operation

A new policy was adopted by the Commission on August 5, 1954, to increase the incentive for constructing UHF stations in areas which might otherwise not be able to support them. Under this policy, UHF stations which propose to originate no local programing and to confine their programing to the rebroadcasting of programs of established stations may be authorized. These so-called "satellite" stations are required to meet all applicable rules and differ from other TV stations only in that they would not be required to originate local programs.

Since the high cost of the necessary equipment for programing is one of the chief deterrents to parties interested in establishing new UHF stations, permitting stations to duplicate the programing of another station should help to overcome this obstacle. It is anticipated that many of the satellites authorized on this basis will in time be able to add local programing and so become full-fledged TV stations. A few VHF satellites have also been authorized on this basis.

Maximum Power for UHF

The Commission is also considering, in a rule-making proceeding instituted June 22, 1955, another means for improving UHF service. It has proposed that the maximum permissible power for UHF stations be increased from 1 megawatt to 5 megawatts. Information concerning UHF receiver sets and their tuning mechanism is being collected to explore the possibility of further improving UHF reception.

Low Power

On June 22, 1955, the Commission took an additional step to encourage the establishment of local TV service in areas where operation might not otherwise be economically feasible by amending its rules to permit UHF or VHF stations to operate with lower power. The minimum visual effective radiated power now permitted by this change is minus 10 dbk (100 watts) at any antenna height. By lowering power requirements, stations can be constructed in small communities at a modest investment, particularly if they are also permitted to operate without originating local programs.

Intercity Relays

The Commission has been considering ways by which the cost of intercity transmission of TV programs can be reduced. At the present time, network programming appears to be a requisite for successful operation of most TV stations, including those located in relatively small communities which are removed from the main network lines and radio links. Stations in communities distant from program service points contend that the common carrier mileage charges for connecting them to network program service points prohibit profitable operation. Under the present rules, the operation of private television intercity relay systems to connect with program service points is permitted only on an interim basis until adequate common carrier facilities are available.

On September 15, 1954, the Commission instituted rule making on a proposal looking toward the relaxation of these rules to permit broadcasters more freedom in establishing private intercity relay systems. In this proceeding, consideration is also being given to the suggestions of the telephone company to furnish a cheaper method of off-the-air pickup and retransmission of network programs to stations.

Antenna Location

The Commission's present rules governing the location of antennas of TV stations place no restrictions an antenna placement other than requiring adequate coverage of the city to be served and mileage separations from other stations. As a result, some stations have

POWER RADIO SERVICE

This service makes available the use of frequencies by those public utilities which supply electricity, gas, water, and steam to the public. Although such use of radio was authorized under the superseded Utility Radio Service, the newer service rules are more liberal, notably in the total number of frequencies provided and specific provisions being made for operation of fixed point-to-point auxiliary circuits.

The basic power radio system usually comprises one or more base stations together with a number of mobile units installed in service vehicles, all operating on a single mobile service frequency. Very large systems, or those operating in congested metropolitan areas, may be assigned two or more mobile service frequencies upon furnishing proof of sufficient need. Many licensees maintain battery-operated pack radio sets of the type commonly known as "handi-talkies", either for emergency use or for specialized operations such as the "sagging in" of transmission line spans.

Fixed circuits are used in lieu of telephone wire lines in areas where wire lines are unavailable or, if constructed, would be unreliable or difficult to maintain. Fixed station frequencies most generally used are those in the band 72–76 megacycles, except in localities where proximity of television stations operating on TV channels 4 or 5 (directly below and above the hand 72–76 megacycles, respectively) precludes power ultility use of those frequencies by reason of interference to TV reception.

Several licensees have installed microwave point-to-point circuits operating at frequencies above 952 megacycles, but only one extensive microwave system has resulted in the power radio service. It is expected that considerable use will be made of 456–458 megacycle frequencies for point-to-point operation, under the rule revision mentioned in the preceding section.

PETROLEUM RADIO SERVICE

Persons eligible for operation in the Petroleum Radio Service are those engaged in searching for, producing, collecting, refining, or transporting by means of pipelines, petroleum or its products, including natural gas.

This service includes drilling companies, but does not include contractors engaged in pipeline or oil field construction, nor is provision made for the inclusion of persons supplying specialized services such as well-cementing, acidizing, or mud-conditioning. Some of these activities are conducted in the Special Industrial Radio Service discussed elsewhere in this chapter.

placed their transmitters at some distance from the city served and in the direction of and to also serve larger cities. This often deprives less populated areas of services contemplated by the assignment table. On November 9, 1955, the Commission denied a proposal that TV transmitters be located within five miles of the nearest boundary of the principal city to be served.

Subscription TV

Subscription ("pay-as-you-see" or "toll") television contemplates a program service to only those who will pay for it. This would be accomplished by transmitting a distorted picture and unintelligible sound which cannot be normally received on any television receiver not equipped with a decoding or unscrambling device. There are different subscription systems. They differ both in the techniques used to scramble and unscramble pictures and also in the manner of collecting payments for the programs furnished. During the past 5 years the Commission has authorized experimental testing of several systems. However, the Commission's rules do not permit TV stations to furnish such a service on a regular basis.

On February 11, 1955, the Commission, in response to several petitions, invited comments as to whether its rules should be amended to authorize TV stations to render a subscription service. Any such authorization involves a basic change in the American system of broadcasting and raises substantial questions of a legal, technical and policy nature. Those filing comments in the proceeding were asked to direct their attention to certain questions. Among these were whether subscription TV would encourage the larger and more effective use of radio; what impact it would have on advertiser-sponsored broadcasting; how it would affect broadcast of news and diverse views on controversial issues; what safeguards are necessary to insure that the public would continue to receive well-balanced TV programing without charge; what is necessary to prevent monopolistic control, and whether it should be open to all stations. The nature and extent of regulation necessary to protect the public interest as well as the type of service and hours of operation must also be resolved.

In addition, the Commission sought comment on several basic legal considerations, including such questions as whether additional legislation would be required to institute a subscription service, the form of any necessary legislation, and whether toll-TV should be classified as "broadcasting", "common carrier", or otherwise under the Communications Act. Technical data relating to the operation of proposed systems; the possibility of degradation of and interference to the regular free TV service; and the adverse effect on receivers in the hands of the public must be studied.

Information was also sought as to the means and methods of those organizations intending to engage in subscription operations; the cost to the viewing audience; the needs of TV broadcasters for additional revenue and program resources from such a service; its anticipated capacity to increase the use of TV channels and bring the public programs now unavailable; the types of programs to be broadcast for a fee and who would control their production and distribution; patent control and licensing arrangements; and the roles to be played by the motion picture industry and the networks.

Filings in this connection have been more voluminous than in any previous docket case in the Commission's history, with more than 25,000 formal documents, letters, postcards, etc., filling nearly 70 reference volumes. The time for filing replies to the original comments submitted expired on September 9, 1955. After the Commission has had an opportunity to study all these comments, it will specify in subsequent notices any further proceedings as may be necessary, including oral hearing and the time and nature of demonstrations of subscription TV systems.

Community Antenna TV Systems

So-called "community antenna systems" or any other closed-circuit TV system which is operated solely over wires may be installed and operated at the present time without Commission authorization. Community antennas do not transmit on the air, but pick up or receive TV programs off the air and send them by means of wire or coaxial cable to customers paying for the service. Usually such systems are used for bringing TV to subscribers in communities where the direct reception of regular TV stations is nonexistent or difficult.

At the present time, community antenna systems are private enterprises, which are not regulated or licensed by the Commission and their activities may be varied or discontinued at will by their operators. However, all wired TV systems are required to operate so that no harmful interference is caused to authorized radio services. The Commission has a current rule-making proposal to restrict the radiation from such systems. The Commission is also considering a petition which requests that the status of community antenna systems under the Communications Act be clarified. The question whether such services constitute common carrier or some other operation which comes within the Commission's jurisdiction is under study.

At the close of the fiscal year, industry estimates that nearly 400 community antenna systems were serving between 250,000 to 300,000 homes. The total number of viewers was estimated at approximately one million.

Color TV

The Commission adopted its present compatible color TV standards on December 17, 1953. They were developed by the National Television System Committee (NTSC), representative of engineers, scientists and others in interested industries. This system is "compatible" in the sense that existing black-and-white receiver sets can receive color transmissions in monochrome without adaptation.

The Commission rules do not require stations to devote any minimum hours to color broadcasting. Nevertheless, many promising developments took place the past year in color telecasting, and the total number of hours devoted by stations to colorcasts has increased. More stations have become equipped to carry color programs, and many have facilities for local film and live color telecasting, as well as for network color programs. The telephone company has also reengineered and reequipped additional relay links for color networking.

Color receivers now being produced have 19 and 21-inch picture tubes as compared to the 15-inch tubes. There has also been a considerable decrease in the price of color sets, and new techniques in production and increased sales promise further cost reductions to the public.

Noncommercial Educational TV

The Commission has recognized that educational institutions require more time than commercial interests to prepare for TV operation and has placed no limit on the duration of assignment of the 258 channels now reserved for noncommercial educational TV operation. However, while a public statement issued on May 11, 1953 reaffirms that these reservations were for an indefinite and unlimited time, the Commission pointed out that this period should not be excessively long and the reservations should be surveyed from time to time.

While several requests for shifts of educational reservations have been granted in rule-making proceedings, the Commission has in the past denied requests to transfer educational channels to commercial use. However, on June 1, 1955, for the first time it instituted rule making to consider a petition seeking the shifting of the VHF educational channel reservation in Des Moines, Iowa, to a UHF channel in order to make the VHF channel available for commercial use there. The resulting comments are under consideration. Other pending petitions request reassignment of educational reservations.

Noncommercial educational TV authorizations netted four for the year, bringing their total to 34. Eleven of these were in operation, or five more than in 1954. Fourteen applications were pending as the year's close. TV educational channels now total 258.

The first and only educational TV station to surrender its permit was KTHE, University of Southern California, Los Angeles (Channel 28). It had been operating.

STANDARD (AM) BROADCAST SERVICE

AM Shows Continued Gain

The number of authorized AM stations continued to increase, showing a net gain of 143 for the year, which brought their number to 2,840. Those on the air totaled 2,732, which was 149 more than the previous year.

North American Regional Broadcasting Agreement (NARBA)

All countries in North America, except Mexico and Haiti, signed this treaty in 1950. It is intended to regulate the assignment and operation of AM broadcasting stations in this region so as to minimize interference. To become effective, the agreement must be ratified by three of its major signers—the United States, Canada, and Cuba. Cuba did so in 1951. In February of that year the agreement was submitted to the United States Senate, where it was referred to the Committee on Foreign Relations. Except for the hearings held by a subcommittee in July of 1953, no other action has been taken.

This new pact was negotiated to replace an interim agreement which extended and modified the provisions of the first NARBA (1937) until 1949. Since then the Commission has adhered to a policy, formalized in 1951, of taking no action in making new assignments or modifying existing assignments which would be inconsistent with the new NARBA.

Other signatory countries have, in general, followed a like procedure. This has made it possible to operate existing stations and to authorize new stations without undue conflict. Any problems have been resolved by negotiation, with mutual observance of the agreement. However, there are indications that some countries may be departing from this procedure because of the delay in effecting the agreement. If this trend continues it can result in United States stations receiving more undesirable foreign interference. Implementation would have reduced present interference to a great extent.

Since the signing of the NARBA, the United States and Mexico have exchanged views and conferred with respect to the solution of mutual AM broadcast problems. Since Mexico is not a party to the 1950 NARBA, negotiations have sought an agreement with respect to Mexico's adherence to NARBA or to its entry into a separate bilateral agreement with the United States. A series of meetings were held in Washington in 1954 for the purpose of negotiating an interim

agreement with Mexico. This objective not having been attained, a further conference took place in Mexico City November 4–December 17, 1954, and reconvened in Washington on July 7, 1955. There was prospect that the latter meeting, which was in progress at the time this report was prepared, would be successful.

Clear Channels and Daytime Skywave Interference

The Commission is nearing the completion of rule making concerning daytime skywave transmissions (Docket 8333). This proceeding was instituted in 1947 when an accumulation of skywave data suggested modification of the technical standards governing skywave transmission of AM radio signals during daytime hours. In the same year, the proceeding was consolidated with the clear-channel proceeding (Docket 6741). During their pendency, the Commission's policy has been to withhold action on applications for new and increased daytime and limited-time stations on clear channels on which the United States has priority for dominant Class I stations under international agreements.

In 1953 the Commission found it expedient to sever the two proceedings. On March 11, 1954, it proposed making certain changes in future allocation of stations on clear channels. New stations would be required to restrict radiation to a specified degree in the direction of the service areas of domestic dominant Class I stations in order to reduce potential interference from skywave transmission shortly after sunrise and shortly before sunset. In addition, no new limited-time facilities would be authorized to operate past sunset.

On July 15, 1954, the Commission held an oral argument on the question of whether these amendments should be adopted. On January 26, 1955, it tentatively adopted them and invited comments as to whether the restrictions should be applied to the operations of existing stations. These comments are now being studied preparatory to a final determination.

In another rule-making proceeding affecting clear channels, the Commission revised its rules, on December 3, 1954, to permit assignment of Class II stations operating unlimited time in Alaska, Hawaii, Puerto Rico, and the Virgin Islands on frequencies assigned to dominant clear channel stations in the United States. These assignments may be made provided they do not cause interference to stations within the continental United States. The allowable signal levels are the same as permitted stations in foreign countries under NARBA. These new rules open up unlimited time use of many frequencies in the territories which are already available to stations in foreign countries located closer to the United States than the territories themselves.

Revision to "10 Percent Rule"

On August 4, 1954, the Commission amended the requirements of its so-called "10 percent rule" governing the assignment of Class II, III or IV AM broadcast stations. This rule is designed for more effective utilization of available frequencies, to further protect existing stations against objectional interference, and to limit the degree of interference which proposed AM stations may receive to their normal service areas from existing stations to 10 percent. However, it permits new assignments, even though they cannot comply with these criteria. when they would give a community its first nighttime service or when more than 25 percent of their primary service area would receive initial primary nighttime service.

FREQUENCY MODULATION (FM) BROADCAST SERVICE

Less Commercial FM Stations; More Educational FM Stations

Commercial FM stations continued to decrease. Their total at the close of the fiscal year was 552, which was 17 less than at the same time in 1954. Of these, 540 were on the air in contrast with 553 the year previous.

However, the number of noncommercial educational FM stations continued to gain. There were 127 such authorizations at the year end, which was a gain of 4 for the year. Those operating numbered 124, or seven more than in 1954.

Functional Music

On March 2, 1955, the Commission amended its rules to permit FM broadcasters to engage in certain types of specialized nonbroadcast operations as an adjunct to their regular FM broadcast service in order to obtain additional revenue. The newly authorized service is limited to special programing of music, news, time, weather reports and similar subjects designed primarily for reception by industrial, mercantile, transportation and other business organizations and individuals subscribing to the service. This is generally referred to as "functional music" operation and includes three types of services—"background" music to commercial and industrial organizations, "storecasting" in stores, and "transitcasting" to passengers on public vehicles such as streetcars.

FM broadcasters desiring to furnish this type of subscription service must apply for a Subsidiary Communications Authorization (SCA) under which they may transmit such specialized programing on a multiplex basis at any time, or on a simplex basis for a one year period following the effective date of the rules (to July 1, 1956). Stations may furnish these programs on a simplex basis only during

the time not devoted to the required minimum of 36 hours of FM broadcasting a week and the minimum requirement of 5 hours of broadcasting a day. Prior to these amendments, FM broadcast stations were required to broadcast a minimum of 42 hours a week, with at least 6 hours daily.

When the station is operating on a simplex basis, subscribers must own or rent special receivers activated by an inaudible supersonic (beep) signal to cut or amplify certain portions of a station's transmissions. Another type of special receiver is required to receive multiplexed programs.

Other requirements are imposed for operation under an SCA to insure the technical quality of the main FM broadcast service, to effect the complete control by the FM broadcaster over all program material transmitted, and to insure observance of Commission rules and policies with respect to controversial issues and political broadcasts.

Form 318 has been designed for use for FM broadcasters to apply for a permit to establish an SCA service, to modify an SCA, to renew an SCA, and to assign or transfer an SCA. The first such grants were made October 12, 1955 to WPEN–FM, Philadelphia, and WWDC–FM, Washington, D. C. By November 16 the total was 20.

Facsimile Broadcast

Under the Commission rules, FM stations may transmit still pictures, graphs, and printed or written matter to the general public on a simplex or multiplex basis. Such transmissions are called "facsimile" or "fax" broadcasting. Multiplex facsimile may be transmitted at the same time as an aural program is being broadcast, but simplex facsimile can be transmitted only when no aural program is being broadcast.

While in the past a few authorizations have been granted for transmission of facsimile, during the year no interest was shown in this service, and no stations are now engaged in facsimile broadcasting.

AUXILIARY BROADCAST SERVICES

The auxiliary broadcast services relate to the use of the portable or mobile radio transmitting apparatus to pick up program material outside a regular studio, to the use of permanently installed transmitting equipment to provide program transmission circuits between the studios and transmitters of AM, FM, and TV broadcast stations, and to the use of private intercity relay circuits for network operation for FM and TV stations in lieu of common carrier coaxial cable or microwave facilities.

Remote Pickup Broadcast Stations

These auxiliaries are used by broadcast stations for on-the-spot coverage of news events. Although used primarily by AM and FM stations, these adjuncts are now being utilized by TV stations for relaying the aural portion of pickups, for communicating with field crews setting up TV pickup equipment, and for dispatching and cueing pickup crews to and at the scenes of such events.

Equipment employed for this purpose ranges in power from a fraction of a watt to a few hundred watts and is mostly self-powered. It can also provide emergency communication in the event of disruption of normal circuits. Authorizations cover 281 such stations.

Aural Broadcast STL Stations

These studio-transmitter links furnish a circuit for relaying programs between the studio and the transmitter of an aural broadcast station. Such a service permits AM and FM stations to locate their transmitters in areas which are most favorable for signal propagation regardless of the availability or suitability of wire line program circuits. During the year three such applications were granted.

FM Broadcast Intercity Relay Stations

These stations provide intercity relaying of programs to FM stations where the special high-quality circuits required by these stations are not available from common carriers. No new stations were authorized during the year.

TV Pickup Stations

These are visual remote pickup stations used by TV licensees for making on-the-spot broadcasts. They are particularly useful to telecasters since their use eliminates the expensive special cables which are necessary for TV transmission and permits the relaying of program material which would otherwise be limited in most cases to that produced in studios. The widespread coverage given sporting events by TV stations would not be possible without the use of these pickups. Forty-one were authorized during the year.

Television STL Stations

These studio-transmitter links perform the same service for TV stations as aural broadcast STL stations do for AM and FM stations. As in the case of pickup stations, they are particularly useful to TV operation, since a physical link between the studio and transmitter would be very costly. The Commission granted 97 such stations during the year.

TV Intercity Relay Stations

These stations provide a means for relaying TV program material between cities. Commission policy in general requires that such relaying be handled by common carriers. However, its rules permit the operation of private intercity relays systems by TV stations on an interim basis where it can be shown that common carrier facilities are not available.

Twenty-three private TV intercity relay stations were granted during the year on showing that common carrier facilities were not available. A number of applicants also stated that the cost of common carrier facilities, even if available, would be beyond their means (see "Intercity Relays" in section of this report dealing with television for rule making to relax present requirements).

EXPERIMENTAL BROADCAST SERVICES

Broadcasting is a dynamic industry and each day sees some new development in equipment or techniques. Every major development, however, has been preceded by experimentation. The Experimental Broadcast Services provide means for carrying on this research and testing. Stations in these services are concerned primarily with the technical phases of broadcasting, the development of new apparatus and techniques, or obtaining engineering data which will be useful to the industry and to the Commission.

Experimental TV Stations

Any experimental operation involving the transmission of transient visual images in connection with TV broadcasting is classed as an experimental TV station.

Considerable research was conducted during the year in the operation of low-powered TV "boosters" in the UHF bands, and with other low-powered apparatus designed to convert signals received on one channel (usually VHF) to a channel in the UHF band for amplification and retransmission.

Experimentation also continued with various forms of "subscription TV". Manufacturers continued to use experimental authorizations for the development and testing of new TV transmitting equipment. Interest in super-power for UHF stations was developing, and 1 application was pending for authority to test equipment capable of providing an effective radiated power of 5 million watts.

Developmental Broadcast Stations

Experimental operation in connection with the development of new apparatus and techniques in connection with the aural broadcasting services (AM and FM) is classed as developmental broadcast.

Activity in this field was, for the most part, limited to the evolving and testing of transmitting equipment by manufacturers.

Experimental Facsimile Broadcast Stations

There was no activity in this field during the year.

MILITARY BROADCAST STATIONS

For a number of years the Department of Defense has operated radio broadcast stations at military establishments outside of the continental United States in order to provide entertainment for and contribute to the morale of military personnel stationed at these bases. Such service has, for the most part, been provided at isolated places, including territorial possessions having little or no primary service from stations licensed by the Commission.

The rapid development of television has led to a desire on the part of the military to establish TV stations, not only at overseas bases, but also at remote posts within the continental United States. Several military TV stations have been placed in operation after consultation with the Commission. Others are in the planning stage. The Commission is watching these developments closely in order to guard against encroachments which would have an adverse effect on the private broadcast industry.

CHAIN BROADCASTING RULES AND NETWORK STUDY

On June 22, 1955, the Commission amended its chain broadcasting rules to remove a restriction which operated to preclude TV stations from contracting with the networks for particular programs when a station with overlapping coverage in another community had contracted for "first call" on the same network programs. Since, at this stage in TV development, network programing is essential to the profitable operation of most stations, and in many cases, to their very survival, it was desirable to remove this restraint on competition among stations for TV network programing.

The Commission had long recommended to Congress that it be given funds to conduct an overall study of the broadcast industry—including a review of the chain broadcasting rules—to develop factual information necessary to determine the effectiveness of its present rules and the need for any revision. The Independent Offices Appropriation Act, 1956, earmarked $80,000 to be used by the Commission to begin a study of radio and television network broadcasting. On July 22, 1955, the Commission designated Chairman George C. McConnaughey and Commissioners Rosel H. Hyde, Robert T. Bartley and John C. Doerfer as a committee to conduct this study.

An important phase of petroleum radio communication is in connection with geophysical exploration for development of our oil reserves. Here radio may be used either for voice communication to coordinate the efforts of exploring parties, for the transmission of timing impulses as an aid to the operation of sounding equipment, or for a combination of both, using the same frequencies. Prospecting for oil and the drilling of wells on the continental shelf in the Gulf of Mexico continues, with some companies licensed in both the Petroleum Radio Service and the Ship Radio Service, the latter primarily for long distance over-water communication.

The major oil companies retailing finished petroleum products, as well as a number of smaller independent producers of crude petroleum, continued to expand their conventional mobile radio systems. Also popular in the Petroleum Radio Service are movable base stations, suitable for temporary installation at a drilling site to direct the movement of men and materials as the drilling progresses.

Perhaps the most spectacular development of the year was the increase in the number of point-to-point radio circuits along petroleum pipelines. In all but one instance, these systems are to operate at microwave frequencies. Provision is made for several voice communication channels, with other channels devoted to telemetering and signaling application. In order to introduce and extract, at transmitter and receiver locations, the various types of intelligence carried simultaneously over the system, highly complicated and expensive equipment similar to that found in telephone exchanges is required at each way station. When it is considered that the average distance between retransmission points on microwave systems is necessarily of the order of 35 miles, it becomes apparent that microwave communication along a long pipeline involves expenditure of a considerable sum of money. For one such installation, cost of the microwave equipment to span a distance of approximately 1,800 miles is approximately a million dollars. This cost excludes the conventional mobile radio system operating along the route of the same line from base stations tied in to each way station.

The point-to-point circuits are used to coordinate the movement of crude petroleum, petroleum products, or natural gas through the line. The most important item is exchange of line pressure information between the various pumping stations along the route. The regular mobile radio system is necessary for maintenance work along the line, and for the dispatching of repair crews in event of leaks or blowouts with accompanying danger of fire or explosion.

MULTIPLE OWNERSHIP RULES

One of the actions taken by the Commission in September of 1954 to encourage the development of the UHF band was the liberalization of its multiple ownership rules. The revised rules increased the maximum number of commercial TV stations any one interest could own from five to seven, and provided that not more than five of the seven could be in the VHF band. This revision was intended to encourage multiple owners of TV stations to enter the UHF field and to lend their knowledge and resources to its development. Since the adoption of these rules, multiple owners have acquired UHF outlets in important markets such as Milwaukee, Portland (Oregon), and Miami.

The multiple ownership rules also preclude common interest in more than 7 commercial AM, or 7 commercial FM stations; or the same person or group from operating more than 1 network, or more than 1 AM, FM, or TV station in the same service area.

On February 24, 1955, the United States Court of Appeals for the District of Columbia Circuit in *Storer Broadcasting Company* v. *United States and Federal Communications Commission*, No. 12,065, held that the Commission's multiple ownership rules were invalid to the extent that they impose maximum limits on interests in broadcast stations. On May 23, 1955, the Commission petitioned for a writ of certiorari to review this decision in the Supreme Court of the United States. To date, the Supreme Court has not taken action on this petition.

POLITICAL BROADCASTS

On September 2, 1954, the Commission revised its political broadcast rules to implement the 1952 amendments to Section 315 of the Communications Act. The new rules are intended to insure that legally qualified candidates for public office are afforded the opportunity to use the facilities of broadcast stations at a rate no higher than that paid by commercial advertisers under comparable circumstances. This and other obligations imposed by section 315 of the act and the Commission's rules are limited solely to the rates charged legally qualified candidates for public office.

As an aid to broadcasters and political candidates, the Commission on September 8, 1954 issued a pamphlet, "Use of Broadcast Facilities by Candidates for Public Office", setting forth the provisions of the law and rules and summarizing some of the determinations made of questions with respect to their application.

"PARTY IN INTEREST" PROTESTS

Commission apprehension, expressed to Congress before Section 309 (c) of the Communications Act was amended in 1952, has been

realized in the way that this section is being used to delay and impede its processes, and to deny the public expected and long-awaited service—especially TV.

Supported by court rulings, this particular provision has the effect of entitling any party claiming economic injury to a hearing on any application that the Commission has granted without a hearing and, further, requiring that the grant be stayed while the protestant is being heard. In consequence, it has been seized upon by unsuccessful TV applicants, AM and FM stations, and even nonbroadcast interests, to hold up TV grants that were previously uncontested.

It became so evident this provision was being used in many cases solely as a device to block broadcast grants and to keep competitors off the air as long as possible that the Commission sought remedial legislation of Congress. Such a bill passed the House and another received Senate subcommittee approval but Congress adjourned without taking final action.

HEARINGS

On July 15, 1954, the Commission made substantial revisions to its rules relating to broadcast hearing procedures in order to simplify and speed up hearings on competitive applications. These revisions were the result of the Commission's experience with hearing procedures previously in use and were undertaken after consultation with representatives of the practicing bar. The changes may be summarized briefly:

> Requirement of a prehearing exchange between applicants, and submission to the examiner by each applicant of his direct case in written form;
>
> Expanded use of the prehearing conference procedure, with a removal of the requirement that applicants submit points of reliance;
>
> Elimination of the requirement in prehearing letters that each applicant submit detailed supplementary information prior to commencement of the hearing; and
>
> Extension of the time between the designation and commencement of a hearing from 30 to 60 days with a corresponding change in the cutoff date for filing competing applications.

The requirement for exchanging supplementary information between competing applicants prior to the commencement of a hearing was deemed no longer necessary because of the elimination of the requirement respecting submission of points of reliance. The extension of the prehearing interval was necessary in order to provide applicants with sufficient time to prepare their written cases in advance of the actual hearing. The Commission also provided for a prehearing conference both prior to and subsequent to the exchange of

exhibits by the parties, with the initial conference covering a wide variety of matters.

These revisions materially expedite the hearing process since each applicant is required to exchange with the other parties to the proceeding his entire direct case in writing in the form of exhibits prior to the oral portion of the hearing. The many advantages of this were cited in the first report of the President's Conference on Administrative Procedure, published January 26, 1954. The procedure adopted by the Commission also limits the direct oral testimony with respect to the applicant's affirmative case.

These new procedures do not require broadcast hearings to commence with the actual presentation of proof, nor are applicants required to make a preliminary submission of detailed information supplementing their applications in specified categories, as was formerly the case. The requirement that the parties state the matters upon which they propose to rely has also been eliminated. However, the Commission still makes findings upon the basic legal, financial, technical, etc., qualifications of the applicants before the applications are designated for hearing, thus eliminating lengthy testimony on which no actual controversy exists.

On April 1, 1955, the Commission amended its procedural rules governing adjudicatory cases. These revisions limit the length of pleading and briefs filed in certain cases, and the length of time allotted to parties for oral argument. The amended rules provide that in adjudicatory proceedings which have been designated for hearing the Commission will not accept pleadings which exceed 15 double-spaced typewritten pages in length, unless good cause is established in a separate pleading.

The amended rules also provide that briefs or memoranda accompanying exceptions to or statements of initial decisions be limited to 50 double-spaced typewritten pages, unless permission is obtained for greater length. Briefs in reply to exceptions are subject to the same limitations. With respect to exceptions to initial decisions, the Commission announced that existing rules requiring each exception to contain specific reference to the page in the transcript, exhibit or order on which it is based, would be more strictly enforced.

In addition, the amended rules provide that Commission orders designating cases for oral argument shall specify the amount of time allotted to each party. Any person may petition for extension of this time, and such petitions will be granted if good cause is shown. Formerly, the normal time allotted to each party for oral argument was 20 minutes. The new rule permits a more flexible arrangement and more administrative efficiency since the Commission now examines each case at the time it is designated for oral argument and makes an

allotment of time to each of the participating parties based on the particular circumstances of the case.

The Commission has drafted a hearing manual designed to promote uniformity in the introduction and use of evidence in comparative broadcast proceedings and, on October 19, 1955, proposed to incorporate it by reference to its rules of practice and procedure.

OTHER BROADCAST RULE CHANGES

In addition to the rule, changes and rule-making proceedings heretofore reported, the following are some of the other important revisions made and rulemaking proceedings instituted which affect the broadcast service.

During the fiscal year, the Commission received approximately 100 petitions requesting amendments to the TV assignment table. Following rulemaking proceedings, 50 changes were made. These proposals no longer consist primarily of simple channel shifts but frequently entail wholesale channel changes as well as amendments to other rules. With the further development of TV and the advent of more stations, the complexity of these rule-making proposals may be expected to increase.

In October of 1954, changes were made in the procedure for processing applications for TV stations to make it in accord with new practices and policies. The new procedure provides for processing TV applications in the order in which they are accepted for filing, as in the case of AM and FM applications. The temporary processing procedure for handling the backlog of applications that existed after the lifting of the TV "freeze" was deleted as well as the "antistraddling rule" which was then necessary to insure that a licensee or permittee would make his channel available to others before seeking another channel.

On May 13, 1955, the Commission specified a 2-year retention period for various records which broadcast stations must maintain. While the rules provide that program and operating logs must be kept for two years, they were previously silent on the retention period of other records.

On May 19, 1955, the Commission incorporated various portions of the Standards of Good Engineering Practice in the broadcast rules. It is codifying its AM and FM standards and preparing a revised edition of Part 3.

The Commission has under study a petition which requests that the rules be revised to permit all AM stations on regional frequencies to commence operation with their daytime facilities at 5 a. m., or local sunrise, whichever occurs earlier, and to cease daytime operation at 7 p. m. or local sunset, whichever is later. The present rules gener-

ally provide that daytime stations cannot sign on before local sunrise and must sign off before local sunset. They also require unlimited time stations on regional frequencies to use their nighttime facilities (generally with reduced power or directional antenna or both) after local sunset. Under the pending proposal, unlimited time stations which operate with reduced power or directional antenna at night would be permitted to operate with their daytime facilities during the proposed daytime hours.

The Commission instituted rulemaking on December 8, 1954, looking toward providing bandwidth definitions and emission limitations for AM and FM broadcast stations. Present rules and standards do not define the bandwidth utilized by aural stations, nor do they set forth any definite limit on their spurious emissions (energy released on other than their assigned channels). The purpose is to curb interference to other broadcast stations and to stations operating in other services.

Rulemaking initiated December 16, 1954, looks to revising license application form (FCC Form 302) to reflect new requirements with respect to TV upper sideband measurements and out-of-band TV emissions, to include questions concerning color operation, and to delete the exception to filing financial data in certain instances.

On July 20, 1955, the rules were amended to permit VHF stations in Zone I to employ maximum power with antenna heights up to 1,250 feet above average terrain, instead of 1,000 feet as previously stipulated. However, a number of petitions for reconsideration and requests for stay were filed and the effective date has been postponed.

New rules of May 19, 1955, establish procedure for "type acceptance" of broadcast transmitters. This form of approval is based on an examination of certified test data submitted by the manufacturer of the transmitter or by a licensee employing the transmitter. An application for a construction permit which specifies a "type-accepted" transmitter need not be accompanied by diagrams and a detailed description of the transmitter.

A current rulemaking proceeding proposes procedures for "type approval" (by laboratory test) of TV frequency and modulation monitors. Present rules prescribe methods for type approving such AM and FM monitors, but not for those in TV.

STATISTICS

Current Broadcast Authorizations

The fiscal year closed with broadcast authorizations collectively exceeding 6,000 for the first time. Their 6,257 total represented a net gain of 419 for the year.

The biggest growth for program outlets was 143 for AM, making its total 2,840. Commercial TV's net gain was 9, giving it 582. A gain of 4 brought educational TV's total to 34. Commercial FM showed a net loss of 17, bringing its total down to 552, but educational FM gained 4, to increase its number to 127. The remaining 2,107 authorizations were for broadcast adjuncts, of which remote pickup facilities accounted for 1,546.

Authorizations for the different classes of broadcast services were:

Class	June 30, 1954	June 30, 1955	Increase or (decrease)
Commercial AM	2,697	2,840	143
Commercial TV	573	582	9
Educational TV	30	34	4
Auxiliary TV	397	516	119
Experimental TV	18	15	(3)
Commercial FM	569	552	(17)
Educational FM	123	127	4
Remote pickup	1,384	1,546	162
Studio-transmitter link	45	43	(2)
Developmental	2	2	0
Totals	5,838	6,257	419

These figures do not include international broadcast stations, which are in a state of flux.

There is no separate facsimile broadcast service, but commercial FM stations can engage in facsimile operation and there is provision for facsimile experimentation. Also, beginning July 1, 1955, FM stations can apply for "Subsidiary Communications Authorization" to engage in functional (background) music operations.

Broadcast Authorizations by States and Territories

Texas continues to lead all States in total number of broadcast authorizations, according to a mid-June tabulation of Commission records. Texas then had 277 AM, FM, and TV authorizations collectively. California came second with 241, and Pennsylvania third with 221.

In the AM list, Texas is also at the top with 212 such authorizations, followed in turn by California with 155, Pennsylvania with 133, North Carolina with 124, New York with 110 and Florida with 109. Every territorial possession (including Guam) has AM grants. Puerto Rico's 25 AM authorizations are more than those in each of a dozen States.

The FM commercial list is headed by Pennsylvania (44), followed by New York (43) and California (39).

In educational FM, California and Indiana are tied in first place with 11 each. Six States are without any FM authorizations—Montana, Nebraska, North Dakota, South Dakota, Vermont, and Wyoming. Hawaii has both commercial and educational FM authorizations.

All States—also Alaska, Hawaii and Puerto Rico—have TV authorizations. The commercial TV authorization list is headed by Texas with 41, followed by Pennsylvania with 36 and California with 35.

New York tops the educational TV list with 7 grants, followed by Alabama and Connecticut with 3 each.

A list of broadcast authorizations by States and Territories follows:

Broadcast authorizations by States

	AM	FM		TV		Total
		Commercial	Educational	Commercial	Educational	
Alabama	92	16	1	11	3	123
Arizona	31	2	1	7	0	41
Arkansas	52	6	0	7	0	65
California	155	39	11	35	1	241
Colorado	44	5	1	8	1	59
Connecticut	25	6	0	8	3	42
Delaware	8	1	0	1	0	10
District of Columbia	6	8	0	6	0	20
Florida	109	21	4	21	1	156
Georgia	99	17	1	15	0	132
Idaho	25	2	0	5	0	32
Illinois	89	32	5	20	2	148
Indiana	56	21	11	16	0	104
Iowa	59	11	4	12	0	86
Kansas	44	2	5	8	1	60
Kentucky	65	11	4	9	0	89
Louisiana	60	12	1	13	0	86
Maine	16	1	0	7	0	24
Maryland	33	7	1	7	0	49
Massachusetts	54	16	5	10	1	86
Michigan	79	22	4	19	2	126
Minnesota	54	5	1	9	0	69
Mississippi	62	3	1	7	0	73
Missouri	69	9	1	19	1	99
Montana	29	0	0	4	0	33
Nebraska	28	0	0	7	0	35
Nevada	14	1	0	4	0	19
New Hampshire	13	4	0	2	0	19
New Jersey	24	6	2	5	1	38
New Mexico	33	2	1	4	0	40
New York	110	43	6	29	7	195
North Carolina	124	33	3	16	1	177
North Dakota	18	0	0	6	0	24
Ohio	81	34	9	28	2	154
Oklahoma	51	2	4	13	2	72
Oregon	59	8	3	8	0	78
Pennsylvania	133	44	7	36	1	221
Rhode Island	12	5	0	3	0	20
South Carolina	57	16	1	11	0	85
South Dakota	17	0	0	3	0	20
Tennessee	86	11	2	11	0	110
Texas	212	16	7	41	1	277
Utah	22	2	2	3	0	29
Vermont	13	0	0	1	0	14
Virginia	74	18	3	12	0	107
Washington	63	6	3	14	1	87
West Virginia	44	11	0	11	0	66
Wisconsin	71	13	8	14	1	107
Wyoming	19	0	0	1	0	20

Broadcast authorizations by Territories

	AM	FM		TV		Total
		Commercial	Educational	Commercial	Educational	
Alaska	13	0	0	4	0	17
Guam	1	0	0	0	0	1
Hawaii	13	1	2	5	0	21
Puerto Rico	25	0	0	3	1	29
Virgin Islands	3	0	0	0	0	3

Broadcast Authorizations by Cities

Cities having 10 or more broadcast authorizations total 54. New York City leads with 37 AM, FM, and TV authorizations collectively, followed by Chicago with 35, Los Angeles with 29, and Philadelphia with 23.

New York and Chicago head the AM list with 16 authorizations each, followed by Los Angeles with 13, and New Orleans with 11.

In the commercial FM field New York leads with 11, followed by Chicago (10), Washington (8), and Cleveland, Detroit, Los Angeles, and Philadelphia (7 each).

Philadelphia, Boston, Dallas, and Louisville each have 3 educational FM authorizations.

Los Angeles has the most commercial TV grants (8), followed by New York and Chicago (7 each), and Washington (6).

The 34 current educational TV grants are to Andalusia, Birmingham and Munford, Ala.; Berkeley, Calif.; Denver, Colo.; Bridgeport, Hartford, and Norwich, Conn.; Miami, Fla.; Chicago and Urbana, Ill.; Manhattan, Kans.; Cambridge, Mass.; Ann Arbor and Detroit, Mich.; St. Louis, Mo.; New Brunswick, N. J.; Albany, Binghamton, Buffalo, Ithaca, New York, Rochester, and Syracuse, N. Y.; Chapel Hill, N. C.; Cincinnati and Columbus, Ohio; Oklahoma City and Tulsa, Okla.; Pittsburgh, Pa.; Houston, Tex.; Seattle, Wash.; Madison, Wis., and San Juan, P. R.

The following tabulation indicates the number of broadcast stations authorized in the particular cities listed. It does not include stations in adjacent communities which also serve those cities.

	AM	FM		TV		Total
		Commercial	Educational	Commercial	Educational	
New York	16	11	2	7	1	37
Chicago	16	10	1	7	1	35
Los Angeles	13	7	1	8	0	29
Philadelphia	10	7	3	3	0	23
Cleveland	8	7	1	5	0	21
San Francisco	10	5	1	5	0	21
Boston	10	4	3	3	0	20
Washington	6	8	0	6	0	20
Atlanta	8	5	1	4	0	18
Detroit	5	7	1	4	1	18
Portland (Oreg.)	10	5	0	3	0	18
Seattle	10	3	1	3	1	18
Denver	10	2	0	4	1	17
Minneapolis-St. Paul	10	2	1	4	0	17
New Orleans	11	3	0	3	0	17
Pittsburgh	7	4	1	4	1	17
Baltimore	8	2	1	5	0	16
Dallas	7	3	3	3	0	16
Houston	8	2	1	4	1	16
San Antonio	9	4	0	3	0	16
Birmingham	8	3	0	3	1	15
Jacksonville	9	3	0	3	0	15
Miami	6	4	1	3	1	15
St. Louis	8	1	1	4	1	15
Buffalo	6	4	0	3	1	14
Cincinnati	6	2	0	5	1	14
Louisville	7	0	3	4	0	14
Richmond	8	4	0	2	0	14
Rochester	6	2	0	5	1	14
Des Moines	6	3	1	3	0	13
Fresno	7	3	0	3	0	13
Memphis	9	1	0	3	0	13
Milwaukee	7	1	0	5	0	13
Oklahoma City	7	0	1	4	1	13
Salt Lake City	7	2	1	3	0	13
Shreveport	7	3	0	3	0	13
Columbus (Ohio)	5	2	1	3	1	12
Honolulu (Hawaii)	6	1	2	3	0	12
Tampa	6	3	1	2	0	12
Tulsa	6	0	1	4	1	12
Albuquerque	6	1	1	3	0	11
Baton Rouge	5	3	1	2	0	11
Columbia (S. C.)	5	2	1	3	0	11
Kansas City	7	1	0	3	0	11
Knoxville	6	1	2	2	0	11
Madison (Wis.)	4	3	1	2	1	11
Providence	6	2	0	3	0	11
Scranton	5	2	1	3	0	11
Grand Rapids	6	2	0	2	0	10
Nashville	7	1	0	2	0	10
Savannah	6	2	0	2	0	10
Spokane	6	1	0	3	0	10
Syracuse	5	1	1	2	1	10
Toledo	4	3	1	2	0	10

Broadcasting Since 1949

The following table shows the number of authorized, licensed and operating broadcast stations, and pending applications, at the close of each of the past 7 fiscal years; also the number of stations deleted during those years:

Year	Grants	Deletions	Pending applications	Licensed	CP's on air	Total on air	CP's not on air	Total authorized
COMMERCIAL AM								
1949	200	55	382	1,963	43	2,006	173	2,179
1950	194	70	277	2,118	26	2,144	159	2,303
1951	116	35	270	2,248	33	2,281	104	2,385
1952	60	25	323	2,333	22	2,355	65	2,420
1953	187	23	250	2,439	19	2,458	126	2,584
1954	148	29	226	2,565	18	2,583	114	2,697
1955	161	18	304	2,719	13	2,732	108	2,840
COMMERCIAL FM								
1949	57	212	65	377	360	737	128	865
1950	35	169	17	493	196	691	41	732
1951	15	91	10	534	115	649	10	659
1952	24	36	9	582	47	629	19	648
1953	29	79	8	551	29	580	21	601
1954	27	54	5	529	24	553	16	569
1955	27	44	6	525	15	540	12	552
EDUCATIONAL FM								
1949	18	7	9	31	3	34	24	58
1950	25	4	3	61	1	62	20	82
1951	19	6	2	82	1	83	12	95
1952	12	2	2	91	1	92	12	104
1953	13	1	3	106	0	106	10	116
1954	9	2	1	117	0	117	6	123
1955	7	3	1	121	3	124	3	127
COMMERCIAL TV								
1949	15	7	338	13	56	69	48	117
1950	0	8	351	47	57	104	5	109
1951	0	0	415	81	26	107	2	109
1952	0	1	716	96	12	108	0	108
1953	381	6	572	101	97	198	285	483
1954	174	81	200	104	298	402	171	573
1955	67	58	127	137	321	458	124	582
EDUCATIONAL TV								
1952	0	0	1	0	0	0	0	0
1953	17	0	29	0	1	1	16	17
1954	13	0	17	0	6	6	24	30
1955	5	1	14	1	10	11	23	34

Any seeming discrepancy in the relation of grants and deletions during the year to total authorizations at the close of the year is due to reinstatement of some deleted authorizations and other considerations impossible to detail in this general table.

Broadcast Applications

Broadcast applications totaled nearly 7,700 in fiscal 1955, which was some 300 less than in 1954. Applications for new TV stations decreased from 106 in 1954 to 58 in 1955. Applications for new AM stations increased from 227 to 330, and applications for new FM sta-

FOREST PRODUCTS RADIO SERVICE

The Forest Products Radio Service was established in 1949 for the purpose of extending the use of radio to privately owned timber and logging companies to promote safety of their personnel, conservation of wooded areas, and increased efficiency of logging and tree-farming operations. No provision is made for use of radio outside of actual woods operations.

To date, the majority of systems have been for conventional single frequency operation of base and associated mobile station, with a few point-to-point circuits to connect base station control positions with their transmitter sites located upon more favorable terrain. A few large operators have been permitted the use of separate frequencies in different divisions of their operating areas, where such divisions are widely separated and do not require intercommunication, or where use of different frequencies may be required to prevent interference to other licensees.

The majority of grants in the Forest Products Service continue to be made in the Pacific Northwest. However, a number of inquiries indicate that timber operators in the Southern and Northeastern States are planning more extensive use of radio communication in their pulpwood operations.

RELAY PRESS RADIO SERVICE

The present Relay Press Radio Service is derived from a former radio service which made no provision for dispatching of mobile units from newspaper offices. Consequently, the newer service is of considerably more benefit to persons engaged in operation of a newspaper or press association in an urban area.

Inasmuch as only four frequencies are available to this service in the range of mobile frequencies considered to be useful at the present state of the radio art, some difficulty is anticipated in areas where the four frequencies have been assigned. In New York City, for example, the next new licensee must be assigned one of the frequencies already in use, except in the event that equipment suitable for mobile service and operation in the band 450–460 megacycles becomes available in the immediate future. The possibility of two reporters from rival papers attempting to file stories simultaneously over the same radio channel indicates that some sort of industry priority or sharing plan must be adopted. As has been successfully demonstrated in other industries, cooperation and self regulation at the licensee level can avoid many situations which would result in degradation of service.

tions rose from 33 to 37. Of all AM applications, 114 had to be designated for hearing in 1955 as compared with 84 in 1954. TV applications designated for hearing decreased from 255 to 26.

Nonhearing broadcast application statistics for fiscal 1955 follow:

Class	On hand June 30, 1954	Received	Granted	Dismissed, denied, or returned	Designated for hearing	On hand June 30, 1955
AM						
New stations	156	330	160	70	79	222
Major changes	132	203	120	55	23	152
Transfers	42	562	506	46	4	52
Renewals	246	1,131	982	96	2	299
Licenses	76	428	408	20	1	76
Other	70	936	895	74	5	35
AM total	722	3,590	3,071	361	114	836
FM						
New stations	6	37	34	2	0	7
Major changes	15	111	116	5	0	5
Transfers	10	67	69	0	0	8
Renewals	75	246	253	4	0	64
Licenses	14	108	112	0	0	10
Other	8	130	137	0	0	1
FM total	128	699	721	11	0	95
TV						
New stations	31	58	39	12	9	30
Major changes	24	197	171	11	8	34
Transfers	17	124	122	3	5	13
Renewals	23	56	65	3	0	11
Licenses	77	123	94	3	0	103
Other	80	954	948	31	4	53
TV total	252	1,512	1,439	63	26	244
Miscellaneous						
New stations	73	459	455	10	0	67
Major changes	15	223	216	2	0	20
Transfers	32	239	213	4	0	54
Renewals	146	435	469	11	0	101
Licenses	264	430	256	29	0	409
Other	3	77	69	4	0	7
Miscellaneous total	533	1,863	1,678	60	0	658
Grand total	1,635	7,664	6,909	495	140	1,833

FM and TV figures include noncommercial educational stations. Miscellaneous includes relay and studio links, experimental, etc.

Pending Broadcast Applications

About 1,800 broadcast applications were pending at the close of fiscal 1955 as compared to 1,600 in 1954. Of the 1955 total, 65 percent were less than 3 months old.

The age of a pending broadcast application depends largely upon the particular problems it presents. Principal reasons for delays are: pending hearing or hearing decision; awaiting outcome of specific rulemaking; involvement in legislation or litigation; correspondence with nonconforming applicants; tardiness of applicants in furnishing additional information; restudies required by changed applications; negotiations between parties; resolvement of conflicting applications, and requests of applicants to hold up action.

The age of broadcast applications pending at the end of fiscal 1955 is shown in the following table:

Service	Under 3 Months	3 to 12 Months	12 to 24 Months	Over 24 Months	Total
AM					
New stations	94	72	22	34	222
Changes	51	41	20	40	152
Renewals	247	34	9	9	299
Other	135	13	5	10	163
AM total	527	160	56	93	836
FM					
New stations	6	0	0	1	7
Changes	4	0	1	0	5
Renewals	59	5	0	0	64
Other	16	1	0	2	19
FM total	85	6	1	3	95
TV					
New stations	9	7	5	9	30
Changes	26	6	2	1	35
Renewals	10	0	0	1	11
Other	89	40	25	15	169
TV total	134	53	32	26	245
Miscellaneous					
New stations	41	12	14	0	67
Changes	18	2	0	0	20
Renewals	77	13	4	7	101
Other	129	146	149	46	470
Miscellaneous total	265	173	167	53	658
Grand total	1,011	392	256	175	1,834

Receiving Sets

Broadcast receiving sets are not subject to Commission licensing. However, the Commission does endeavor through cooperative effort to curb interference to or from these receivers in their relation to radio communication operations in general.

Industry estimates that more than 120 million radio (audio) receivers are in use, including approximately 10 million FM sets and over 30 million sets in automobiles. Television receivers in use approximate 35 million, of which number about 15,000 are equipped to get color transmissions (which appear in monochrome on regular sets). In 1955 the Department of Commerce reported that two-thirds (32 million) of the 48 million households in this country had one or more TV sets, which was six times the number in 1950.

Networks

The Commission does not license broadcast networks as such. However, individual station licensees are subject to the so-called "chain broadcasting rules" adopted by the Commission in 1941 to promote competition in broadcasting.

The major networks are the American Broadcasting Co.; Columbia Broadcasting System, Inc.; Mutual Broadcasting System, Inc.,

and National Broadcasting Co. There are many regional, state, and group networks.

The Senate Interstate and Foreign Commerce Committee on August 5, 1954, instituted an inquiry of radio and TV network broadcasting. Congress appropriated the Commission $80,000 to begin a network study in fiscal 1956. On July 22, 1955, the Commission designated a committee of four of its members to institute and direct this study—Chairman George C. McConnaughey and Commissioners Rosel H. Hyde, Robert T. Bartley, and John C. Doerfer.

Broadcast Industry Financial Data

In the calendar year 1954, the grand total revenues of the broadcasting industry (radio and television) passed the $1 billion mark for the first time on record. The industry's total revenues (which are derived from the sale of time, talent, and program materials to advertisers) were reported at $1,042,500,000.

The year 1954 marked the first time in 16 years that the radio industry failed to establish a new alltime high for total revenues which declined to $449.5 million, or 5.4 percent below 1953. Total revenues of the television industry continued upward in 1954, however, to reach $593 million, or 37 percent above 1953. As a result, TV's revenue total in 1954 surpassed radio's alltime high of $475.3 million which was reached in 1953.

Total radio and TV profits of $132.1 million in 1954 were 7.4 percent above 1953. Television broadcast profits of $90.3 million were 32.8 percent higher while radio profits declined to $41.8 million or by 24 percent. All profit figures are before payment of Federal income tax.

The following tables show the comparative calendar year 1953–54 financial data for the radio and television broadcast industries:

All Networks and Stations, 1953–54

Item	1953 (millions)	1954 (millions)	Percent increase [or decrease] in 1954
Total broadcast revenues	$908.0	$1,042.5	14.8
Radio[1]	475.3	449.5	(5.4)
Television	432.7	593.0	37.0
Total broadcast expenses	785.0	910.4	16.0
Radio	420.3	407.7	(3.0)
Television	364.7	502.7	37.8
Broadcast income (before Federal income tax)	123.0	132.1	7.4
Radio	55.0	41.8	(24.0)
Television	68.0	90.3	32.8

[1] Radio includes AM and FM broadcasting.

Note. 1954 radio data cover the operations of 4 nationwide networks and 3 regional networks, 2,554 AM and AM–FM and 43 independent FM stations. 1953 data are for the same networks and 2,434 AM and AM–FM and 45 independent FM stations. 1954 TV data cover the operations of 4 networks and 410 stations; 1953 data are for the same networks and 334 stations.

Nationwide Networks only, 1953–54

(Including owned and operated stations)

	1953 (millions)	1954 (millions)	Percent increase or (decrease) in 1954
Broadcast revenues			
Radio	$92.6	$84.5	(8.7)
Television	231.7	306.7	32.4
Total	324.3	391.2	20.6
Broadcast expenses			
Radio	83.2	77.0	(7.5)
Television	213.7	270.2	26.4
Total	296.9	347.2	16.9
Broadcast income (before Federal income tax)			
Radio	9.4	7.5	(20.2)
Television	18.0	36.5	102.8
Total	27.4	44.0	60.6

Note 1. Radio data include the operations of 16 network-owned stations in 1953 and 1954.
Note 2. Television data include the operations of 16 stations in 1953 and 1954.

AM Radio [1] *Broadcast Revenues, Expenses, Income and Investment, 1953–54*

[In thousands]

Item	4 nationwide networks and their stations [2]		3 regional networks and their stations [2]		All other stations [3]		Industry total	
	1953	1954	1953	1954	1953	1954	1953	1954
Total broadcast revenues	$92,654	$84,484	$4,679	$4,109	$377,252	$360,192	$474,585	$448,785
Total broadcast expenses	83,220	76,981	3,702	3,462	331,867	325,890	418,789	406,333
Total broadcast income (before Federal income tax)	9,434	7,503	977	647	45,385	34,302	55,796	42,452
Investment in tangible broadcast property:								
Original cost	24,602	21,714	1,712	1,737	249,926	255,331	276,240	278,782
Depreciation to date	13,480	11,701	1,209	1,074	113,258	120,557	127,947	133,332
Depreciated cost	11,122	10,013	503	663	136,668	134,774	148,293	145,450

[1] Excludes independently operated FM stations, 45 in 1953 and 43 in 1954.
[2] Includes the operations of 22 network-owned stations in 1953 and 21 network-owned stations in 1954.
[3] Includes 2,412 stations in 1953 and 2,534 stations in 1954.

FM Broadcast Revenues, Expenses and Income, 1953–54

Item	1953		1954	
	Number of stations	Amount (millions)	Number of stations	Amount (millions)
FM stations operated by:				
AM licensees:				
Reporting no FM revenues	412		355	
Reporting FM revenues	137	$1.3	130	$1.1
Non-AM licensees	45	.8	43	.8
Total FM stations	594	2.1	528	1.9
FM broadcast expenses				
FM stations operated by non-AM licensees	45	1.6	43	1.4
Industry total		(1)		(1)
Total FM broadcast income (before Federal income tax)				
FM stations operated by non-AM licensees	45	(.8)	43	(.6)
Industry total		(1)		(1)

[1] In view of the difficulty in a joint AM–FM operation in allocating FM operation expense separately from AM station operation expense, licensees of such stations were not required to report FM station expense separately. As a result, FM industry totals for expense and income are not available. AM–FM licensees, however, were requested to report separately the revenues, if any, attributable to FM station operation if such data were readily available. In only a few instances did AM–FM licensees state they were unable to segregate the FM revenues.

( ) Denotes loss.

TV Broadcast Revenues, Expenses and Income, 1954

(In thousands)

Item	4 networks and their 16 owned and operated TV stations	380 other TV stations	Total 4 networks and 396 TV stations [1]
Revenues from the sale of time:			
Network time sales:			
Nationwide networks	$177,212	$64,013	$241,225
Miscellaneous networks and stations			
Revenue from network time sales	177,212	64,013	241,225
Non-network time sales to:			
National and regional advertisers and sponsors	46,849	129,917	176,766
Local advertisers and sponsors	22,542	97,589	120,131
Total revenues from non-network time sales	69,391	227,506	296,897
Total revenues from time sales	246,603	291,519	538,122
Deduct—Commissions to regularly established agencies, representatives, brokers and others	[2] 47,504	38,413	85,917
Net revenues from time sales	199,099	253,106	452,205
Revenues from incidental broadcast activities:			
Talent	75,850	9,137	84,987
Sundry broadcast revenues	31,731	24,014	55,745
Total revenues from incidental broadcast activities	107,581	33,151	140,732
Total broadcast revenues	306,680	286,257	592,937
Total broadcast expenses of networks and stations	270,159	232,478	502,637
Broadcast income before Federal income tax	36,521	53,779	90,300

[1] Excludes data for 14 stations with less than $25,000 in time sales. Such stations report only total revenues and total expenses.

[2] Of this amount $36,757,871 is applicable to the total sale of network time.

Radio Interference

INTERFERENCE PROBLEM

The subject of interference to radio transmission and reception merits a separate chapter. That is because interference has become one of the most vexing problems confronting electrical communication today. It affects all types of services and involves consideration of a growing number of electronic devices and gadgets.

With some 800,000 authorized transmitters, it is difficult enough to see that radio transmissions do not collide with one another. But this engineering task is magnified by the accidental or careless release of emissions by apparatus using radio-frequency energy for various noncommunication purposes.

Many of these units employ power far in excesse of the maximum permitted broadcast stations, and their combined energy exceeds the total transmitter power for all forms of radio communication. In many cases the radiations from such equipment have skip-jumped clear across the continent to disrupt communication thousands of miles away. This is a particular menace to radio messages on which the safety of life and property depend.

CAUSES OF INTERFERENCE

Offending unlicensed equipment falls into two general groups. One group embraces industrial, scientific, and medical equipment typified by industrial heaters, diathermy machines, arc welders, and similar items. The other group covers restricted radiation devices such as carrier current (wired) communication systems, also remote-control operation of garage doors, phonograph record players, etc.

Causes of interference are multitude. To name a few: defective or obsolete light bulbs or radio tubes; defective interior or exterior electric circuits; broken wires and insulators; oscillating AM or FM receivers; inadequately shielded or improperly installed or adjusted TV sets; radio equipment inadvertently left "on"; defective antenna systems; homemade record players; electric fences; home and factory heating equipment; college campus "broadcast" systems; community antenna systems; electric signs, razors, heating pads, thermostats and other household equipment; ignition effects of passing planes, auto-

mobiles, streetcars and buses; draw bridges; faulty transformers and insulators; and weather disturbances.

A particular interference headache concerns television reception. Of all broadcast reception apparatus, that for video is most susceptible to receiving—also giving—interference. Also, many TV interference complaints come from persons who attempt to receive stations far beyond their normal range.

DEALING WITH INTERFERENCE

In the old days, Commission monitoring was largely confined to listening in on dot-dash telegraph messages, which could be deciphered by ear and be traced as easily. Today, complicated apparatus is required to distinguish between types of emissions; several monitoring stations are needed to "fix" (plot) the general area where a questionable signal originates; mobile direction finders are employed to further trace the source, and sometimes hand-carried detectors must be used for the final run-down. All of this takes a lot of time and effort—at the taxpayers' expense—and some cases can be resolved only after months of effort.

The mounting number of interference complaints makes it impossible for the FCC's limited field investigative staff to give attention to every individual case. Consequently, priority is given to those cases endangering radio services which protect life and property—such as marine, aviation, police, and fire—and to those involving illegal transmitters and unlicensed operators.

As a result, the Commission has sought the cooperation not only of radio users but also of manufacturers, distributors, and retailers of apparatus which can cause interference. This is particularly helpful in the majority of cases where trouble can be prevented or minimized by using more adequate shielding, or by installing a wave trap, filter, or some other equally simple contrivance. The Commission also tests and type-approves certain equipment in advance of manufacture to reduce the likelihood of interference when the apparatus is put in operation. In cases of wilful and reckless violation it can, and does, resort to show cause orders or other proceedings.

On the whole, industry and users are equally aware of the interference problem and work with the Commission for mutual solution. One example is the continued progress made in organizing Commission-sponsored local TVI (Television Interference) committees. There are now 437 such committees functioning in 412 communities, with additional committees being established. Amateur radio operators, TV set owners, broadcasters, manufacturers, retailers, and others concerned thus work together to deal with TV interference at the local level.

Though the amateur radio operator is often the popular suspect when local TV interference develops, it is the Commission's observation and experience that only about 10 percent of this interference is due to "hams," and they are quick to cooperate in remedying the trouble.

More detailed information about interference and its control will be found in the following chapters of this report dealing with Field Engineering and Monitoring, Research and Laboratory, and Frequency Allocation.

Field Engineering and Monitoring

GENERAL

The Field Engineering and Monitoring Bureau, broadly speaking, is the Commission's regulatory arm, rendering a technical service in behalf of the Government, station licensees, and the public. Additionally, it performs licensing functions for radio operators and certain classes of stations; also many specialized services involving the location and disclosure of unlicensed stations, the investigation and solution of thousands of interference complaints, and long-range direction finding including the furnishing of bearing "fixes" to lost aircraft and ships.

As a result of consolidation and geographical reorganization, there are now 6 regional field engineering offices, and ship offices have been reduced from 2 to 1. Otherwise the field "plant" remains the same with 24 district offices, 6 suboffices, and 18 monitoring stations.

The Washington headquarters consists of the Office of the Chief of the Bureau and four divisions—Field Operating, Engineering, Monitoring, and Inspection and Examination.

MONITORING

Monitoring Facilities

The monitoring and direction-finder network consists of 10 primary and 8 secondary monitoring stations (see list in appendix of this report).

All of these stations are now equipped with remote-controlled, long-range high-frequency direction finders with the exception of the Anchorage secondary monitoring station. Four types of direction finders are presently in use—the fixed adcock Type MH/HH, the Type B and the improved Type C adcock, and seven of the monitoring stations have medium-frequency direction finders.

The Lexington, Ky., secondary monitoring station was relocated at Chillicothe, Ohio. This station has been connected to the teletype network and will have a more elaborate installation than the average secondary and a larger staff to handle its work.

In line with the Commission's program of moving monitoring stations now on leased property to Government-owned land, the Muskogee, Okla., secondary monitoring station is being shifted to the former

MOTION PICTURE RADIO SERVICE

This is another service carried over from rules in effect prior to the rule revisions of July 1, 1949. Eligibility is confined to persons producing motion pictures for public showing. In the new Motion Picture Radio Service, additional frequencies are available, affording the applicant a wider choice of the usable frequency spectrum.

As predicted in the last report, there has been no material increase in this service. Since the use of equipment in this service is largely limited to operation while on location in remote areas, and because of the intermittent character of such operation, the use of frequencies shared with other services has been found satisfactory.

SPECIAL INDUSTRIAL RADIO SERVICE

Eligibility for the Special Industrial Radio Service is restricted to persons engaged in production or construction activities and no provision is made for operations of a service or distribution nature. Under the present rules, the applicant is further required to show that his activities would be confined to remote or sparsely settled regions, the yard area of a single manufacturing plant or a construction project of a public character.

Even with the restrictions outlined, the rapid growth of this service and the heterogenous character of its licensees attests to the value placed upon the use of radio by businesses, both large and small, heretofore ineligible for radio operation. Typical operations include directing the movement of locomotive and rail cars within steel mill yards; agriculture, including the operation of large ranches, produce farms, and nurseries; operation of canneries, and vegetable or fruit processing plants; and strip mining of coal and copper.

Another important group of special industrial licensees are contractors engaged in public construction, such as highway building, bridge and tunnel construction, and dredging or other harbor improvements. Particularly important at the present time is the construction of petroleum and natural gas pipelines by independent contractors. As indicated earlier in this report, these contractors are not included under either the Power or Petroleum Radio Services rules. Likewise ineligible under the Petroleum Radio Service, geophysical exploration companies engaged in prospecting for minerals other than oil have obtained authorization in the Special Industrial Radio Service.

The problems of determining the eligibility of applicants for the Special Industrial Radio Service have been the most troublesome arising in any of the industrial radio services. One chief difficulty lies in establishing at what point an applicant's productive operations leave off and his distribution or service activities begin. An unsuspected

site of the Burton Auxiliary Air Field near Ambrose, Tex. This property was obtained without cost to the Commission through the assistance of General Services Administration and the U. S. Corps of Engineers. It consists of 283 acres well suited for long-range direction finder work due to its flatness and remoteness from industrial plants. The relocated station will be read by January 1956.

The moving of the Anchorage monitoring station to Federal property at Pt. Campbell, near Anchorage, Alaska, is approaching completion.

Six acres of additional land were purchased for the Spokane, Wash., secondary monitoring station.

Monitoring for Defense

Since the Commission's direction-finder network is the only coordinated system capable of performing certain functions, the demand for its services by defense agencies has continued to increase. Through such cooperation, the Commission materially assists the defense effort and obviates the need for a duplicate system. Department of Defense monitoring contracts with the FCC totaled $275,500 in 1955. These funds were expended largely for personal services.

Monitoring Surveys

The United States is committed by international agreements to furnish technical data concerning radio frequency usage and band occupancy to the International Telecommunication Union (ITU) at Geneva. This information is essential to a logical frequency allocation plan for communication between countries.

The Commission's monitoring stations have been the principal United States source of data for the International Frequency Registration Board (IFRB) of the ITU. However, in 1955 several commercial operating companies participated in this program.

The Commission made 36 monitoring surveys during the year, which is nine less than in 1954. The 1955 figure does not reflect the true workload since 6 surveys were set up to run concurrently into most of next year. They are designed to check the extent of international compliance on newly implemented frequency bands. The monitoring network sacrificed lower priority work to make all of the surveys requested by other Commission bureaus. Some were for 3-day periods, but many ran for weeks and 6 extended into fiscal 1956.

The system for handling monitoring identification index slips (Form 955) has been revised and such reports resulting from cruising are now combined with those for surveys. Data from these slips are forwarded to the ITU. The information they contain is necessary for domestic allocation work as well as for international discussion. A total of 154,739 slips were submitted during the year.

Monitoring for Interference

Since radio transmissions cannot be confined to geographical boundaries, the solution of interference problems often requires the services of the Commission's entire monitoring and direction-finding network. During the year more than 3,700 requests for such services were received as follows:

	Fiscal 1954	Fiscal 1955
U. S. Air Force	150	287
U. S. Army	109	139
U. S. Navy	52	60
U. S. Coast Guard	66	64
Civil Aeronautics Administration	88	65
Other Government agencies	26	38
Law enforcement agencies	13	24
Commercial airlines	186	177
Commercial concerns	398	462
Foreign governments	13	38
Total major cases	1,101	1,378
Miscellaneous (minor cases)	1,898	2,348
Grand total	2,999	3,726

The following are examples of widespread interference cases that were solved quickly through monitoring:

Aeronautical Radio, Inc., at Honolulu reported a signal causing interference to an air-ground communications frequency. The FCC direction-finder net pin-pointed the source as an airline transmitter at Wilmington, N. C., some 4,800 miles distant. The airline was notified within 20 minutes after receipt of the complaint.

The Coast Guard reported an unidentified signal disrupting ship-shore communication. In 9 minutes the net fixed the source at Alexandria, Va. The offending transmitter was shut down and repaired.

The Navy Search and Rescue officer at Pearl Harbor, Hawaii, complained of a steady signal disturbing a vital distress frequency. The offending transmitter was traced to Midway Island. Its immediate repair made the frequency usable again within a few minutes.

Direction Finding

Long-range direction-finder bearings are the only practical way of locating many sources of interference which cannot be identified otherwise, such as electromagnetic radiations from electronic heaters and diathermy equipment, unmodulated carriers, experimental or complex emissions, and illegal stations. These transmissions are a potential danger to radio communication services besides having possibilities of being used as clandestine transmitters.

Balloon tracking work for the military gave the monitoring stations a heavy load. Such bearings totaled 107,032 during the year as compared to 104,477 bearings in 1954.

The Commission's participation in the air-sea search and rescue program resulted in 1,387 bearings being taken in 110 emergency cases. There was an increase in requests for emergency location of small boats. Some typical air-sea search and rescue operations are listed below:

Emergency assistance to planes.—The Coast Guard requested a "fix" on an Air Force C54 plane over the Atlantic Ocean approximately 120 miles from Charleston, S. C. It was carrying 39 persons and losing altitude. The FCC furnished 2 "fixes," the first within 10 minutes after receipt of the alert. With this assistance the rescue plane was able to locate the craft and escort it to a safe landing.

The Civil Aeronautics Administration at Oakland, Calif., sought FCC assistance for a Navy plane having engine trouble and lost while en route to Travis Air Force Base, Calif., from Hawaii. The pilot was having difficulty in maintaining altitude in the strong winds. Two "fixes" were furnished, the first within 12 minutes after the initial bearing on the aircraft. This enabled a rescue plane to contact the disabled aircraft and guide it in safely.

Emergency assistance to ships.—The Coast Guard requested FCC aid for a fishing vessel, sinking several hundred miles north of Bermuda. One estimated position and several "fixes" were obtained. A rescue plane and a Coast Guard cutter were dispatched to the scene and all aboard the sinking craft were saved.

The Coast Guard at Honolulu asked FCC help to locate a fishing sampan, with engines disabled, lost somewhere west of the Hawaiian Islands. With the assistance of the "fix", a Coast Guard cutter was able to locate the disabled vessel and tow it to Honolulu for repairs.

Another Coast Guard request involved a vessel with its engine room flooded and pumps inoperative near San Salvador in the Bahamas. With the aid of three fixes, the Coast Guard was able to locate the vessel. The pumps and engine were repaired and it proceeded to Kingston under its own power.

Other Monitoring Cases

Although the majority of FCC's monitoring cases arise from some sort of interference, there are others which involve the location of illegal transmitters. There are also many special surveys and fact-finding assignments to assist other bureaus of the Commission or other agencies of the Government.

Monitoring stations processed 5,768 noninterference cases in 1955 compared to 6,084 last year.

Field offices and monitoring stations were able to solve 6,664 cases compared to 6,568 last year. This was without reference to either Washington or the monitoring network as a whole.

Additional Monitoring Statistics

	Fiscal 1954	Fiscal 1955
Alerts, unknown or suspicious signals	8,111	6,730
Identification file slips	83,523	154,739
Monitoring citations served	6,939	11,192

INSPECTIONS

Due to budgetary limitations, fewer inspections of radio stations were accomplished during fiscal 1955 than in 1954.

Broadcast Station Inspections

The transmitting equipment of broadcast stations is now inspected at intervals as permitted by curtailed travel itineraries. The technical functioning of each station is observed and its engineering records of such operation, past and present, are reviewed in order to assure that each station has been operated efficiently and in compliance with technical rules, standards, and terms of its license. These inspections assist materially in assuring an adequate technical broadcast service to the listening and viewing public. Likewise, the inspections reveal whether the station's antenna towers—some of which are over 1,500 feet in height—are properly painted and lighted. Inspections also develop whether interference to other broadcast stations or to stations of other classes (such as those in the safety services) due to improper technical adjustments is actual or imminent.

Six hundred and sixty-one broadcast station inspections were made during 1955, and 309 discrepancies were noted, as compared to 533 inspections and 181 discrepancies in 1954.

Ship Radio Inspections

Accuracy and reliability of operations of the radio equipment, when called upon in an emergency, is a prime requisite for the safety of life and property in the maritime service. To maintain this standard, inspections of radio equipment on board passenger ships and certain freight vessels are made by Commission engineers under the provisions of the Communications Act and the Safety of Life at Sea Convention.

The FCC's marine inspection, in terms of geographical area, includes the continental United States and its possessions. The Commission has licensed radio installations on approximately 50,000 vessels, from voluntarily equipped pleasure craft to compulsorily equipped ocean liners.

Since 1953 the frequency of ship radio inspections has been curtailed because of a 50-percent decrease in field personnel available for

this work. The Commission now inspects American passenger ships at 6-month intervals, and United States cargo ships once each year. Great Lakes ships—passengers and cargo—are inspected once a year. Scheduled inspection of voluntarily equipped vessels has decreased. Inspection of ships of nonconvention countries has been discontinued, and ships of convention countries are inspected only on request.

During the past 2 years, inspections of the required main and emergency safety radio installations on ships were:

	U. S. ships		Foreign ships	
	1954	1955	1954	1955
Compulsory Ship Stations				
Number of stations	1,219	1,800	0	0
Number of inspections [1]	2,146	1,708	402	381
Number of deficiency notices served	1,378	1,089	150	191
Number of violations corrected during inspections [2]	2,288	2,149	319	330
Voluntary Ship Stations				
Number of stations	41,000	47,959	----------	----------
Number of inspections	91	163	----------	----------
Number of deficiency notices served	39	122	----------	----------

[1] Not including "call-backs" to verify correction of violations.
[2] For which deficiency notices were not served.

In addition, field engineers completed 1,420 inspections of lifeboat portable radiotelegraph equipment, at the request of the Coast Guard, for the purpose of certifying such equipment for issuance of safety equipment certificates by that agency.

The Commission's field office commenced issuance on November 13, 1954, of Great Lakes Agreement Radiotelephony Certificates. A total of 95 such certificates were issued during fiscal 1955. On December 13, 1954, the field offices began direct issuance of Society Radiotelegraphy and Safety Radiotelephony Certificates, in accordance with the provisions of the International Convention for the Safety of Life at Sea, London, 1948. During fiscal 1955, a total of 1,186 Safety Radiotelegraphy Certificates were issued to United States ocean-going ships and 315 to foreign ships. During the same period, 11 Safety Radiotelephony Certificates were issued.

Other Radio Station Inspections

A total of 4,202 inspections of other than broadcast and ship radio stations were made during the year contrasted with 6,622 such inspections in 1954. Technical discrepancies totaling 722 were discovered and reported to the licensees as compared to 1,514 the year previous.

SMALL BOAT INTERFERENCE PROBLEM

The Commission's monitoring, inspection and certification program has made some progress in curbing interfering harmonics by

ship radio transmitters, but the number of vessels involved is so great that serious interference is still caused to safety aviation frequencies.

A recent report from the Canadian Department of Transport emphasizes the chaotic condition that exists on the radiotelephone distress frequency of 2182 kilocycles, especially from radiotelephone operation on small boats. Thousands of such craft are used for pleasure or for commercial purposes, principally in the fishing business. Radio is incidental to their operation except as it may be required for safety purposes.

The users of this small boat radio equipment are not trained technicians. Their owners and crew members continually violate the Commission's rules. Their improper transmissions, which now invade Canada, include obscene and profane language as well as interference to actual distress operations.

Many small boats refrain from identifying their transmissions as required by both domestic and international law, thus preventing the Commission from taking disciplinary action. Limited monitoring and inspections by Commission personnel from Coast Guard vessels has produced some results. But, because of insufficient staff to deal with the large number of boats in operation, the situation is growing worse in spite of the Commission's efforts to indoctrinate small boat owners through "user committees", distribution of more than 100,000 pieces of information, and talks and other contacts by FCC officials in the interest of self-regulation.

In addition to the large number of licensed vessels whose operations are in need of surveillance, there are thousands of small craft using unlicensed radio equipment which add to the confusion on the ship frequencies. The Commission is studying the prospect of recommending legislation which might help relieve this situation. However, it feels that these conditions can be brought under control only with an adequate staff which will be able to seek out and take action against the most chronic violators.

INTERIM SHIP STATION LICENSES

Effective August 2, 1954, the Commission's field offices began the issuance of "90-day" interim ship radiotelephone licenses. This procedure permits the boat owner who wishes to sail immediately to obtain the required radio operating authorization without the necessity of waiting for issuance of the full-term license by Washington.

Such requests are required to be accompanied by a related formal application for a new or modified ship station license in the band 1600–3500 kilocycles on board a vessel not required to be fitted with a radiotelephone installation by international agreement. As of June 30, 1955, field offices had issued a total of 3,686 such interim licenses.

359964—55——10

INVESTIGATIONS

Radio direction-finding cars with special equipment to aid in locating unauthorized radio stations and for running down sources of interference to radio reception are based at 33 of the Commission's field offices and monitoring stations. These mobile units are manned by engineers skilled in tracing such signals to their source, and in conducting necessary investigations. Such investigations grow out of observations and long-range direction finder "fixes" by Commission monitoring stations, or as a result of complaints or reports from the public, radio stations, or military and other Government agencies.

Interference Complaints

During fiscal 1955, the number of interference complaints handled by investigative units was 17,962 as compared to 18,037 in 1954. Of these, 15,733 involved interference to broadcast reception. In general, the greater number concerned TV. Complaints were received not only of interference to TV, but also of interference from radiating TV receivers to neighbors' AM broadcast receivers.

Less numerous, but frequently of major importance to safety of life and property, were the other 2,229 complaints of interference to communication and radio navigation services on land, sea and air. Such complaints included interference to aeronautical radio navigation facilities, to airport control towers, to distress channels for ships at sea, to radio communication with trains, and to police and fire departments and other vital services.

Because it is necessary to give priority to interference to safety services and to cases involving illegal radio activity, it was not always possible to conduct prompt or complete investigation of every complaint of interference to broadcast reception. In such instance, local "self-help" was encouraged, such as cooperative checking between neighbors to locate interference from a radiating TV receiver.

The 437 Commission-sponsored TV interference committees now established in 412 communities throughout the nation were of outstanding assistance to TV viewers. Sixty-seven of these committees were added in fiscal 1955. The committees are composed of local citizens, manufacturers' representatives and TV set owners; however, the majority of the membership is composed of radio amateurs who have made a great contribution to the Commission and to the public in offering their services free of charge in this very important undertaking. By rendering such assistance to their communities, these TVI committees have enabled the Commission's limited field staff to devote more attention to other urgent duties and to the more serious TV interference cases.

While some serious cases of interference occurred as a result of radiation from industrial, scientific and medical equipment utilizing radio frequency energy, the total number of such cases investigated decreased from 576 in fiscal 1954 to 223 in fiscal 1955.

This reduction has come about, in part at least, as a result of continued efforts of Commission engineers to eliminate the cause of such unnecessary and harmful interference. As part of this effort, 5,093 offices using medical diathermy equipment were visited during the year. Although equipment which complies with the Commission's rules was in use in most offices, 1,040 obsolete noncomplying diathermy machines were encountered and were removed voluntarily from service.

The effect of spurious radiations from radio transmitters is illustrated by a complaint of serious interference to aircraft navigation aids in Ohio where the interference was traced to radio frequency harmonics from an international broadcast station near Cincinnati.

Serious interference to communication of a major airline was localized to the general vicinity of Louisville, Ky., by means of radio bearings taken by Commission monitoring stations located hundreds of miles apart. A mobile unit then traced the interference to an industrial heater in a factory at Louisville. The equipment was removed from operation.

Interference which disrupted airport communication at Renton, Wash., was traced to a radio frequency type arc welder a mile from the airport. A similar welder was responsible for jamming CAA reception and interfering with two airlines at Minneapolis.

Serious interference to distress frequency reception of ships in the Pacific was traced to an industrial heater, near Seattle, used for treating roller bearings for chain saws.

Illustrative of the widespread interference sometimes caused by spurious radiations from defective receiving equipment is an instance which occurred at Barstow, Calif. Interference to Channel 10 over a large part of the community was traced to radiation from a defective TV receiver "booster". The Barstow Chamber of Commerce thanked the Los Angeles Field Office on behalf of the hundreds of persons whose TV reception has been bettered.

Aside from the annoyance and safety hazards created by radio interference, its seriousness from an economic viewpoint is illustrated by the statement of a company near New York that interference to its reception was costing the company $1,000 a day.

Investigation of Unlicensed Stations

One hundred and five unlicensed stations were located by mobile investigative units in 1955 as compared to 52 in 1954. The operator

of an unlicensed transmitter at a Rhode Island race track was sentenced to one year, placed on probation and fined. The operator of an illegal transmitter at a Florida race track is awaiting trial after being indicted by the grand jury in Miami.

Among unlicensed TV stations found was one located on an Indian reservation in Washington State, and another was atop a 9,000-foot mountain near Kingman, Ariz.

The lack of technical skill on the part of an unlicensed would-be broadcaster in Minneapolis, Minn., was responsible for interference to airline communications as well as broadcast frequencies.

When a masculine voice was observed on a Los Angeles station using a call assigned to a licensed girl amateur at San Francisco, investigation disclosed an unlicensed station which was quickly located and silenced.

While not all instances of unlicensed operation result in criminal prosecution, a number of cases involving operators of illegal stations detected during 1955 have either been referred to the U. S. Attorney General for possible prosecution or are being considered for possible legal action.

INDUSTRIAL, SCIENTIFIC, AND MEDICAL SERVICE

Administration of Part 18 of the rules progressed during the year although there were many instances when operators were reluctant to take the necessary steps to bring their equipment into compliance. Only one related cease and desist order was necessary. This was directed to an operator of electric arc welding equipment which caused interference to broadcast reception.

Other welders throughout the country caused interference to authorized radio services but in these instances no legal action was necessary. In most of these cases it was found that welding equipment was not installed and operated in accordance with the manufacturer's instructions as required by the rules. Some users were unaware of the rules or that welders can be a potential source of interference to authorized radio services. Manufacturers of welders cooperated by aiding users in eliminating interference and in properly installing and certifying the offending welders.

Console models of electronic heating equipment appeared in greater numbers and it became evident that amendments to the rules would be necessary to permit mass certification of heaters that are identical in construction.

No objections to the diathermy rules were received as in the previous years, and very few inquiries were received concerning those rules. This is an indication that the Commission's requirements for diathermy equipment are becoming well known.

Misunderstanding of the miscellaneous rules applicable to epilators (hair removers) appears to have been eliminated. Apparatus operating in accordance with the rules caused no difficulties.

Reports from manufacturers indicate that ultrasonic equipment is finding varied application in industry, science, and therapy. Ultrasonic equipment has caused no interference problems.

RESTRICTED RADIATION DEVICES

The use of restricted radiation devices continued to find new applications. In one instance a blind inventor developed an electronic cane to guide the blind. Some garage door openers now operate between 230 and 290 megacycles, where smaller antennas can be used and more combinations of radio and audio frequencies are possible.

The number of TV "community antenna systems" is now reported to exceed 400. These systems, operating in poor signal areas, utilize a favorably located receiving antenna and then feed the received signal through coaxial cables directly to subscribers' TV receivers. Or, instead of picking up programs of TV stations on the air, special "TV film" can be run through appropriate equipment and associated distribution cables so that it will appear on subscribers' TV receivers as a TV program.

Engineering surveys in fringe areas where community TV systems are used indicate that considerable interference to AM broadcast reception results from horizontal oscillator radiation by television receivers and by radiation from community antenna cables which conduct horizontal oscillator energy. Additionally, leakage from some cable systems caused interference to direct reception of television signals.

Numerous college campus "wired-wireless" systems, erroneously referred to as broadcast stations, used for distributing programs of news, music, advertising, etc., by carrier current on wire circuits over the campus, require continuing attention. These systems oftentimes are not properly engineered. The need for making field intensity measurements is borne out by the considerable number of campus carrier systems found radiating in excess of the limits allowed by Part 15 of the rules. After reducing power some colleges complained of insufficient coverage of the campus which indicates the need for more careful design and construction if such systems are to operate within the regulations.

Thousands of "wired-wireless" intercommunication systems are used in homes and offices. Sample field intensity measurements indicate that when these systems operate over unshielded power circuits they frequently radiate in excess of the allowable limits.

ambiguity which became apparent only after the service had been placed in operation was what is meant in the present rules by the term "remote or sparsely settled region." Still another, though less insoluble problem, presented itself from time to time in determination of what constituted a "construction project of a public character".

Accordingly, a proposal to amend the rules pertaining to the Special Industrial Radio Service is now under consideration, designed to eliminate a majority of the defects presently apparent in eligibility requirements, as well as to more clearly indicate to applicants what types of radio systems may be established. It is believed that a number of applicants presently ineligible may be admitted if the proposed rule revisions are adopted.

LOW-POWER INDUSTRIAL RADIO SERVICE

All business organizations are eligible for licenses to operate in this service whenever they have a need for short-distance mobile communication as an aid to the more efficient and safe conduct of their operations. Eligibility has purposely been made broad because by limiting every one to the use of low-power, short-range equipment it is possible for a large number of persons to operate their own radio systems with little interference to one another.

This service was first established in July 1949, when it was expected that its growth would be rapid. The experience of the past year has shown that its expansion is not as rapid as anticipated, but it is still substantial and, according to reports, has proved to be useful to the licensees. The principal users of the service are contractors and maintenance and service companies.

7. EXPERIMENTAL RADIO SERVICES

Part 5 of the rules and regulations governing experimental services became effective October 1, 1939, and has been modified from time to time as the demands of these services have required. The rules were designed to promote all types of experimentation in and relating to the radio art. This was done in compliance with the Communications Act requirement that the Commission "study new uses for radio, provide for the experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest."

Under the present rules, experimental stations are divided into three categories, namely: Class 1, class 2, and class 3. Class 1 stations are for the use of persons engaged in fundamental or general research, experimentation and development of the radio art; or for the development, testing and calibration of radio equipment. Class 2 stations are authorized for the development of a new radio service or the expansion of an established service. Class 3 station authorizations are available

Radio interference caused by leakage from rural electric power lines was a problem in some areas; however, the operators of the lines almost always cooperate toward reducing this type of interference.

With the many new types of low power devices and systems that are being developed for operation without a license it has become apparent that amended rules are necessary to establish conditions and standards under which such apparatus may function without causing disturbance in the radio spectrum.

COMMERCIAL RADIO OPERATORS

General

Radio transmitting equipment of all types (except Government) used in the United States and its territories must be licensed by the Commission and, in general, must be operated by persons who hold Commission-issued operator licenses. The grade of radio operator license required is determined by the class of station and the complexity of its equipment as well as the degree to which the station serves to promote safety of life and property. Only citizens of the United States may be issued radio operator licenses.

The duties of radio operators are many and varied. They include the handling of routine and emergency communications, the manipulation of controls of radio transmitting equipment, the keeping of radio station operating records and the performance of complex technical duties that may critically affect the proper operation of the transmitting equipment and the service of the station. At some stations a single class of operator is employed to perform all types of duties; at others the duties are subdivided among operators of different classes who perform limited duties according to the needs of the particular station and the grade of operator license held.

Waivers have been granted by the Commission relieving radio operator requirements for certain "pushbutton" types of station transmitters.

During the year the Commission raised the license requirements for operators of radiotelephone equipment on board certain classes of Great Lakes ships to conform to the Agreement for the Promotion of Safety on the Great Lakes by Means of Radio. The radiotelephone third-class operator permit now required is usually held by the master and several of the deck officers of each ship affected. The permit is issued upon passing a nontechnical written examination on basic radio regulations and on practice and procedure in mobile radiotelephone communication.

The Commission also changed the operator requirements for a group of oceangoing ships from 500 to 1,600 gross tons which must now carry radiotelephone installations for safety purposes. Under

the amended provisions there must be at least one third-class radiotelephone operator on board each ship affected.

The Commission instituted further rule-making proceedings looking toward requiring third-class operators for ship and aircraft radiotelephone stations with antenna powers from 50 to 250 watts. This is in conformance with international radio regulations. Operators of these stations are graded, broadly speaking, according to the communication range of the stations and consequent potential impact on other stations with which they must share the use of radio channels.

Operator Suspensions and Denials

Remedial action was taken by the Commission against 13 commercial radio operators through suspension of their licenses. In eight of these cases, hearings were requested by the operators and the suspensions were held in abeyance pending the outcome of the hearings.

Four commercial radio operator applications were denied for failure of the applicants to furnish information with respect to their alleged affiliation with subversive groups and two other applications were designiated for public hearing for the same reason.

The Commission proposed on June 10, 1954, to deny commercial radio operator licenses to members of subversive groups and oral argument on this proposal was heard on March 7, 1955 (see chapter on National Defense).

Operator Examinations

Examinations are offered to radio operator candidates daily, quarterly, semiannually or annually at examination points throughout the United States and its territories. The places and times of these examinations are published in a "Radio Operator Examination Schedule" which may be obtained from any of the district engineering field offices shown in the appendix of this report.

Commercial operator type examinations and amateur (General and Extra grade) examinations are given at these examination points.

An increase was noted in the number of amateur operator examinations given during the year. A total of 46,238 such examinations were conducted in 1955, while 42,004 were given in 1954 (see section of chapter on Safety and Special Radio Services which deals with amateurs).

Since August 17, 1954, the Commission has not issued Temporary Limited Second Class Radiotelegraph Operator Licenses which had previously been available to certain applicants. This class was originally established to meet the demand for radio operators during World War II and was reestablished during the Korean hostilities. Issuance of this emergency type of operator license was discontinued following the Korean armistice.

Commercial Radio Operator Authorizations

Of 213,368 applications received in fiscal 1955, commercial radio operator authorizations of all classes, totaling 188,504, were issued as compared to 179,140 in 1954. This represents a significant increase, bringing the total of outstanding commercial licenses to more than 986,000 at the close of the year. This was 144,000 more than at the close of fiscal year 1954. Comparative figures by grades of licenses follow:

Class of license	June 30, 1954	June 30, 1955	Net increase or (decrease)
Radiotelegraph:			
1st class	5,628	6,183	555
2d class	9,538	10,083	545
3d class	1,992	2,063	71
Temporary limited, 2d class [1]	641	635	(6)
Radiotelephone:			
1st class	49,602	53,415	3,813
2d class	29,540	32,333	2,793
3d class	18,027	25,214	7,187
Restricted radiotelephone operator permits [2]	649,121	795,011	145,890
Aircraft radiotelephone operator authorizations [1]	77,999	61,426	(16,573)
Totals	842,088	986,363	144,275

[1] Issuance of this class of license discontinued.
[2] Issued for lifetime of operator.

FIELD ENGINEERING PROJECTS

A number of improvements were made to monitoring stations. Additional all-metal long-range direction finder structures were built and installed. Progress was made toward improving the remote controlled rotating adcock direction finders to increase the speed and accuracy of establishing fixes on radio stations. Radiotelegraph communication for long-range direction finder coordination was improved by installation of higher powered transmitters in Alaska at the Anchorage and Fairbanks monitoring stations. Higher-powered transmitters were also installed at Laurel, Md., Twin Falls, Idaho, and Fort Lauderdale, Fla. Radioteletype facilities are being established for communication between Livermore, Calif., and monitoring stations in Alaska and Hawaii. An improved spectrum analyzer for measuring the bandwidth of emissions of radio signals was acquired and placed in service at the Laurel monitoring station.

A program to provide field offices with portable frequency measuring equipment, sufficiently accurate to enforce rigid tolerances now required of radio stations, has been continued by procurement of accurate portable instruments for use in the 200 kilocycles to 20 megacycles frequency range. Two sets of precision frequency measuring equipment and associated receivers were purchased for mobile coverage of frequencies in the 1000 to 10000 megacycle range. Further progress was made toward providing improved portable direction

finding and receiving facilities for field engineers conducting investigations of interference and unauthorized radio transmissions.

A mobile television monitoring unit to be used for enforcement of Commission engineering standards for TV stations was developed, constructed and has been put in service. It is equipped with a variety of complex electronic equipment for making precision engineering measurements of TV signals which will be accomplished by moving the unit into the service areas served by individual stations. Such mobile monitoring facilities are essential since the fixed monitoring stations cannot monitor transmissions of distant TV stations.

Field intensity recording for determining propagation characteristics of VHF and UHF signals was continued at about the same level as the previous year at selected monitoring stations. However, more emphasis was placed on the UHF television broadcast bands. Special surveys and measurements were made for interference studies and enforcement of Commission rules, particularly as regards the reduction and elimination of spurious emissions from authorized radio transmitters and from other sources of interference to radio services.

ANTENNA OBSTRUCTION MARKING

The Antenna Survey Branch administers Part 17 of the rules which concern the construction, marking, and lighting of antenna towers and their supporting structures. The primary functions of this branch are to apply the criteria of Subpart B of those rules to all proposals for new or modified antenna structures and to refer proposals that exceed these criteria to appropriate Regional Airspace Subcommittees (ASP) of the Air Coordinating Committee (ACC) for special aeronautical study by aviation interests outside of the Commission. The branch approves conforming antennas and prescribes, when necessary, obstruction markings in order to minimize their potential hazard to air navigation.

The number of antenna proposals processed in fiscal 1955 exceeded all previous years, totaling 9,131, an increase of over 100 applications per month above fiscal 1954. Notwithstanding this increase, fewer antenna proposals were referred to ASP for special aeronautical study due to the decline in the number of TV applications which generally involve higher towers having a greater probability of requiring special aeronautical study.

The number of applications for antenna processing reached a record high during fiscal 1955, totaling 9,856, an increase of more than 200 applications per month over fiscal 1954. Antenna proposals for broadcast and common carrier services decreased slightly while safety and special radio proposals increased from 5,357 to over 8,000.

At the close of the year, 28 tall TV towers—1,000 feet in height and higher—were in operation; construction permits for 13 additional towers over 1,000 feet in height were outstanding, including the combined tower of WFAA–TV and KRLD–TV in Dallas, Tex., which is under construction to a height of 1,521 feet. The Commission held hearings on applications involving two additional high towers. They were KSWS–TV, Roswell, N. Mex., for 1,610 feet, and KGEO–TV, Enid, Okla., for 1,356 feet. The Commission designated for hearing the Deep South Broadcasting Co., WSLA, Selma, Ala., proposal for 1,993 feet. An application on file by WHAS, Inc., WHAS–TV, Louisville, Ky., proposes a 2,003-foot tower.

The Commission amended Part 17 to require construction permitees whose antennas require obstruction markings to mail a postcard notification to the Coast and Geodetic Survey advising the start of antenna construction in addition to the previous requirement for notification of the completion of such construction.

The Commission proposed rulemaking to amend Section 17.14 of its rules which presently exempts certain antenna structures from special aeronautical study. It provides that such exemptions will not apply when any increase in height to an existing antenna structure is involved.

The Commission has been advised by the Airspace Subcommittee that certain proposed antenna structures which were given aeronautical approval by the subcommittee are considered "critical obstructions". Since a necessary premise to such approvals is substantial accuracy by the applicant in his determination of the exact location and height of such structures, a public notice was issued setting forth the Commission policy that construction permits which authorize antennas that are considered to be "critical obstructions" will require an affidavit by a qualified surveyor setting forth the geographic coordinates and the overall height of the structure above mean sea level.

Statistics of antenna construction proposals processed during the year follow:

Services	Pending July 1, 1954	Received in ASB	Cleared by ASB	Pending June 30, 1955 [1]
Broadcast:				
AM	28	734	717	45
FM	0	113	112	1
TV	29	602	611	20
International	0	1	1	0
Experimental	0	6	6	0
Total	57	1,456	1,447	66
Safety and special radio services	159	8,065	7,358	866
Common carrier	5	335	326	14
Grand total	221	9,856	9,131	946

[1] Totals in this column include totals shown in last column of the next table.

The number of proposals referred to the Airspace Subcommittee for special aeronautical study was:

Services	Pending at airspace July 1, 1954	Sent to airspace during year	Received from airspace during year	Pending at airspace June 30, 1955
Broadcast:				
AM	18	128	120	26
FM	0	8	8	0
TV	21	75	82	14
International	0	0	0	0
Experimental	0	0	0	0
Total	39	211	210	40
Safety and special radio services	18	176	166	28
Common carrier	2	19	17	4
Grand total	59	406	393	72

Research and Laboratory

TECHNICAL RESEARCH

General

The Commission, through its Technical Research Division, studies engineering problems relating to technical standards for the various radio services, and miscellaneous radio-frequency devices, studies wave propagation, reviews equipment specifications, and administers to the Experimental Radio Service. In these tasks, it uses technical information obtained from other Government agencies, university research departments, industrial laboratories, etc. Lists of equipment acceptable for use in the various services are published, besides being available for inspection at the various offices of the Commission.

Division representatives continued to participate on Panel II of the Telecommunications Planning Committee, which is sponsored by the Office of Defense Mobilization to coordinate development and application of new and improved systems of communication within the Government.

Government-industry committees.—The division also cooperated with the Radio Propagation Advisory Committee, organized in 1953. This committee works to resolve new problems involving radio wave propagation, with special emphasis on VHF and UHF television. It is also concerned with field strength measurement and frequency allocation standards. The Commission's Chief Engineer is the Chairman of RPAC. Other members include engineers from the Commission, other Government agencies, industry, and consulting engineers who practice before the Commission.

The division was represented on various committees of URSI (International Scientific Radio Union) and CCIR (International Radio Consultative Committee), the Executive and Budget Committees of CRPL (Central Radio Propagation Laboratory), Committee C63 of the American Standards Association, and in technical meetings of the Radio Technical Commission for Marine Services, the National Association of Radio and Television Broadcasters, the Radio Technical Commission for Aeronautics, and the Radio-Electronics-Television Manufacturers Association.

VHF and UHF propagation research.—Two kinds of measurements are vital in determining allocation patterns for television and

other services operating in the VHF and UHF regions. One concerns measurement of the area surrounding the station wherein satisfactory grades of service would be provided by the station; the other deals with measurement of field strengths far beyond the normal service area for determining the amount of interference which a distant station may cause. These measurements, along with theoretical considerations, furnish propagation information essential to achieving the most efficient utilization of frequency space.

A system of measurement standards for determining serviceable signals from VHF and UHF broadcast stations has been in effect for a decade. These measurements, usually undertaken by TV stations and consulting engineers, are a source of valuable information concerning radio transmission of energy as applied to station allocation principles. A file of these measurements has been established, and the industry has been invited to submit measurements voluntarily for the use of the Commission, the industry, and others interested.

This system, however, has not been entirely satisfactory for measurement of UHF broadcast stations. The Commission has worked closely with the Radio Propagation Advisory Committee to develop a better system of measuring both UHF and VHF broadcast stations. If such a system is developed, it would be incorporated in the Commission's rules and standards.

As for the second kind of measurements, the diverse monitoring installations of the Commission are especially adaptable to the continuous recording of field strengths of TV and other radio stations at long distances. During the fiscal year these recordings were made of eight UHF stations, and eight VHF and FM broadcast stations. New methods of recording were developed during the year, and special instruments were constructed for analysis purposes.

Much time was spent in developing new VHF–UHF tropospheric propagation curves as well as techniques for predicting service signal strengths under specific terrain conditions. There remains an urgent need for UHF propagation information based on actual measurements.

A study is in progress on the relative merits of normal line-of-sight microwave relays as compared with tropospheric scatter relays which operate over greater distances.

The division continues to supervise a project under contract with the Army Signal Corps, and prepares reports on the information obtained for the use of the Signal Corps, but which is also of interest to the Commission.

Sunspot cycle recording.—Field strength recordings on AM broadcast frequencies were continued during the year on a reduced scale at three FCC monitoring stations. Because of the pressure of more

urgent VHF and UHF propagation research, these records have been put aside for later analysis.

Experimental Radio Services

The Communications Act of 1934 requires the Commission "to provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest". The Experimental Radio Services (covered by Part 5 of the rules) is one of the mechanisms for carrying out this mandate.

These services provide for two categories of experimentation. One permits basic research in the radio-electronic art, while the other is for the development of a new service or for improvements in an existing service.

Experimental stations are used by universities and research laboratories for ionosphere research and propagation studies, particularly on frequencies above 30 megacycles using scatter techniques. Considerable attention is being given to meteor trails and other localized ionization effects in the ionosphere.

Stations operated by manufacturers are engaged in developing new radio and electronic techniques. Development of narrow band communication equipment is being pushed by most manufacturers. New and improved radio aids to navigation—in particular in the band 90 to 110 kilocycles—are being investigated. Other work includes the continued study and improvement of microwave equipment, with special stress on multichannel equipment.

Experimental stations are also used extensively by sales engineers to make field strength and coverage surveys for determining the equipment requirements and the antenna location needed to provide optimum performance.

Many experimental stations are operated by persons engaged in developing or testing equipment under contract with the Government. Most of these contracts are with the Department of Defense and a large part of this work is classified.

Under a 1953 revision of the rules, no frequencies are specifically allocated for experimentation. Instead, any frequency—with certain exceptions designed to protect safety communications and aids to navigation—may be used for experimentation provided no harmful interference is caused to the stations regularly licensed on that frequency.

With the expanded use of radio, it is becoming increasingly difficult to find frequencies for experimentation. This problem has caused the Commission to start a study to determine what, if any, changes should be made in its frequency allocation policy and the assignment procedures governing experimental operations.

to individuals interested in conducting an experimental program on his own behalf for a limited time.

In addition to the above categories, two subclasses of experimental stations were established by part 2 of the rules. These subclasses of class 1 stations are contract developmental and export developmental stations. The former classification includes experimental stations licensed for developing equipment or techniques to be used by stations operated by the United States Government. The latter classification is for a similar purpose where the equipment is to be used by stations under the jurisdiction of a foreign government.

Class 1 stations are, in the main, presently operated by equipment manufacturers and research and development organizations. They engage in experimentations directed toward the improvement of existing radio equipment as well as the development of new equipment, new techniques in the electronic art, and fundamental studies involving radio propagation. Several manufacturers are developing equipment suitable for adjacent channel operation which would effect a more efficient use of the radio spectrum. Other development work includes microwave equipment, radiolocation equipment and systems, and radio aids to navigation. Considerable experimental work is also being done in ionospheric investigations and propagation studies of the various frequency bands, particularly in the spectrum range where the presently available information is meager.

Prior to February 1, 1949, specific frequencies above 25 megacycles were available for assignment to class 1 stations. These frequencies are no longer available specifically for that purpose. In lieu thereof, part 2 of the rules provides for the use of frequencies throughout the spectrum, subject to the condition that interference is not caused to the service or stations to which these frequencies are regularly assigned. The Commission is, therefore, unable to make frequency assignments to experimental stations for general use throughout the United States. The use of assigned frequencies is limited to a designated geographical area. The specific frequencies below 25 megacycles allocated for class 1 stations and listed in part 5 of the rules are still available for assignment as in the past.

Applications for class 2 experimental stations usually involve proposals for the establishment of new services which are not provided for in the rules or are directed toward the development of some phase of an established service. Since the establishment of the Land Transportation and Industrial Radio Services on a regular basis, the number of class 2 stations has decreased.

Because of the limited scope of experimentation permitted by class 3 stations, the Commission receives few requests for such authorizations. Most types of experimentation permitted under a class 3 authorization

Statistics covering the Experimental Radio Services for fiscal years 1952–55 are given below:

	Stations	Applications
June 30, 1952	369	915
June 30, 1953	444	1,055
June 30, 1954	586	975
June 30, 1955	625	1,447

Since a separate license is required for each experimental project and the license is deleted when the project is completed, activity in this field cannot be measured by the number of stations licensed at the year end. Rather, the measure of activity must be based on the number of applications handled.

During the year it was found necessary to simplify the experimental records in order to keep abreast of the large volume of applications. Accordingly, the separate count of research and developmental stations was discontinued.

Rulemaking was finalized on two experimental matters. Educational institutions were permitted to use microwave frequencies between 2900–3246 megacycles for instructional purposes. Requests of this nature can now be handled by the staff. Authority was also delegated to the Chief Engineer to act on certain requests to operate experimental stations without announcement of call letters.

Control of Man-Made Interference

Man-made interference may be defined as spurious—that is, unwanted—radiation of electromagnetic energy within the radio spectrum which is not useful for the intended purpose of the radiating source. Examples include oscillator radiation from superheterodyne receivers, sweep-circuit radiation from TV receivers, harmonic radiation and out-of-channel sideband radiation from transmitters, and radiation from the many devices which generate radio frequency energy for local use, such as heaters, diathermy machines, certain types of arc welders, and many others.

The effective use of the radio spectrum requires a carefully engineered allocation plan so that licensed radio stations can operate harmoniously together. However, the most expert plan can be made unworkable if electronic and electrical devices are permitted to radiate excessive amounts of radio frequency energy.

As pointed out in the special chapter of this report dealing with interference, the control of this unwanted radiation is one of the most complex problems facing the Commission, the solution of which is made particularly difficult because of the number and diversity of devices involved. These devices can be separated into two groups.

First is the group of devices which generate radio frequency energy to operate noncommunications equipment on the spot. They include all electronic heating equipment (such as industrial and diathermy), certain types of arc welders, oscillators in radio receivers, sweep-circuit generators in television receivers, plus a host of others. Many of these devices (the industrial heaters particularly) generate more radio frequency power than the most powerful standard broadcast station.

The second group includes the multiplicity of electrical and electronic labor-saving "gadgets" that have become a part of our daily life. Every rotating machine, every switch and every spark plug is a source of interference. Individually, no one small device seems to be important, but together their total radiation produces a high level of noise or interference. Since their use increases with population density, this man-made noise level is much more evident in urban areas than it is in rural areas. This fact has long been recognized in the AM broadcast field, where the Commission's engineering standards specify that in an urban area the minimum signal required for satisfactory service is about 2000 uv/m whereas in a rural area it can be as low as 100 uv/m.

The Commission has approached the regulation of this unwanted radiation in three steps. Most of its present rules contain standards for spurious radiation from licensed transmitters. It has promulgated special rules for industrial, scientific and medical equipment, and it is expanding its rules to take care of restricted radiation devices.

The field of spurious radiation is enormous in scope. The offending devices are so diverse and widespread that every industrial activity and every individual is directly concerned. Their regulation presents many exceedingly complex and difficult legal, technical, economic, and administrative problems. The Commission must, therefore, make haste slowly in this field, and has engaged in extensive correspondence and consultation with industry for the dual purpose of explaining the need for regulation and of soliciting support for this mutually beneficial program.

Technical Standards

The Technical Research Division, in collaboration with the FCC bureaus concerned, developed improved technical standards for the various radio services. Proposed rules for revised technical standards in the common carrier, public safety, industrial and land transportation radio services operating in the 25–50 and 152–162 megacycle bands were issued.

Their purpose is to reduce the frequency bandwidth occupied by stations in services from 40 to 20 kilocycles. Such a reduction would

359964—55——11

approximately double the number of channels available for assignment and, thereby, accommodate an increased number of stations. The technical standards necessary to make such improved frequency utilization possible represent the best performance practicable in the present state of the art. The proposed standards include reduced FM frequency deviation, specification of audio response characteristics and tighter frequency stability requirements. The values selected for these important operating parameters were specified after detailed study of equipment capability and theoretical considerations.

As part of the continuing program for minimizing interference caused by out-of-channel radiation from stations in all services, proposed standards were issued for suppression of spurious emissions from FM and AM broadcast stations. Comments filed in response to these proposals are now being reviewed. The adoption of required bandwidth and spurious emission measurements in connection with type acceptance of transmitters will enable the Commission to determine that these transmitters comply with the rules in this regard.

Techenical standards for microwave systems are now under consideration. These systems usually consist of chains of stations which relay signals by narrow beams of radiation from one point to another. They are often used along pipe and power lines to carry operating messages and instructions. There has been FCC participation in joint Government-industry conferences to collect current data on the performance of operating microwave systems and to obtain opinions and recommendations concerning rules which should be adopted for this service, which has been operating on a developmental basis.

Still under consideration is further action on proposed rules in the maritime mobile service to specify limitations on spurious emissions for ship stations below 500 megacycles and to extend equipment type acceptance requirements to include transmitters in this service below 30 megacycles. Similarly, further action is being considered concerning technical standards and type acceptance requirements for the domestic public radio service, pursuant to proposed rulemaking.

Industrial, Scientific, and Medical Equipment

This equipment is regulated by Part 18 of the Commission's rules, first adopted in 1947. Regulated under this part are medical diathermy, industrial heating, certain types of arc welders, cyclotrons, and other particle accelerators, and many others. These rules provide frequencies on which such equipment may operate with unlimited radiation without causing interference to radio communication and impose limitations on radiation on frequences outside these bands.

During the past year the Commission amended Part 18 to provide special regulations and type approval for ultrasonic equipment. This

equipment, developed in the last few years, generates radio frequency energy which is applied to a special kind of crystal or to a rod of magnetic material which is thereby caused to vibrate at ultrasonic frequencies, and is used largely for cleaning and flaw detection in industry and for medical purposes. Under these new rules, which became effective March 1, 1955, the Commission has type approved 11 pieces of medical ultrasonic equipment and is testing several industrial ultrasonic items.

The problem of radio frequency stabilized arc welders still confronts the Commission. Industry and the Commission are cooperating in seeking a solution. These machines are designed to weld stainless steels and certain non-ferrous metals, such as aluminum, in an inert gas atmosphere. Because they use spark gap oscillators to initiate and stabilize the arc, they produce a broad band of interference. The situation is aggravated by the fact that many of these welders are operated in the vincinity of airports.

Although considerable reduction of arc-welding interference has been brought about by the efforts of industry acting through the Joint Industry Committee for High Frequency Stabilized Arc Welders, a permanent solution is still not in sight. In July 1954, the Commission requested the Joint Technical Advisory Committee (JTAC) to lend its assistance. An interim report holds out hope that operation with a reduced duty cycle may be helpful. This approach is now being investigated by both groups.

Based on enforcement activities during 1953–54 which showed that the industrial heating regulations were inadequate, the Commission started work on a rule-making proceeding which will clarify the requirements and establish a type-acceptance procedure for certain of these heaters. It is anticipated that these revisions will insure a greater degree of compliance and thereby improve the interference situation considerably.

Restricted Radiation Devices

These devices are regulated by Part 15 of the Commission's rules, adopted in 1938. Although intended basically for the regulation of certain "gadgets" used in the home, such as wireless record players and remote control units, the rules have been applied with a fair degree of success to radiation from other apparatus, such as carrier current systems, wired wireless systems, wireless microphones, radio-controlled garage-door openers and the like.

Since 1949 the Commission has been struggling with the problem of amending these rules to take into account the continually growing number of devices producing spurious radiations. Action had to be suspended from time to time in order to use available manpower on

other—more pressing—matters, particularly those affecting television. During 1954 the Commission was able to return to this problem. New proposed rule making was issued in April 1954 and comments were received from industry. The Commission is now preparing to finalize its proposal.

Type Acceptance and Type Approval

"Type acceptance" of transmitting equipment is based on the results of tests made by the manufacturer and evaluated by the Commission. Final rules were adopted for type-acceptance procedure and measurements to show the equipment to be capable of meeting the applicable technical standards. The broadcast, public safety, industrial, and land transportation service rules were amended to require type acceptance of transmitters as a prerequisite to licensing.

As a result, the Commission will publish lists of type-accepted broadcast equipment in addition to the nonbroadcast equipment already being type accepted and listed. The performance capability of equipment so listed is established on the basis of test data applicable to the respective types of equipment; consequently, a detailed showing by each applicant is unnecessary, and less time is needed to process individual applications for use of listed equipment.

The radio equipment lists also include "type-approved" equipment which has been tested and approved by the Laboratory Division (see Laboratory section of this report).

During the year, two issues of the Radio Equipment List, Part C, (nonbroadcast equipment) and six supplements were published. The number of entries in Part C increased from 1,115 to 1,322 or 18½ percent, during the year. Compilation of Part B, Aural Broadcast Equipment, was begun. This part includes aural broadcast transmitters which, prior to June 30, had been type approved, and type-approved frequency and modulation monitors. There was no type-acceptance requirement for TV broadcast transmitters prior to June 30; consequently, there were no initial entries for Part A, Television Broadcast Equipment.

Twenty-two type-acceptance applications were granted and 14 were pending at the end of the year. One hundred fifty-seven equipment specifications were filed for application reference purposes.

LABORATORY

General

The Commission maintains a laboratory near Laurel, Md. Its Laboratory Division assists in various phases of technical work, particularly where actual performance data on equipment are needed.

It studies various methods of transmission and reception to determine the possibilities of harmful interference as well as the degree

of achievement of desired reception. It also studies the interference to radio reception produced by other electrical equipment. It develops special monitoring equipment used by Commission engineers in the field, and calibrates signal generators, field intensity sets and other apparatus used in enforcement and investigation activities. Various proposals to change television signal standards or frequency allocations are studied to determine their impact upon the operation of the millions of receivers now in use by the public.

The laboratory is also engaged in studying new uses of radio. For example, during the year extensive tests were made on an automatic radiotelegraph call receiver. This is a selective device intended to ring bells on a ship when the ship is called by another station or when a distress, urgency, or safety transmission is to be made. This work was in connection with congressional hearings on H. R. 6004, 83d Congress, 2d session, and H. R. 4090, 84th Congress, 1st session, which would require that such a device be installed on certain ships.

Following is a summary of other activities of the laboratory during the year:

Type Approval Testing

The Commission's rules require that equipment covered by certain applications must comply with detailed performance specifications. In some cases these are designed to reduce the likelihood of generation of interference, and in others they are intended to assure that certain compulsory equipment is capable of functioning under emergency conditions. The tests to prove compliance with the specifications may be so difficult or expensive that they cannot reasonably be required of individual users. On proper application, a manufacturer may request that the Commission issue a certificate of type approval covering a new model of such equipment. After type approval, units identical to the approved type need not be tested in detail.

During the year there were type approval tests of 28 medical ultrasonic treatment devices, 6 medical diathermy units, and 8 epilators (hair-removal devices). In the industrial field, an ultrasonic equipment for the degreasing of mechanical parts was submitted for test.

A number of new models of equipment using the citizens radio band were tested. These included five mobile communication units intended for use in automobiles, one base station unit for communication with automobile units, four "walkie-talkie" units, one transmitter intended to control a garage door opener, one to control model aircraft, one to operate traffic lights ahead of an emergency vehicle such as fire apparatus, and one burglar alarm.

Five new models of marine radar equipment were examined for spurious emissions which might interfere with essential radio com-

359064—55——12

munication equipment on shipboard. A radiotelegraph auto alarm for reception of distress signals aboard ship was tested.

Tests were made on a new type of frequency monitor for AM broadcast stations. This device uses electronic means to count the number of cycles occurring in a precisely known length of time.

Calibration of Measuring Equipment

Certain measuring equipment is used in laboratory tests in which accuracy of results is of great importance. The same types are also employed by the Field Engineering and Monitoring Bureau in its enforcement of the rules. During the year the laboratory made necessary repairs and calibration measurements of 9 standard signal generators and 5 field strength meters for its own use, and on 8 standard signal generators and 9 field strength meters for field use.

Radio Propagation

The laboratory continued to assist in radio field strength recording activities. Nine special receivers were modified to provide the characteristics needed. Measurements were made at four of the monitoring stations where recording equipment is operated, to verify the accuracy of the recorded values. Recordings of the strengths of the signals of two distant UHF stations were continued at the laboratory.

Experiments were made to find a relation between antenna height and recorder indication on one of the UHF channels being recorded. Mobile field strength measurements were made to determine the area of coverage of a UHF television station in Salisbury, Md. Surveys were made to test the relative coverage of two Baltimore VHF stations at the picture and sound frequencies in order to gain information concerning color TV problems.

Assistance to Field Enforcement

The laboratory assists in the enforcement activities of the Field Engineering and Monitoring Bureau.

During the year it measured the characteristics of two filters intended for reduction of TV interference and three miniature transmitters suspected of illegal operation.

The development of equipment and techniques for a mobile TV monitoring unit was substantially completed. This unit is equipped to make performance tests on TV broadcast stations in the field to assure that their transmissions are in accordance with Commission standards.

A new spectrum analyzer was adapted for use at the monitoring stations, and its performance evaluated. This new analyzer will make observations on the bandwidth of a great number of signals for which no previous facilities were available.

Cooperation With Other Groups

In the effort to reduce interference and to advance the utlity and efficiency of radio communication, the Laboratory Division is represented on the following committees: IRE Committee 10 on Industrial Electronics; IRE Committee 27 on Radio Frequency Interference and its Subcommittees 27.1 on Basic Measurements and 27.3 on Radio and TV Receivers; IRE Subcommittee 15.4 on Pulse Modulated Transmitters; AIEE Subcommittee on Induction and Dielectric Heating; ASA Committee C63, Subcommittee No. 1 on Techniques and Developments for Measuring Radio Noise; RTCM Special Committee 29 on Testing of Radiotelegraph Auto Alarm Receivers; and URSI Committee I on Radio Measurements and Standards.

Frequency Allocation

GENERAL

Constant study of the radio spectrum is required so that allocation and use of channels keeps pace with advancements in electronics so as to render maximum and proficient service. Continual change is the price of progress.

The radio spectrum has varying characteristics throughout. Consequently, one group of frequencies may be useful to a particular service but not to others. For that reason, bands must be allocated to those services for which they are best suited. Some of these bands have to be subdivided and resubdivided to serve more specific purposes.

Because radio transmissions cross national boundaries, there must be international agreement on the allocation of frequencies for the different radio services, and standardized assignments and operating procedures in such international services as aviation and marine. There must be like cooperation between nations to minimize interference by stations of one country to those of other countries. The United States is the world's largest user of radio communication facilities, so international concord and coordination are essential in protecting our interests.

The Commission's national frequency records, comprising approximately 135,000 IBM listings and 60,000 5 x 8 card records, were brought up to date as of July 1, 1955, for the first time in 6 years. Semiannual listings reflecting these assignments were furnished the Commission's Washington and field offices, non-Government licensees, and all Government agencies using radio.

During the year 53,306 separate listings, reflecting Government and FCC stations, were registered with the International Frequency Registration Board of the International Telecommunications Union (ITU). Six hundred and fifty-two unsatisfactory findings of the board were processed. This required additional technical information from the licensees and the Government agencies involved to justify request for favorable findings. One hundred additional findings by the board are now under study.

INTERNATIONAL FREQUENCY ALLOCATION

As was the case for the past four years, the Commission has been chiefly concerned in the international field with carrying out domes-

may also be conducted under a class 1 authorization or by persons qualifying under the rules governing the amateur radio service.

Part 5 is being completely revised and it is expected that the necessary rule-making procedure will be completed in the near future.

8. INDUSTRIAL, SCIENTIFIC AND MEDICAL SERVICE

The prevalence of electrical interference tending to prevent the satisfactory reception of transmitted signals is one of the most serious limiting factors in the use of radio transmitting and receiving equipment. This interference may be in the form of atmospheric background noise, or it may appear as a result of spurious and harmonic emissions from various types of electrical and radio frequency operated equipment.

The Commission has long recognized the fact that certain equipment using radio frequency energy, but not designed for communication purposes, contributes a substantial portion of the interference to authorized radio services. Interference caused by this type of equipment has often resulted in the complete obliteration of the service of communication systems. Such interruptions to radio reception are not confined to the broadcast services but also seriously hamper those services concerned with the safety of life and property.

To minimize the actual or potential interference from particular kinds of radiating equipment, the Commission adopted, effective June 30, 1947, part 18 of its rules which relates to the Industrial, Scientific and Medical Service. It is designed to govern the operation of medical diathermy, industrial heating, and miscellaneous apparatus.

Medical diathermy equipment includes any apparatus (other than low power intermittent surgical diathermy equipment) which generates radio frequency energy for therapeutic purposes. Industrial heating equipment embraces apparatus using radio frequency energy for the purpose of heating operations in manufacturing or production processes. Miscellaneous equipment covers apparatus, other than diathermy or industrial heating equipment, in which the action of the energy emitted is directly upon the workload and does not involve the use of associated radio receiving apparatus.

Part 18 specifies the frequency bands which have been allocated for use by such equipment. Subsequent to the adoption of this part, five additional frequency bands above 40 megacycles have been made available for the operation of this equipment but have not as yet been included in part 18. The rules also specify the extent to which harmonic and spurious radiations must be suppressed.

Proceeding under these rules, the Commission has dealt with interference problems first on a request-for-cooperation basis, and later, in those cases where cooperation was not satisfactorily accomplished,

tically the provisions of the Geneva Agreement (1951) to which some 65 countries are parties. This task is virtually completed insofar as the Commission's licensees in the aeronautical mobile, amateur, fixed, and maritime mobile services are concerned. In the high frequency broadcast service, all stations licensed by the Commission are now assigned frequencies within the internationally agreed broadcast bands. However, within those bands there has not been developed any channeling or plan of assignment that is mutually acceptable to all user countries from the standpoint of number of frequencies and hours of availability.

NATIONAL FREQUENCY ALLOCATION

Coincidental with bringing into force the new Atlantic City table of frequency allocations within the United States, the need for major revisions in Alaskan communications practices became apparent. Coordination and cooperation between the Commission's Alaskan licensees, Government users of radio in Alaska and Canadian authorities enabled the Commission to rewrite its rules to improve the distribution of frequencies and to make other changes which are expected to add to the flexibility and reliability of radio communications in Alaska.

Action was also initiated during the year to reallocate certain portions of the FM and TV broadcast bands in Alaska for the joint use of Government operations and the Commission's point-to-point licensees. This move was made in the interests of better frequency management and spectrum conservation inasmuch as there had been no demand for extensive broadcasting in Alaska. Furthermore, there is more than ample spectrum space to accommodate TV broadcasting needs in Alaska for the indefinite future.

Increased emphasis has been given to frequency utilization studies of the VHF and UHF land mobile bands. The results are expected to lead to improved frequency management and more efficient utilization of these bands by an everexpanding land mobile service. For example, a comprehensive proposal to reduce channel separations in the land mobile service and thereby make room for new users was pending at the close of the year.

The Commission's table of frequency allocations was amended to permit test of a newly developed technique termed "tropospheric scatter" which permits "over-the-horizon" communication on frequencies normally considered suitable only for line-of-sight distances. This radical development is expected to have wide application in years to come. An interim authorization, pending the development of equipment to operate on even higher frequencies, has been granted in the International Fixed Public Radiocommunications Service for

point-to-point communications from Florida to Cuba in the UHF TV band between 716 and 890 megacycles in expanding public telephone facilities between these two countries.

FCC-GOVERNMENT FREQUENCY COORDINATION

During the year approximately 4,000 engineering studies were conducted on frequency assignments proposals involving joint Government-civil interference problems. It was noted that the various "rules of thumb" employed by most Government agencies to protect their existing communication systems were generally relaxed to permit at least trial operation on a frequency-separation differential much less than that customarily used in previous years.

For example, it is not uncommon to at least obtain agreement for a trial operation on 2 multiplex (MUX) circuits 5 kilocycles apart in frequency in the same general area. Such trend may be accounted for by (1) overcautiousness in the past, (2) improvement of equipment, and (3) operating advancements which can tolerate a certain amount of interference.

Approximately 275 civil versus Government interference cases were handled during the year. The majority were resolved with the cooperation of the using parties.

The staff concerned with these matters attended approximately 150 frequency management meetings between Government and non-Government representatives. This includes regularly scheduled meetings of the Interdepartment Radio Advisory Committee (IRAC) and its Frequency Assignment Subcommittee (FAS) in addition to special meetings on particular projects.

INTERNATIONAL FREQUENCY COORDINATION

The world-wide program for rearrangement of radio stations throughout the spectrum, according to internationally agreed procedure, was promoted by Commission action in contacting some 34 countries to determine their schedules for moving some 300 of their stations into frequency bands under treaty provisions. The Commission was in turn contacted by some foreign administrations requesting similar information about the movement of United States stations into designated frequency bands.

The Geneva Agreement of 1951, among member countries of the International Telecommunication Union, tells how this program is scheduled to be carried out so as to bring into force the Atlantic City (1947) radio regulations. Most of the foreign assignments previously in conflict with United States operations have now been cleared, due partly to 550 letters and radiograms exchanged between the Commission and foreign administrations.

The thousands of United States police, fire, industrial and other radio stations operating on frequencies between 30 and 460 megacycles in areas near the Canadian border received continuing protection by Commission action in exchanging technical data and engineering comments with the Canadian Department of Transport. This procedure, which began in 1950, has assisted the Commission and the Canadian authorities to make assignments in a manner to avoid large scale interference from developing along the border.

Similar coordinating action occurred on a lesser scale with other foreign administrations, all with the same objective of promoting the use and benefit of radio for Commission licensees.

When the Commission decided to terminate the regular use of type A2 (tone modulated telegraphic) emission by coast stations in the frequency band 415–490 kilocycles and by ship stations and coast stations in the maritime bands between 2200 and 17,000 kilocycles in order to enhance the use of this spectrum space by all users, it had been assured that Canada would take similar action, and it made strong representations to other governments for the same purpose. The result is that these portions of the spectrum are less crowded, because each station can now carry on the same amount of communication with a signal which uses a narrower channel. This is an example of international cooperation and coordination which redounds to our benefit.

INTERNATIONAL INTERFERENCE AND INFRACTIONS

The radio "highways" or frequency channels in the spectrum used by United States stations are kept as clear as possible of road blocks caused by interfering or improperly operating foreign stations.

In the past year this was done by taking prompt and effective action to resolve 316 interference cases involving in each case a foreign station and a Commission licensed station. Each case required the recording of data documented internationally and nationally, together with formal representations to foreign telecommunication officials, either directly or through diplomatic channels. The Department of State has been most helpful and cooperative in taking these matters up with the proper officials of foreign administrations.

For the purpose of further resolving international interference problems affecting the United States, progress was made, with the cooperation of affected communication companies, toward adoption of new uniform procedures to help bring about even more rapid and effective international action. Completion of this program should benefit United States utilization of radio frequency resources.

Other radio obstacles were prevented from developing by forwarding directly to appropriate foreign officials, in accordance with inter-

nationally agreed procedures, some 1,700 treaty infraction reports by Commission monitoring stations. These are reports showing that the specified foreign station is operated improperly, technically or administratively, so that its signals monopolize traffic lanes in the spectrum which could be employed by other stations operating properly. The corrective action, which is generally taken by the foreign administration concerned upon receiving these reports, serves as a preventive against the development of hundreds of full-fledged international interference cases.

Through these activities, the safety of life and property in the air and on the sea is enhanced.

INTERNATIONAL FREQUENCY USAGE DATA

In competition with many thousands of others throughout the world, United States radio stations must frequently confirm their actual use of a frequency assignment, such as for purposes of having a complaint of international interference resolved in their favor. Since considerations of this nature are based generally upon listings and data published in Geneva by the International Telecommunication Union, it is important for the Commission to see that correct and current data reflecting actual use of the spectrum is made available to the ITU. For this purpose, approximately 100,000 items from reports of the Commission's monitoring stations were processed and forwarded to the ITU.

INTERNATIONAL CONFERENCES AND MEETINGS

Preparation was made for 10 international telecommunication conferences and meetings during the year. Commissioners and staff personnel participated with United States delegations for a number of these.

Additionally, 28 meetings are expected to be held in the future, work on some of which is already under way. A few of these represent international discussions conducted by official communications rather than by an actual assembly. Agreements thus reached are nonetheless important in their effect on the United States.

All international conference participation is under Department of State sponsorship.

The Commission furnished 2 delegation chairmen and 8 representatives for the following 5 conferences and meetings:

Name	Place	Date
CCIT, Study Group XI	Geneva	June 30–July 9, 1954.
ICAO North Atlantic Regional Air Navigation Meeting	Montreal	Oct. 5–Oct. 29, 1954.
U. S.-Mexico Broadcasting Conference 1st Session	Mexico City	Nov. 4–Dec. 17, 1954.
ICAO Special European-Mediterranean Communications meeting.	Paris	Nov. 16–27, 1954.
URSI Spring Meeting	Washington	May 3–5, 1955.

Preparatory and follow-up work occurred, without personnel participation, for the following five conferences and meetings:

Name	Place	Date
ICAO SEA Communications Coordinating Committee, Informal Meeting.	Bangkok	Oct. 18–27, 1954.
U. S.-Mexico Meeting on CONELRAD	Colorado Springs	Fall 1954.
CCIR, Study Group I	Brussels	Mar. 22–Apr. 6, 1955.
CCIR, Study Group XI	do	Mar. 22–Apr. 6, 1955.
ITU Administrative Council, 10th Session	Geneva	Apr. 23–May 21, 1955.

The following 28 listings are conferences or discussions projected for the future with which the Commission is concerned:

Name	Place	Date
CCIT, Study Group X	Geneva	July 4–13, 1955.
U. S.-Mexico Broadcasting Conference, 2d Session	Washington	July 6, 1955.
ICAO Air Navigation Conference, 2d Session	Montreal	Aug. 30, 1955.
Baltic and North Sea Radiotelephone Conference	Gotegorg	Sept. 1, 1955.
ICAO Pacific Regional Air Navigation Meeting	Manila	Nov. 1, 1955.
U. S.-Canada Meeting on CONELRAD	Undetermined	1955.
ICAO North Atlantic Consol Advisory Panel	do	1955.
ITU Administrative Council, 11th Session	Geneva	Apr. 21, 1956.
CCIR, 8th Plenary Assembly	Warsaw	Aug. 23–Sept. 27, 1956.
ICAO Fourth European-Mediterranean Regional Air Navigation Meeting.	Undetermined	1956.
ICAO Third Caribbean Regional Air Navigation Meeting	do	1956.
ICAO North Atlantic Consol Advisory Panel	do	1956.
ICAO North Atlantic Ocean Station Conference	do	1957.
ICAO AGA/OPS/COM Air Navigation Conference	do	1956 or 1957.
U. S.-CANADA Meeting on CONELRAD	do	1956.
U. S.-Cuba Meeting on CONELRAD	do	1956.
U. S.-Mexico Meeting on CONELRAD	do	1956.
International Telegraph and Telephone Consultative Committee, 1st Plenary Assembly.	Geneva	1956.
ITU Administrative Telegraph and Telephone Conference	Undetermined	Undetermined.
ICAO African-Indian Ocean Regional Air Navigation Meeting.	do	1957.
ICAO South East Asia Regional Air Navigation Meeting	do	1957.
URSI 12th General Assembly	Boulder, Colo	August 1957.
U. S.-Bahamas Meeting on CONELRAD	Undetermined	1957.
U. S.-Bermuda Meeting on CONELRAD	do	1957.
U. S.-Haiti Meeting on CONELRAD	do	1957.
U. S.-Jamaica Meeting on CONELRAD	do	1957.
ITU Plenipotentiary Telecommunication Conference	do	Undetermined.
ITU Administrative Radio Conference	do	Do.

Appendix

FIELD OFFICES

Fifty-eight field offices are operated by the Federal Communications Commission.

Of this number, 55 are under the Field Engineering and Monitoring Bureau. These embrace 6 regional offices, 24 district offices with 6 suboffices and 1 ship office, and 18 monitoring stations.

The remaining three field offices are used by the Common Carrier Bureau for accounting purposes.

The nature and location of each field office are shown on the following list:

FIELD ENGINEERING AND MONITORING BUREAU

Regional Offices	*Headquarters*
Region 1	954 Federal Bldg., New York 14, N. Y.
Region 2	718 Atlanta National Bldg., Atlanta 3, Ga.
Region 3	323–A Customhouse, San Francisco 26, Calif.
Region 4	802 Federal Office Bldg., Seattle 4, Wash.
Region 5	P. O. Box 1142, Lanikai, Oahu, Hawaii
Region 6	832 U. S. Courthouse, Chicago 4, Ill.

District Offices	*Address*
1	1600 Customhouse, Boston 9, Mass.
2	748 Federal Bldg., New York 14, N. Y.
3	1005 New U. S. Customhouse, Philadelphia 6, Pa.
4	500 McCawley Bldg., Baltimore 2, Md.
5	402 Federal Bldg., Norfolk 10, Va.
6	718 Atlanta National Bldg., Atlanta 3, Ga.; (suboffice) 214 Post Office Bldg., Savannah, Ga.
7	312 Federal Bldg., Miami 1, Fla.; (suboffice) 409–410 Post Office Bldg., Tampa 2, Fla.
8	608 Federal Bldg., New Orleans 12, La.; (suboffice) 419 U. S. Courthouse and Customhouse, Mobile 10, Ala.
9	324 U. S. Appraisers Bldg., Houston 11, Tex.; (suboffice) 329 Post Office Bldg., Beaumont, Tex.
10	500 U. S. Terminal Annex Bldg., Dallas 22, Tex.
11	539 U. S. Post Office and Courthouse Bldg., Los Angeles 12, Calif.; (suboffice) 15–C U. S. Customhouse, San Diego 1, Calif.; (ship office) 326 U. S. Post Office and Courthouse, San Pedro, Calif.
12	323–A Customhouse, San Francisco 26, Calif.
13	433 New U. S. Courthouse, Portland 5, Oreg.
14	802 Federal Office Bldg., Seattle 4, Wash.
15	521 New Customhouse, Denver 2, Colo.

District Offices	*Address*
16	208 Uptown Post Office and Federal Courts Bldg., St. Paul, 2 Minn.
17	3100 Federal Office Bldg., Kansas City 6E, Mo.
18	826 U. S. Courthouse, Chicago 4, Ill.
19	1029 New Federal Bldg., Detroit 26, Mich.
20	328 Post Office Bldg., Buffalo 3, N. Y.
21	502 Federal Bldg., Honolulu 1, Hawaii.
22	322–323 Federal Bldg., San Juan 13, P. R.
23	53 U. S. Post Office and Courthouse Bldg., Anchorage, Alaska; (suboffice) 6 Shattuck Bldg., Juneau, Alaska.
24	Briggs Bldg., 415 22d St. NW., Washington 25, D. C.

Primary Monitoring Stations	*Secondary Monitoring Stations*
Allegon, Mich.	Searsport, Maine
Grand Island, Nebr.	Spokane, Wash.
Kingsville, Tex.	Twin Falls, Idaho
Millis, Mass.	Fort Lauderdale, Fla.
Santa Ana, Calif.	Chillicothe, Ohio
Laurel, Md.	Muskogee, Okla.
Livermore, Calif.	Anchorage, Alaska
Portland, Oreg.	Fairbanks, Alaska
Powder Springs, Ga.	
Lanikai, Oahu, Hawaii	

COMMON CARRIER BUREAU

New York, N. Y., 90 Church St.
St. Louis, Mo., 815 Olive St.
San Francisco, Calif., 180 New Montgomery St.

PUBLICATIONS

The Commission's printed publications are available from the Superintendent of Documents, Washington 25, D. C., at nominal cost. They are not distributed by the Commission.

Included are rules and regulations governing the different classes of radio and other services. Each part covers a particular service. On the back page is a form which, when filled out and forwarded to the Commission, entitles the purchaser to receive any subsequent changes to the part or parts purchased until a complete revision is printed.

A list of these printed publications follows:

Title	*Price*
Communications Act of 1934, with Amendments and Index, revised to May 1954	$0.70
Amendments to September 1955	.30
Federal Communications Commission reports (bound volumes of decisions and reports exclusive of annual reports):	
Volume 5, November 16, 1937, to June 30, 1938	1.50
Volume 6, July 1, 1938, to February 28, 1939	1.50
Volume 8, March 1, 1940, to August 1, 1941	1.50
Volume 11, July 1, 1945, to June 30, 1947	3.75
Volume 12, July 1, 1947, to June 30, 1948	3.50
Volume 13, July 1, 1948, to June 30, 1949	4.25

Title	*Price*
Annual reports of the Commission:	
Thirteenth Annual Report—Fiscal year 1947	$0.25
Fourteenth Annual Report—Fiscal year 1948	.30
Fifteenth Annual Report—Fiscal year 1949	.35
Sixteenth Annual Report—Fiscal year 1950	.40
Seventeenth Annual Report—Fiscal year 1951	.40
Eighteenth Annual Report—Fiscal year 1952	.40
Nineteenth Annual Report—Fiscal year 1953	.50
Twenty-first Annual Report—Fiscal year 1955	(1)
Statistics of the communications industry:	
For the year 1943	.35
For the year 1945	.50
For the year 1946	.55
For the year 1947	.75
For the year 1948:	
Sections A and B	1.00
Section B—Broadcast only	.35
For the year 1949—Sections A and B	1.00
For the year 1950—Common Carrier only	.50
For the year 1951—Common Carrier only	.40
For the year 1952—Common Carrier only	.50
For the year 1953—Common Carrier only	.50
Report on Public Service Responsibility of Broadcast Licensees (Blue Book), 1946	.40
An Economic Study of Standard Broadcasting, 1947	.40
Study Guide and Reference Material for Commercial Radio Operator Examinations	.75
Digest of Radio Regulations and Instructions for Restricted Radiotelephone Operators	.05
Figure M3, Estimated Ground Conductivity in the United States, set of 2 maps	3.50
Rules and Regulations:	
Part 0, Organization, Delegation of Authority, etc., revised; effective October 15, 1954	.15
Part 1, Practice and Procedure	(2)
Part 2, Frequency Allocations and Radio Treaty Matters; General Rules and Regulations, revised; effective July 1, 1955	.25
Part 3, Radio Broadcast Services (includes AM, FM and TV engineering standards), revised to Jan. 2, 1956	(1)
Part 4, Experimental and Auxiliary Broadcast Services, revised to June 1, 1955	(.15)
Part 5, Experimental Radio Services, revised; effective March 17, 1953	.10
Part 6, Public Radiocommunication Services (Other Than Maritime Mobile), revised; effective July 1, 1949	.10
Part 7, Stations on Land in the Maritime Services, revised; effective August 1, 1955	(1)
Part 8, Stations on Shipboard in the Maritime Services, revised; effective August 1, 1955	(1)

[1] In the process of printing—available at Superintendent of Documents at a later date.
[2] Not available at present.

Title	*Price*
Rules and Regulations—Continued	
Part 9, Aviation Services, revised; effective July 14, 1953	$0.10
Part 10, Public Safety Radio Services, revised; effective December 18, 1953	.15
Part 11, Industrial Radio Services, revised; effective July 29, 1953	.15
Part 12, Amateur Radio Service, revised; effective November 20, 1953	.20
Part 13, Commercial Radio Operators, revised; effective November 30, 1954	.10
Part 14, Public Fixed Stations and Stations of the Maritime Services in Alaska, revised; effective June 20, 1955	.10
Part 15, Restricted Radiation Devices	(2)
Part 16, Land Transportation Radio Services, September 1955 edition	(1)
Part 17, Construction, Marking, and Lighting of Antenna Structures, revised to June 3, 1953	.05
Part 18, Industrial, Scientific, and Medical Service, revised; effective September 4, 1953	.10
Part 19, Citizens Radio Service, revised; effective February 1, 1955	.05
Part 20, Disaster Communications Service, September 1955 edition	(1)
Part 31, Uniform System of Accounts for Class A and Class B Telephone Companies, revised to May 12, 1948	.40
Part 33, Uniform System of Accounts for Class C Telephone Companies, revised to May 12, 1948	.30
Part 34, Uniform System of Accounts for Radiotelegraph Carriers, revised to October 14, 1949	.20
Part 35, Uniform System of Accounts for Wire-Telegraph and Ocean-Cable Carriers, revised to October 14, 1949	.25
Part 41, Telegraph and Telephone Franks, revised to December 4, 1947	.05
Part 43, Reports of Communication Common Carriers and Certain Affiliates, revised; effective September 21, 1953	.05
Part 45, Preservation of Records of Telephone Carriers, effective October 1, 1950	.10
Part 46, Preservation of Records of Wire-Telegraph, Ocean-Cable, and Radiotelegraph Carriers, effective October 1, 1950	.10
Part 51, Occupational Classification and Compensation of Employees of Class A and Class B Telephone Companies, revised to October 10, 1951	.05
Part 52, Classification of Wire-Telegraph Employees, effective July 11, 1944	(2)
Part 61, Tariffs, Rules Governing the Construction, Filing and Posting of Schedules of Charges for Interstate and Foreign Communication Service, revised to August 1, 1946	.10
Part 62, Applications Under Section 212 of the Act to Hold Interlocking Directorates, revised to May 23, 1944	.05
Part 63, Extension of Lines and Discontinuance of Service by Carriers, revised to December 30, 1946	(2)
Part 64, Miscellaneous Rules Relating to Common Carriers, revised to July 16, 1948	.10

[1] In the process of printing—available at Superintendent of Documents at a later date.
[2] Obtainable temporarily from the Federal Communications Commission without charge.

NOTE.—The Commission's Annual Report for 1954 is out of print and is no longer available.

Because of their number and constant state of flux, radio station lists cannot be supplied by the Commission. However, on request, it will furnish a fact sheet about commercial sources of such lists, also one on communications commercial publications and services.

Also available from the Commission are the following nonprinted information primers concerning the FCC and its various fields of activity:

"An ABC of the FCC"
"A Short History of Electrical Communication"
"Radio Broadcast Primer"
"Safety and Special Radio Services Primer"
"Common Carrier Primer"
"Use of Broadcast Facilities by Candidates for Public Office"
"Radio Station Calls"

In addition, various fact sheets are issued about the individual safety and special radio services, and about amateur and commercial radio operators. Examples are:

"Citizens Radio Service"
"Private Aircraft Radio Stations"
"Amateur Radio Service"
"How to Obtain a Ship Radiotelephone License"
"Ship Radiotelephone"
"Study Questions for Amateur Novice Class Examinations"
"Industrial Radio Services and Land Transportation Services"
"Special Emergency Radio Service"
"Information Concerning Commercial Radio Operator Licenses and Permits"

Though none of these can be furnished in quantity, a single copy may be obtained upon individual request to the "Secretary, Federal Communications Commission, Washington 25, D. C." for reproduction in whole or in part.

TREATIES AND OTHER INTERNATIONAL AGREEMENTS

Applicable Federal laws, international treaties, and arrangements relating to radio, to which the United States is a party, were formerly listed in this section. Those interested are now referred to the revised tabulation in Part 2 of the Commission's Rules and Regulations Governing Frequency Allocations and Radio Treaty Matters; General Rules and Regulations, which can be purchased from the Superintendent of Documents.

PAST AND PRESENT COMMISSIONERS

Past and present members of the Federal Communications Commission, and their terms of service, are listed below:

by the use of enforcement provisions available to the Commission. In the administration of part 18, the Commission has been guided by a desire to provide interference-free communication and yet permit the necessary use of medical diathermy, industrial heating, and miscellaneous equipment. Advice and suggestions regarding the possibility of modifying older types of equipment to effect compliance with the rules have been given by the Commission. The Commission's efforts to effect amicable solutions of interference problems created by the use of equipment included in part 18 have, in general, been well received.

The mounting use of the television broadcast facilities and the growing congestion of the frequency spectrum by other services have resulted in an increase in the number of interference cases reported. Thus far the procedure set up for processing complaints of interference to radio reception has been satisfactory; however, the rapid growth and expansion of the broadcasting, communication and safety services may lead to difficult situations which can be resolved only by the use of stronger measures available under the Communications Act.

In addition to its regulatory duties, the Commission has held conferences with representatives of industries engaged in the manufacture, sale or construction of equipment regulated by part 18. These conferences have been beneficial to both the Commission and industry and have resulted in a better understanding of the problems concerning interference confronting the Commission. Type approval certificates have been issued covering 58 machines and equipment tested in accordance with and found to comply with the rules.

In order to clarify sections 18.17, 18.24, and 18.32 of the rules, footnotes were appended to these sections which relieves operators of diathermy and other type-approved or certified devices from being required to eliminate interference to authorized radio services resulting from direct intermediate frequency pickup in inadequately shielded receivers of the fundamental frequency of such devices where the radiation is otherwise in accord with the rules.

The Commission has successively postponed the effective date of the rules concerning welding devices employing radio frequency energy until January 31, 1951. An industry committee is cooperating with the Commission to eliminate interference caused by the operation of such welders. Conferences have been held with representatives of the welding industry to study this problem and to arrive at suitable technical standards whereby the welding industry can be brought under the rules and, at the same time, minimize interference caused to radio communication services.

Commissioners	*Terms of service*
*Eugene O. Sykes	July 11, 1934–Apr. 5, 1939
Thad H. Brown	July 11, 1934–June 30, 1940
*Paul A. Walker	July 11, 1934–June 30, 1953
Norman S. Case	July 11, 1934–June 30, 1945
Irvin Stewart	July 11, 1934–June 30, 1937
George Henry Payne	July 11, 1934–June 30, 1943
Hampson Gary	July 11, 1934–Dec. 24, 1934
*Anning S. Prall	Jan. 17, 1935–July 23, 1937
T. A. M. Craven	Aug. 25, 1937–June 30, 1944
*Frank R. McNinch	Oct. 1, 1937–Aug. 31, 1939
Frederick I. Thompson	Apr. 13, 1939–June 30, 1941
*James Lawrence Fly	Sept. 1, 1939–Nov. 13, 1944
Ray C. Wakefield	Mar. 22, 1941–June 30, 1947
Clifford J. Durr	Nov. 1, 1941–June 30, 1948
**Ewell K. Jett	Feb. 15, 1944–Dec. 31, 1947
*Paul A. Porter	Dec. 21, 1944–Feb. 25, 1946
*Charles R. Denny	Mar. 30, 1945–Oct. 31, 1947
William H. Wills	July 23, 1945–Mar. 6, 1946
*Rosel H. Hyde	Apr. 17, 1946–
Edward M. Webster	Apr. 10, 1947–
Robert F. Jones	Sept. 5, 1947–Sept. 19, 1952
*Wayne Coy	Dec. 29, 1947–Feb. 21, 1952
George E. Sterling	Jan. 2, 1948–Sept. 30, 1954
Frieda B. Hennock	July 6, 1948–June 30, 1955
Robert T. Bartley	Mar. 6, 1952–
Eugene H. Merrill	Oct. 6, 1952–Apr. 14, 1953
John C. Doerfer	Apr. 15, 1953–
Robert E. Lee	Oct. 6, 1953–
*George C. McConnaughey	Oct. 4, 1954–
Richard A. Mack	July 7, 1955–

*Served as Chairman.
**Served as Interim Chairman.

○

HISTORY OF BROADCASTING:
Radio To Television
An Arno Press/New York Times Collection

Archer, Gleason L.
Big Business and Radio. 1939.

Archer, Gleason L.
History of Radio to 1926. 1938.

Arnheim, Rudolf.
Radio. 1936.

Blacklisting: Two Key Documents. 1952–1956.

Cantril, Hadley and Gordon W. Allport.
The Psychology of Radio. 1935.

Codel, Martin, editor.
Radio and Its Future. 1930.

Cooper, Isabella M.
Bibliography on Educational Broadcasting. 1942.

Dinsdale, Alfred.
First Principles of Television. 1932.

Dunlap, Orrin E., Jr.
Marconi: The Man and His Wireless. 1938.

Dunlap, Orrin E., Jr.
The Outlook for Television. 1932.

Fahie, J. J.
A History of Wireless Telegraphy. 1901.

Federal Communications Commission.
Annual Reports of the Federal Communications Commission. 1934/1935–1955.

Federal Radio Commission.
Annual Reports of the Federal Radio Commission. 1927–1933.

Frost, S. E., Jr.
Education's Own Stations. 1937.

Grandin, Thomas.
The Political Use of the Radio. 1939.

Harlow, Alvin.
Old Wires and New Waves. 1936.

Hettinger, Herman S.
A Decade of Radio Advertising. 1933.

Huth, Arno.
Radio Today: The Present State of Broadcasting. 1942.

Jome, Hiram L.
Economics of the Radio Industry. 1925.

Lazarsfeld, Paul F.
Radio and the Printed Page. 1940.

Lumley, Frederick H.
Measurement in Radio. 1934.

Maclaurin, W. Rupert.
Invention and Innovation in the Radio Industry. 1949.

Radio: Selected A.A.P.S.S. Surveys. 1929–1941.

Rose, Cornelia B., Jr.
National Policy for Radio Broadcasting. 1940.

Rothafel, Samuel L. and Raymond Francis Yates.
Broadcasting: Its New Day. 1925.

Schubert, Paul.
The Electric Word: The Rise of Radio. 1928.

Studies in the Control of Radio: Nos. 1–6. 1940–1948.

Summers, Harrison B., editor.
Radio Censorship. 1939.

Summers, Harrison B., editor.
A Thirty-Year History of Programs Carried on National Radio Networks in the United States, 1926–1956. 1958.

Waldrop, Frank C. and Joseph Borkin.
Television: A Struggle for Power. 1938.

White, Llewellyn.
The American Radio. 1947.

World Broadcast Advertising: Four Reports. 1930–1932.

9. RESTRICTED RADIATION DEVICES

As a result of studies made in 1938, the Commission adopted rules relating to certain low-power devices. These rules, presently codified as part 15, Rules Governing Restricted Radiation Devices, were the outgrowth of the Commission's recognition of the necessity for establishing a minimum field strength figure, below which it would not require the use of radio frequency emissions to be licensed. The present part 15 does not place a limitation upon the permissible power, but specifies the maximum distance at which such equipment can be used, the distance being an inverse function of the frequency employed, and specifies a maximum permissible radiation at that distance.

Considerable use has been made of equipment ostensibly designed to operate within the provisions of part 15, particularly within the frequency band allocated for use by the standard broadcast service. Typical of these uses are so-called "college campus" broadcast stations which employ carrier current techniques for the dissemination of programs essentially broadcast in nature; industrial signalling and communication systems using carrier current; space radiating devices such as phono-oscillators, garage door openers, remote-control devices for model airplanes or other objects, etc.

Since the operation of radio transmitting devices under part 15 does not involve licensing procedure for either equipment or operators, this mode of operation has been adopted by many persons. As a result, the Commission has received considerable correspondence regarding restricted radiation devices purportedly operating in compliance with part 15. It has been found, however, that much of the equipment intended to operate under these rules has proved incapable of compliance with the maximum permissible field strength. Campus broadcasting, and other carrier current systems, have grown to such proportions that an examination of the problems created is being made.

A notice of proposed rule making has been published and comments invited regarding suggested amendments to part 15. The Commission and industry are cooperating in an effort to secure all available information and data regarding the various types of restricted radiation devices and systems now in use. Due to the many ramifications of the problem involved, it is apparent that further intensive study by all interested groups will be required to effect an equitable solution.

10. STATISTICS

SAFETY AND SPECIAL RADIO AUTHORIZATIONS

Authorizations in the safety and special radio services (exclusive of amateurs, citizens, and special aircraft radiotelephone, which are treated in a separate chapter) exceeded 66,000 at the close of the fiscal year. This represents a net increase of more than 5,000 during the

year. The figures for 1950 reflect various service changes occurring during the year, which are explained under the following table:

Class of station	June 30, 1949	June 30, 1950	Increase or decrease
Aeronautical:			
Carrier aircraft	1,600	1,572	(−28)
Private aircraft	21,517	17,856	[1](−3,661)
Public service aircraft	606	690	84
Aeronautical and fixed	1,485	1,409	(−76)
Civil air patrol	1,608	1,886	278
Airdrome control	53	53	0
Navigational	88	134	46
Flight test	89	83	(−6)
Flying school	19	16	(−3)
Mobile utility	162	95	(−67)
Total	27,227	23,794	(−3,433)
Marine:			
Ship	18,140	22,601	4,461
Ship radar	863	1,125	262
Coastal and marine relay	136	130	(−6)
Alaskan coastal	302	340	38
Alaskan fixed public	480	524	44
Other	83	201	18
Total	20,004	24,921	4,917
Public safety:			
Police	4,759	5,618	859
Fire	124	276	152
Forestry-conservation	565	1,307	742
Highway maintenance	165	238	73
Special emergency	97	168	81
Total	5,700	7,607	1,907
Industrial:			
Power	2,712	3,601	889
Petroleum	802	1,380	578
Forest products	144	246	102
Special industrial	571	724	153
Low-power industrial	3	93	90
Relay press	19	26	7
Motion picture	15	20	5
Total	4,266	6,090	1,824
Land transportation:			
Railroad	334	450	116
Urban transit	80	100	20
Intercity bus	20	30	10
Taxicab	3,144	2,750	[2](−394)
Highway truck	8	107	99
Automobile emergency	2	58	56
Total	3,588	3,495	(−93)
Experimental:			
Class 1	455	416	(−39)
Class 2	46	50	4
Total	501	466	(−35)
Grand total	61,286	66,373	5,087

[1] Approximately 7,000 new private aircraft radio licenses were issued during the year. The numerical drop in the number of these stations is due to several factors. There is a large turn-over in private aircraft and many owners are delinquent in notifying the Commission when their planes are sold or removed from service. In addition, large numbers of private aircraft owners have been delinquent in filing applications for renewal of licenses. This delay was not apparent previous to 1950 since the rapid expansion of new aircraft stations more than offset these cases. The fiscal year 1950 was the first major renewal year since the 2-year license term was inaugurated for private aircraft. The Commission surveyed its active files and deleted more than 4,000 such stations whose licenses had expired. An enforcement program instituted by the Commission resulted in a large increase in the number of applications for private aircraft during June; such an increase is expected to continue during the ensuing 6 months.

[2] The apparent decrease in the taxicab service was the result of a change in licensing procedure. For administrative convenience, there was inaugurated a system license plan which combined the base station transmitter and the associated mobile units into a single station authorization. If the Commission had continued to license these stations as it did formerly, the station count would have been approximately 5,400 instead of the 2,750 shown as of June 30. In fact, more than 500 new taxicab systems were authorized during the fiscal year 1950.

FIXED, PORTABLE AND MOBILE TRANSMITTERS

Operation of more than 300,000 transmitters was covered in non-broadcast radio authorizations, according to a Commission compilation, completed in February 1950, on the basis of records as of June 15, 1949.

Of this total, nearly 100,000 were land or fixed stations, and over 220,000 were portable or mobile units. The greater portion of these—over 290,000—were in the safety and special services, which had some 94,000 land or fixed stations and 196,000 portable or mobile units. Nearly 26,000 transmitters were authorized for the common carrier services—about 2,200 land or fixed stations and over 23,600 portable or mobile units.

The breakdown follows:

Classification	Land or fixed stations	Portable or mobile units	Total transmitters
Safety and special services:			
Aircraft [1]		23,723	23,723
Aviation ground	1,987	4,314	6,301
Total aeronautical services	1,987	28,037	30,024
Police	3,425	47,327	50,752
Fire	174	3,118	3,292
Forestry	493	7,774	8,267
Highway maintenance	139	682	821
Special emergency	70	221	291
Total public safety services	4,301	59,122	63,423
Ship [1]		18,140	18,140
Coastal and marine relay	425		425
Radar [1]		863	863
Other marine	18	167	185
Total marine services	443	19,170	19,613
Railroad	213	2,388	2,601
Transit utility	42	1,108	1,150
Busses and trucks	7	304	311
Taxicabs	2,497	47,974	50,471
Total land transportation services	2,759	51,774	54,533
Power radio service	1,925	23,248	25,173
Petroleum	370	5,474	5,844
Forest products	80	874	954
Relay press	6	60	66
Motion picture	2	103	105
Low-power industrial		37	37
Special industrial	157	1,787	1,944
Provisional and experimental	225	2,025	2,250
Total industrial services	2,765	33,608	36,373
Experimental, class 1	179	2,078	2,257
Experimental, class 2 (miscellaneous)	195	2,484	2,679
Total experimental services	374	4,562	4,936
Citizens		[2] 300	[2] 300
Amateur [1]	81,675		81,675
Total civilian radio service	81,675	300	81,975
Total safety and special services	94,304	196,573	290,877

[1] As of June 30, 1949.
[2] Estimated.

Classification	Land or fixed stations	Portable or mobile units	Total transmitters
Common carrier:			
International fixed public service:			
Fixed telegraph	[3] 697		[3] 697
Fixed telephone	[3] 776		[3] 776
International fixed public (press) service:			
Fixed telegraph	[4] 155		[4] 155
Agriculture service:			
Fixed telegraph	9		9
Domestic public land mobile service:			
Base	369		369
Auxiliary test	154		154
Control	9		9
Mobile		23, 602	23, 602
Domestic fixed public service:			
Microwave relay	39		39
Rural subscriber	6		6
Short haul toll telephone	18		18
Total common carrier	2, 232	23, 602	25, 834

[3] These tables contain both station counts (Alaskan stations) and frequency assignment counts (other than Alaskan stations). [4] This is a count of frequency assignments.

SAFETY AND SPECIAL RADIO APPLICATIONS

There was a net increase of more than 10,000 applications affecting the safety and special radio services during the year, bringing the sum total of those received during the fiscal year to more than 62,000. The number of applications by services was as follows:

Class of station	Received 1949	Received 1950	Increase or decrease
Aeronautical:			
Aircraft	13, 524	14, 201	677
Ground	4, 300	2, 413	(−1, 887)
Total	17, 824	16, 614	(−1, 210)
Marine:			
Ship	15, 249	16, 905	1, 656
Ship radar	966	680	(−286)
Coastal and marine relay	297	126	(−171)
Alaskan fixed public	599	351	(−248)
Alaskan coastal	487	264	(−223)
Other	145	340	195
Total	17, 743	18, 666	923
Public safety:			
Police	4, 609	8, 119	3, 510
Fire	254	488	234
Forestry conservation	611	2, 201	1, 590
Highway maintenance	243	327	84
Special emergency	110	298	188
Total	5, 827	11, 433	5, 606
Industrial:			
Power	3, 167	5, 228	2, 061
Petroleum	1, 166	2, 452	1, 286
Forest products	269	364	95
Special industrial	1, 129	1, 418	289
Low-power industrial	50	169	119
Relay press	40	48	8
Motion picture	30	41	11
Total	5, 851	9, 720	3, 869
Land transportation:			
Railroad	401	579	178
Urban transit	60	104	44
Taxicab	3, 667	4, 323	656
Intercity bus	[1] 209	13	109
Highway truck		189	
Automobile emergency		116	
Total	4, 337	5, 324	987
Experimental:			
Class 1	849	799	(−50)
Class 2	105	100	(−5)
Total	954	899	(−55)
Grand total	52, 536	62, 656	10, 120

[1] Not broken down in fifteenth annual report.

CHAPTER IV—RADIO BROADCAST SERVICES

1. BROADCAST REGULATION

SCOPE OF AUTHORITY

The Communications Act deems broadcasting not to be a common carrier operation; hence the Commission has no jurisdiction over charges made by broadcast stations for air time, nor does it maintain surveillance of their day-by-day programming and internal management, salaries paid artists and personnel, etc.

Consequently, the Commission's regulation of broadcasting is limited to two general phases. The first deals with the allocation of portions of the spectrum to the different types of broadcast services in accordance with the Commission's rules and regulations to carry out the intent of international agreements, the Communications Act and other domestic law affecting broadcasting.

The second phase concerns individual stations, and embraces consideration of applications to build and operate; the assignment of specific frequencies, power, operating time, and call letters; the periodic inspection of equipment and the engineering aspects of operation; passing upon transfers and assignments of facilities, also changes in existing authorizations; modifying and renewing construction permits and licenses; licensing radio operators, and otherwise discharging regulatory responsibilities.

Broadcast stations are licensed to serve "the public interest, convenience and necessity." Because radio channels are limited and are a part of the public domain, it is important that they be entrusted to licensees who have a high sense of public responsibility.

The Communications Act sets up certain basic requirements which must be met by broadcast applicants. In general, applicants must be legally, technically, and financially qualified, and show that their proposed operation will be in the public interest.

Under the Communications Act, it is the responsibility of each broadcast station licensee, in addition to meeting technical requirements, to arrange his program structure so that his operation is in the public interest. Pursuant to duties imposed by the act, the Commission periodically reviews the over-all performance of stations, usually when they apply for renewal of license, to see if they have lived up to their obligations, and the promises they made in applying for facilities.

This review of broadcast station performance does not, however, give the Commission censorship authority, for the Communications Act states: "Nothing in this act shall be understood or construed to give the Commission the power of censorship over the radio communications or signals transmitted by any radio station, and no regulation or condition shall be promulgated or fixed by the Commission which shall interfere with the right of free speech by means of radio communication." The Commission has held that freedom of speech on the radio must be broad enough to provide full and equal opportunity for the presentation of both sides of public issues.

The Communications Act contains an express provision with respect to political broadcasts: "If any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station, he shall afford equal opportunities to all other such candidates for that office in the use of such radio facilities * * * *Provided*, That such licensee shall have no power of censorship over the material broadcast under the provisions of this section. No obligation is hereby imposed upon any licensee to allow the use of its station to any such candidate."

The United States Criminal Code prohibits broadcast of information concerning "any lottery, gift enterprise, or similar scheme," also utterance of obscene, indecent, or profane language. Under the first-named provision, the Commission on August 19, 1949 adopted rules affecting lotteries and "give-away" programs, to become effective October 1 thereafter. However, because of litigation, the Commission on September 29, 1949, postponed the effective date of these rules until final court determination.

The Commission prohibits the same interest or group from owning or operating more than 1 AM, FM, or TV broadcast station in the same area, or more than 6 FM stations or 5 TV stations throughout the country as a whole. Decision was pending, following oral argument, on proposed rule amendments which would limit ownership or control to not more than 7 AM stations in the country as a whole, and over-

lapping interest to not more than 14 AM, 12 FM and 10 TV stations throughout the Nation.

On January 12, 1950, the Commission proposed rules which would curb trafficking in broadcast frequencies by causing construction permits for AM, FM, and TV stations to be automatically forfeited if the holder enters into a contract to transfer to another party before the station has been constructed and operated. Oral argument began June 19.

NETWORKS

The Commission does not license networks as such; only individual stations. However, stations owned or affiliated with networks are subject to chain broadcasting regulations promulgated by the Commission in 1940 and now incorporated in part 3 of its rules.

There are four major networks—American Broadcasting Co., Columbia Broadcasting System, Mutual Broadcasting System, and National Broadcasting Co.—and various regional and other AM, FM, and TV groups.

At the close of the year, 1,189 AM stations were affiliated with the major networks, which operated 18 AM stations. A breakdown follows:

Network	Network owned AM stations	Affiliated AM stations
ABC	[1] 5	286
CBS	[2] 7	184
MBS	[3] 0	543
NBC	6	176

[1] Includes one 100-percent owned subsidiary.
[2] Includes one 100-percent owned subsidiary, but does not include a 45-percent minority interest in 1 other station.
[3] Although MBS does not itself operate any broadcast station, its stock is held by 7 corporations of which 6 are station licensees in this country.

RECEIVING SETS

The Commission does not license radio receiving sets which are exclusively that, nor does it regulate their manufacture or sale. Based upon industry estimates, the total number of broadcast receivers was currently approaching 81 million.

Production of home broadcast receivers declined 31 percent between the calendar years 1948 and 1949 but was expected to show an increase of 70 percent in calendar year 1950. Production of TV receivers almost tripled in calendar year 1949.

Production of all types of home receivers was increasing in 1950. The output during the first 6 months of that year was reported to be 6,263,857 sets. Of this total, 2,413,145, or 38.5 percent, were TV sets, and 539,852, or 8.6 percent, were FM sets (including dual FM–AM

sets). Production of AM only receivers accounted for 52.9 percent of the total. However approximately 10 percent of the TV sets produced in the first half of 1950 contained AM or FM bands, or both.

TYPES OF BROADCAST STATIONS

At the close of fiscal 1950 there were more than 4,500 outstanding authorizations in 10 categories of broadcast services. The majority of these—over 3,100—comprised stations in the three principal commercial broadcast services, namely: AM (amplitude modulation); FM (frequency modulation), and TV (television), also known as video. The remainder were made up of noncommercial educational, facsimile, international, developmental stations, and remote pickup and studio transmitter links.

GROWTH OF BROADCASTING

The growth of AM, FM, and TV broadcast services since 1943 is shown in the following table of authorized and licensed stations at the close of each fiscal year:

	AM		FM		TV		Total	
	Authorized	Licensed	Authorized	Licensed	Authorized	Licensed	Authorized	Licensed
1943	912	911	48	37	6	6	966	954
1944	924	912	52	45	9	6	985	963
1945	955	931	53	46	25	6	1,033	983
1946	1,215	961	456	48	30	6	1,701	1,015
1947	1,795	1,298	918	48	66	6	2,779	1,352
1948	2,034	1,693	1,020	142	109	7	3,163	1,842
1949	2,179	1,963	865	377	117	13	3,161	2,353
1950	2,303	2,118	732	493	109	47	3,144	2,658

2. TELEVISION (TV) BROADCAST SERVICE

INCREASE IN TV APPLICATIONS AND SERVICE

Throughout the year there was greater availability of television receivers, transmitters, and relay facilities. The public acceptance of and interest in visual broadcasting continued at a high level. Due, however, to the continuance of the so-called "freeze" policy, explained hereafter, there was only a small increase in the number of commercial TV broadcast stations on the air.

At the end of the year, 47 television stations were licensed and 62 construction permits were outstanding. In addition to those licensed, 59 stations were operating on a commercial basis under special temporary authorizations.

In spite of the "freeze," the year's close saw 106 stations bringing TV programs to 64 cities and metropolitan areas as compared with 42 cities served by 71 stations the previous year. It was estimated

that there were 87,000,000 potential television viewers in 43 States. This represented about 57 percent of the population of the entire United States. The demand for TV outlets also continued high with 351 applications for new stations pending at the end of the year, many of which were in comparative hearing status due to the fact that their requests exceeded the available facilities.

Television receiver production also continued to mount with a continued trend toward larger picture screens. It was estimated that over 7,000,000 receivers were in the hands of the public in areas capable of TV reception. The 16-inch direct view tube replaced the 10-inch tube in public favor. The rectangular shaped tube made its debut.

EXPERIMENTAL TV SERVICE

At the end of the year there were 183 experimental TV stations licensed and a score of outstanding construction permits. Included in these figures were 158 relay stations operating in the microwave region and used by TV broadcasters as pick-up, studio-to-transmitter link, and interim intercity relay stations. Proposed rules for putting these television auxiliary services on a permanent basis were pending at the end of the year.

Television research and experimentation continued with special interest in color televising and operation in the 475–890 megacycle UHF (ultra high frequency) band. About 25 authorizations were outstanding in this band. Studies made included propagation, circuitry in transmitters and receivers, and the rebroadcasting of VHF (very high frequency) signals in the UHF region. One such station commenced experimentation for the purpose of testing the feasibility of satellite operation in small cities using the signals of "mother" stations in nearby large cities or metropolitan areas. Several licensees used pulse-type transmitters to explore the coverage possibilities of the UHF band.

OTHER TV DEVELOPMENTS

The principal development in the television art was the giant strides made in color TV. The Commission authorized color transmissions on an experimental basis for the three systems of the principal proponents of color. These broadcasts were made over regular commercial TV stations and were witnessed by thousands of persons on receivers especially built or converted for the reception of the respective color systems.

On February 8, 1950, the Commission granted the Zenith Radio Corp. special temporary authority for a 90-day period to utilize the facilities of its Chicago experimental station to conduct "Phonevision" tests under certain conditions attached. It was proposed to transmit

programs to 300 telephone subscribers in that area interested in this pay-as-you-see television broadcasting method.

TV network facilities, both coaxial cable and radio relay, were expanded, bringing the total number of metropolitan areas in the chain to 28. About 14 more cities and metropolitan areas are on the 1950 schedule for network linkage. (See also coaxial cable and microwave relay in the chapter on common carriers.) In addition to these common carrier facilities for simultaneous viewing of network programs, many broadcasters were using programs picked off the air and relayed to their stations by means of private intercity relays operated by themselves.

Two motion picture companies continued their experiments in the relaying of events to theater audiences. In view of the many petitions filed by motion picture interests, the Commission on January 11, 1950, issued a notice of hearing to determine whether provision should be made for a theater television service. The date of this hearing was to be set later.

ULTRA HIGH FREQUENCY TV

The Commission's rules now in effect are based on the use of 12 VHF television channels with assignments distributed about the country in a precut plan involving approximately 150-mile separation between stations operating on the same channel, the stations having a maximum 50 kilowatts effective radiated power and an average antenna height of 500 feet. This plan was drafted in 1945 on technical data then available and did not take into account interference from propagation due to tropospheric bending of radio waves. Early in 1948 it became evident from new data and the operational performance of stations on the air that the 150-mile cochannel separation of stations was inadequate if a service radius of about 40 miles was to be expected. As a result, the Commission (on September 30, 1948) stopped granting applications for new TV facilities pending a study of the problems involved. This was the so-called "freeze" order.

After the study was completed it was apparent that the cochannel separation would necessarily have to be increased to approximately 220 miles to retain a reasonable service area for TV stations. This fact greatly reduced the number of potential assignments on the 12 available channels. At the same time, the number of applications from people desiring to get into the TV broadcasting field was rapidly increasing. The Commission had no alternative other than to propose additional channels in the only available spectrum space, which was in the 475–890 megacycle region. This UHF region had previously been set aside for experimentation in color and high definition monochrome television.

COLOR TELEVISION

As early as May of 1945, the Commission foresaw the necessity for the development of a Nation-wide competitive TV service, including color operation in the UHF band. In September of 1946 the Columbia Broadcasting System, Inc., filed a petition for authorization of its color system in the UHF band using channels 16 megacycles wide. In the course of the hearing held on that petition, the Radio Corp. of America demonstrated its color system operating within a 14.5 megacycle band. In its report of March 18, 1947, the Commission denied the CBS petition on the ground that it was not ready for commercial use and concluded: "It is hoped that all persons with a true interest in the future of color television will continue their experimentation in this field in the hope that a satisfactory system can be developed and demonstrated at the earliest possible date."

TELEVISION HEARING

On July 11, 1949, the Commission announced a rule-making proceeding looking towards new standards to avoid interference, the opening up of 42 additional channels in the UHF, to hear evidence on "stratovision" (broadcasting from planes) and "polycasting" (community service by various low-powered stations), and the introduction of information and proposals for a color system. It was proposed to base the new allocation table and standards on the latest available technical information in order to provide a satisfactory television service giving the maximum coverage. To insure that any standards adopted for black-and-white television would not adversely affect future color television, it was further proposed to consider only color systems which could operate in a 6-megacycle channel (the same as for black and white).

At the end of the year, this important hearing was not yet concluded except for the color phase which began September 26, 1949, and was completed May 26, 1950, except for final filings up to July 10. Nearly 10,000 pages of color testimony were taken from experts in the television industry. The Commission witnessed the proposed color systems of the Columbia Broadcasting System, Inc., the Radio Corp. of America, and Color Television, Inc. All three systems were in various stages of development and could operate in the prescribed 6 megacycles. A decision on the color phase of the proceeding was to be rendered before the other issues in the hearing would be taken up.

3. STANDARD (AM) BROADCAST SERVICE

EXPANSION AND OTHER DEVELOPMENTS

The fiscal year witnessed continued interest in standard (AM) broadcast and demand for new outlets. At its close, the number of

outstanding authorizations had climbed to 2,303, which was an increase of 124 over the previous year. For the first time the number of licensed AM stations passed the 2,000 mark. They totaled 2,118, or 155 more than in 1949.

Most of this expansion took place outside of the metropolitan districts, particularly in communities which did not have local AM stations previously. Since the close of the last war, approximately three-quarters of all new AM authorizations have been made in the smaller communities, and more than half in communities which had no local outlets at the end of the war.

There was an increase over the previous year in both number of applications for new stations and in number of applications for major changes in facilities. The Commission was still able to process applications at a somewhat higher rate than they were filed and thereby make a fairly substantial reduction in the backlog.

The Commission staff reorganization contemplates the establishment of a broadcast bureau wherein legal, engineering, and accounting personnel will all be responsible to one bureau chief. Preparatory changes have already been effected. The old standard broadcast and FM broadcast engineering divisions have been incorporated into one division, now known as the Aural Broadcast Division.

A number of significant rule changes have been made which are primarily designed to simplify procedures and include changes which eliminate the requirement for formal applications for stations originating programs to be transmitted to foreign broadcast stations for rebroadcast in those cases where the same program is broadcast by a United States station.

Other changes in rules and standards included the adoption of a simplified form for certain pro forma transfers of control or assignments of license; inclusion of a map of ground conductivity in Canada to aid in estimating interference between United States and Canadian stations; and streamlining the administrative procedures involved in the transition time between completing construction of facilities and granting of a license.

A solution to a long standing difficult problem was proposed (docket 9671) in the form of a new set of rules specifying the conditions under which antennas of a certain height would be considered as not constituting a hazard to air navigation. The proposal, the result of lengthy discussion with the Civil Aeronautics Administration and military agencies, was released on May 23, 1950 for public comment and had not yet been adopted.

CLEAR CHANNELS

Action in the clear channel hearing (docket 6741), for which the record was closed in October 1947, and with which is consolidated the daytime skywave hearing (docket 8333), was held in abeyance during the year. It involves questions which are intimately tied in with those encountered in the negotiations for a new North American Regional Broadcasting Agreement since the latter is concerned to a large extent with exclusive rights on and the sharing of the so-called clear channels.

The need for clear channels arises indirectly from the fact that 47 of the 106 broadcast channels are used for service to cities and towns by numerous stations of medium or low power. Their unavoidable mutual interference, particularly at night when signals are propagated over long distances by means of skywaves, restricts their service to a relatively few miles from the transmitter. Hence the remaining 59 channels are used for wide area coverage by one, two, or perhaps three high-powered stations whose signals are relatively free from interference, so that persons not residing in or near cities where a broadcast station is located may have some radio service. Dividing up the available clear channel assignments between the several countries thus is a major issue in the regional conference and the decisions reached there will have an important effect on the decision in the clear channel hearing.

NORTH AMERICAN REGIONAL BROADCASTING CONFERENCE

Because radio signals ignore political boundaries, the question of interference from stations of one country with the stations in another country rapidly became acute as the number of broadcast stations increased. Piecemeal efforts at abatement by bilateral arrangements with neighboring countries gave way in 1937 to the signing of the first North American Regional Broadcasting Agreement (NARBA) which included Mexico, Cuba, Haiti, the Dominican Republic, and all countries to the north. It became effective in 1941 and by its own terms expired in 5 years, in 1946. An interim agreement was effected in 1946 which extended the terms of the first NARBA for 3 years until March 28, 1949, making certain new priorities for the benefit of Cuba. It also established a timetable for the negotiations of a new agreement.

This timetable was extended by mutual agreement of the countries, although Cuba could not agree to her adherence to the terms of the interim agreement beyond the 3-year period. Thus, when the third NARBA conference opened in Montreal on September 13, 1949, Cuba

already had made a number of assignments which were inconsistent with the terms of the old agreement. Mexico, at the last minute, notified the other countries that she would be unable to attend the conference and Haiti was also not represented, but the other signatories decided to proceed nevertheless, making provision that Mexico and Haiti could adhere to it at a later date. The United States delegation was headed by FCC Commissioner Rosel H. Hyde with the Honorable Fletcher Warren, United States Ambassador to Paraguay, as special consultant. There were 18 other Government members and 27 industry members accredited by the Department of State.

The conference drafted the administrative sections of the new treaty which concerned the methods of establishing priorities, the method of reporting and handling interference cases, the duration of the agreement and the method of its renewal. However, no agreement was reached on the basic problem of the degree of protection from interference to be afforded to stations of the various categories, particularly with respect to the sharing by Cuba, Dominican Republic, and Jamaica of the clear channels on which the United States had heretofore enjoyed exclusive or nearly exclusive use. Under the advice of the Department of State, the United States delegation agreed to suspension of the deliberations on December 8 in order that Cuba and the United States could undertake bilateral conversations in Havana beginning in February 1950.

The initial phases of the Havana discussion indicated that an agreement on station assignments in Cuba might be reached which would avoid the obstacles which proved insurmountable in Montreal. A document embodying the essentials of an arrangement was submitted by the United States delegation to the Cuban delegation, which indicated its acceptability in principal. The United States delegation was entrusted with the preparation of a document that would specify the scope and effect of the proposed arrangement and fill in the detailed specifications regarding mutual protection from interference. When this document was received by the Cuban delegation, the latter advised the United States delegates that it did not accord with their understanding of the first document. The Cuban delegates in turn prepared a draft of the proposed arrangement as they understood it. It embodied certain reservations concerning its effectiveness not contemplated by the United States delegates during the preceding conversations, as well as a number of differences in the details. Since part of the problem involved the question of the effect of the proposed Cuban assignments on Mexican priorities, which was unanswerable in the absence of Mexican representation, and since the total discrepancy be-

tween the United States and Cuban proposals was quite large, it seemed advisable to the United States delegation to postpone further efforts at agreement until the full conference reconvened. Accordingly, the delegation returned to Washington after more than 7 weeks in Havana.

The second session of the third NARBA conference is scheduled, by mutual agreement between all countries of the region, to open on September 6, 1950, in Washington. As of June 30, 1950, all countries have signified their intention to attend. Meanwhile, between sessions of the conference, the chairman of the United States delegation is keeping in close touch with the interested segments of the broadcasting industry through a Government-industry NARBA preparatory committee.

4. FREQUENCY MODULATION (FM) BROADCAST SERVICE

Although the number of FM broadcast stations on the air decreased by 46 during the year, leaving a total of 691 in operation as of June 30, 1950, the number of licensed FM stations increased from 377 to 493. Also, FM broadcasting service continued available over most of the eastern half of the United States, over most of the west coast area, and in a number of cities and adjacent rural areas in the West. It was estimated that more than 100,000,000 people live within range of one or more FM stations. The stations which are in operation provide high-quality reception which is static-free and fade-free in character.

The rate of filing new FM applications remained low. During the year, only 16 applications for new FM stations were filed. However, many FM modification applications were filed to make changes in previous authorizations to increase power or decrease power, to change location or frequency, or to make other changes. Many of these represented a revision of earlier plans because of economic factors, while others sought improved facilities made available by the decrease in stations authorized.

Also, the total number of FM stations authorized decreased from 856 to 732. This reduction was largely due to economic problems and uncertainties occasioned by the rapid growth of television and the limited number of satisfactory FM receivers which have been purchased and placed in use.

FM receiver production and sales continued to be slow. At the end of the fiscal year, approximately 5,500,000 FM receivers were in use. Small inexpensive receivers providing FM reception only were a moderately popular item. Some television receivers tune the FM band;

however, the percentage is small. Since the FM and TV services operate in the same general frequency range, it is possible to provide FM broadcast reception in TV receivers at very little increase in cost.

Under the Commission's rules, FM stations operated in conjunction with AM stations may employ duplicate or separate programming of the two stations or a combination of the two. In most cases fully duplicated programming is chosen.

Due to the noise-free characteristics of FM reception, many FM stations rebroadcast the programs of others and thereby form regional networks without the use of wire facilities. In one instance 11 stations are combined in a network extending for more than 500 miles. The programs are relayed entirely by means of radio.

5. NONCOMMERCIAL EDUCATIONAL FM BROADCAST SERVICE

Interest in this field has continued to increase and 82 stations were authorized at the end of the fiscal year as compared with 58 in 1949.

Much of the activity centers around the low-power (10 watt) stations which cover a radius of from 2 to 5 miles and which can be built for $2,000 to $3,000 if studio facilities are available. (If studio facilities are required the minimum cost is usually increased by another $1,000 or more.) These can later be built into higher powered stations.

To facilitate the operation of these 10-watt stations, the Commission in June 1950, announced a new grade of radio operator's license—the radiotelephone third-class operator permit—to become effective September 1, 1950. An operator must have basic radiotelephone operating practice, but is not required to be an expert in radio theory.

At the request of the Department of State, the Commission set aside a noncommercial educational FM channel for the United Nations headquarters in New York City.

A considerable number of educational institutions are also licensed in the AM broadcast service, but in the standard band no distinction is made insofar as Commission rules are concerned between licenses issued educational institutions and those issued to the more numerous commercial operators. It is only in the FM band that a portion of the band has been set aside for use by educational institutions and special rules established to promote the particular noncommercial type of operation that is advantageous to these institutions. However, educators have requested an allocation of TV frequencies for their particular use.

6. FACSIMILE BROADCAST SERVICE

Commission rules provide that FM broadcast stations may conduct facsimile broadcasting, and a few FM stations carried on facsimile

service during the year. In some instances FM stations operated facsimile on a temporary basis for experimental and exhibition purposes.

Facsimile transmission of printed matter and pictures is received by recorders attached to FM broadcast receivers. This may be accomplished on either a simplex or multiplex basis. When using simplex facsimile the regular aural FM program is not transmitted, but with multiplex operation both are transmitted simultaneously. It is, of course, preferable that multiplex operation be employed so that there will be no interruption of the aural programs. In December 1949, the Commission conducted a hearing to determine whether additional multiplex standards should be adopted and multiplex operation permitted without limitation on hours during the broadcast day. Decision was pending at the close of the year.

7. INTERNATIONAL BROADCAST SERVICE

The number of stations in this country engaged in international broadcasting increased from 37 to 40 during the fiscal year. Though licensed by the Commission, these stations operate under the auspices of the Department of State. Shortwave transmitters located near New York, Boston, Cleveland, and San Francisco daily beam "The Voice of America" programs in a score of languages to various parts of the world.

8. REMOTE PICKUP BROADCAST SERVICE

Remote pickup broadcast stations, employing portable or mobile transmitters of low power and generally self-powered, are used to provide temporary aural program circuits from points away from regularly maintained studios to a broadcast station. They are employed in the origination of on-the-spot broadcasts of sporting events, parades, fairs, and other special events. Since these transmitters are often mounted in automobiles and light trucks, they can also provide emergency communication during the disruption of normal circuits as the result of floods, storms, or other disasters.

During the past year the rules governing this service were revised pursuant to frequency-service allocation proceedings consummated July 1, 1949, and expanded to meet certain requirements of the growing TV and FM broadcast services.

Amendment of the rules made it possible to place on a formal licensed basis a number of stations that had been operating under special temporary authority. This, together with the demands of an expanding broadcast service, has resulted in a large increase in the number of stations in the remote pickup service during the past year, and this growth is expected to continue.

9. ST (STUDIO-TRANSMITTER) BROADCAST SERVICE

ST broadcast stations are used to provide a program circuit between the main studio and the transmitter of FM broadcast stations. The use of radio for this purpose permits locating FM broadcast transmitters at highly favorable locations that may be inaccessible to ordinary wire lines. Operated in the 940 to 952 megacycle portion of the UHF spectrum and required to employ directional antennas, they not only serve a real need of the broadcast industry with maximum spectrum economy but also act as a proving ground for equipment that may be used by other domestic fixed services in this portion of the spectrum.

During the year the Commission proposed rules that would extend the availability of this service on frequencies in a portion of the ISM (industrial, scientific, and medical) band, 890–940 megacycles, to AM broadcast stations which may be faced by problems similar to those frequently encountered by FM broadcast stations and would also permit FM broadcast stations to employ studio-transmitter links at studios other than the main studio if frequencies are available. This proposal was awaiting final action.

10. DEVELOPMENTAL BROADCAST SERVICE

Developmental broadcast stations are licensed experimentally to carry on development and research, primarily in radiotelephony, for the advancement of the broadcasting services. They are used extensively by manufacturers in the development and testing of transmitters and antennas designed for use in the broadcast or auxiliary broadcast services. Among projects conducted during the year was the development of low-powered FM transmitters for use by noncommercial educational FM broadcast stations and experimentation with remote pickup equipment designed for use in the newly allocated 450-megacycle band. Such stations are also used in propagation studies and the data thus accumulated adds to the fund of knowledge required by the Commission in the orderly administration of its functions.

11. STATISTICS

BROADCAST AUTHORIZATIONS

As of June 30, 1950, there were 4,510 broadcast authorizations outstanding, an increase of 425 over the previous year. A breakdown by broadcast services follows:

Class of broadcast station	June 30, 1949	June 30, 1950	Increase or decrease
Standard (AM)	2,179	2,303	124
Frequency modulation (FM)	865	732	(−133)
Television (TV)	117	109	(−8)
Television (experimental)	205	206	1
Noncommercial educational (FM)	58	82	24
Facsimile	2	[1] 0	[1](−2)
International	37	40	3
Remote pickup	580	1,003	423
Studio transmitter (ST)	28	29	1
Developmental	14	6	(−8)
Total	4,085	4,510	425

[1] Commercial facsimile broadcasting is now authorized over FM broadcast facilities.

Broadcast authorizations by States and cities

Texas leads all States in the total number of broadcast station authorizations, according to a tabulation of Federal Communications Commission records of June 7, 1950. As of that date, Texas had 222 AM, FM, and TV authorizations collectively; California came second with 219.

Texas and California likewise topped the AM list, with 183 and 143 such authorizations, respectively; and Pennsylvania was third with 111. Puerto Rico's 25 AM authorizations was more than any of 15 States.

Pennsylvania had the most FM authorizations—67, commercial and educational—followed by 65 for California, 62 for New York and 51 each for Illinois and Ohio. Commercial FM authorizations showed 63 for Pennsylvania, 58 for California, and 56 for New York State. In the noncommercial educational FM field, California had 7 such authorizations, and Indiana, New York, Ohio, and Wisconsin 6 each.

The television list was led by New York, Ohio, and California, in that order, with 13, 12 and 11 TV stations respectively.

Cities with 10 or more broadcast stations, including noncommercial educational, totaled 36. In number of AM, FM, and TV stations collectively, New York led with 35, with Chicago's 34 a close second.

New York had the most commercial FM outlets—14; Chicago second with 13. Eight cities had more FM (commercial and educational) than AM grants (New York, San Francisco, Washington, Baltimore, Pittsburgh, Detroit, Columbus, and Madison), and two cities had as many FM as AM grants (Boston and Dallas).

Chicago led with 16 AM stations, followed by New York with 14, Los Angeles 13, and 10 each for Philadelphia, Minneapolis-St. Paul, Portland, and New Orleans.

Los Angeles headed the TV list with 7 stations; New York 6 and 4 each for Chicago and Washington, D. C.

A breakdown of broadcast authorizations by States and cities follows:

Broadcast authorizations by States

	AM	FM		TV	Total
		Commercial	Educational		
Alabama	71	14	1	2	88
Arizona	25	0	2	1	28
Arkansas	34	7	0	0	41
California	143	58	7	[1] 11	219
Colorado	35	3	0	0	38
Connecticut	27	11	0	1	39
Delaware	5	3	0	1	9
District of Columbia	7	8	0	4	19
Florida	75	21	1	3	100
Georgia	76	22	1	3	102
Idaho	22	3	0	0	25
Illinois	74	46	5	5	130
Indiana	45	20	6	2	73
Iowa	52	20	2	2	76
Kansas	39	6	1	0	46
Kentucky	43	12	3	2	60
Louisiana	42	16	2	1	61
Maine	16	2	0	0	18
Maryland	22	18	0	3	43
Massachusetts	51	28	2	2	83
Michigan	63	25	4	6	98
Minnesota	49	10	2	2	63
Mississippi	43	5	1	0	49
Missouri	51	15	2	2	70
Montana	25	0	0	0	25
Nebraska	22	3	0	2	27
Nevada	10	1	0	0	11
New Hampshire	12	4	0	0	16
New Jersey	20	13	2	1	36
New Mexico	25	0	1	1	27
New York	95	56	6	13	170
North Carolina	93	42	2	2	139
North Dakota	14	0	0	0	14
Ohio	69	45	6	12	132
Oklahoma	46	10	3	2	61
Oregon	43	8	2	0	53
Pennsylvania	111	63	4	7	185
Rhode Island	11	5	1	1	18
South Carolina	42	11	0	0	53
South Dakota	14	1	0	0	15
Tennessee	57	13	1	2	73
Texas	183	29	4	6	222
Utah	18	3	1	2	24
Vermont	9	0	0	0	9
Virginia	57	20	0	2	79
Washington	53	7	1	1	62
West Virginia	38	15	0	1	54
Wisconsin	55	18	6	1	80
Wyoming	13	0	0	0	13
Alaska	10	0	0	0	10
Hawaii	12	0	0	0	12
Puerto Rico	25	0	0	0	25
Virgin Islands	3	0	0	0	3
Grand totals	2,295	740	82	109	3,226

[1] Includes 1 experimental authorization operating on commercial basis.

Broadcast authorizations by cities with 10 or more stations

	AM	FM		TV	Total
		Commercial	Educational		
New York	14	14	1	6	35
Chicago	16	13	1	4	34
Los Angeles	13	7	1	[1] 7	28
Philadelphia	10	8	1	3	22
San Francisco	8	8	1	3	20
Washington	7	8	0	4	19
Boston	8	6	2	2	18
Minneapolis-St. Paul	10	4	2	2	18
New Orleans	10	6	1	1	18
Baltimore	6	8	0	3	17
Pittsburgh	7	8	1	1	17
Atlanta	7	5	1	3	16
Cleveland	7	5	1	3	16
Detroit	5	6	1	3	15
Portland (Oreg.)	10	5	0	0	15
Dallas	6	5	1	2	14
Louisville	7	3	2	2	14
Seattle	9	4	0	1	14
Columbus	4	5	1	3	13
Houston	8	3	1	1	13
Madison (Wis.)	4	4	5	0	13
Providence	7	4	1	1	13
San Antonio	8	3	0	2	13
Cincinnati	5	4	0	3	12
Jacksonville	7	3	0	2	12
Miami	6	4	1	1	12
Birmingham	7	2	0	2	11
Buffalo	6	4	0	1	11
Oklahoma City	7	3	0	1	11
Richmond	6	4	0	1	11
Denver	7	3	0	0	10
Des Moines	6	4	0	0	10
Milwaukee	7	2	0	1	10
St. Louis	7	1	1	1	10
Syracuse	5	2	1	2	10
Tulsa	6	2	1	1	10

[1] Includes 1 experimental authorization operating on commercial basis.

BROADCAST DISTRIBUTION

GENERAL

The more than 3,100 authorized commercial AM, FM, and TV broadcast stations at the close of the fiscal year were distributed throughout nearly 1,300 communities in the United States and its possessions. All but 20 of these communities had at least one authorized AM station. The remaining 20 communities had FM authorizations only. A total of 384 communities had one or more authorized FM stations, and 66 cities had TV authorizations.

In addition, there were 35 AM stations and 82 FM stations engaged in or planning noncommercial operation. All but 16 of these 117 nonprofit authorizations were in communities which had commercial broadcast operation.

AM EXPANSION IN SMALL COMMUNITIES

During fiscal 1950, AM broadcast stations continued to expand in the small and medium sized nonmetropolitan communities. The table below shows the number and percent of communities of specified population size in the United States having one or more authorized commercial AM stations on October 8, 1945 when the Commission

resumed its peacetime licensing procedures, on December 31, 1948 and on June 30, 1950:

Population	Total number of communities (1940 Census) [1]	Number and percent of communities with 1 or more authorized commercial AM broadcast stations					
		On Oct. 8, 1945		On Dec. 31, 1948		On June 30, 1950	
		Number	Percent	Number	Percent	Number	Percent
2,500 to 5,000	1,134	27	2.4	[2] 218	19.2	[3] 282	24.9
5,000 to 10,000	678	86	12.7	311	45.9	356	52.5
10,000 to 25,000	413	204	49.5	330	79.9	350	84.7
25,000 to 50,000	122	109	89.3	123	100.0	124	100.0
Over 50,000	140	140	100.0	140	100.0	140	100.0
Total	2,487	566	22.8	1,122	45.1	1,252	50.3

[1] The number of communities in each of the population groupings under 50,000 is derived from the 1940 census data and excludes communities forming part of metropolitan districts. Each metropolitan district is counted as a single community and is defined as including a central city or cities with a population of 50,000 or more and all adjacent and contiguous areas having a population of 150 or more persons per square mile. Based on the 1940 census, there are 140 metropolitan districts in the United States.
[2] Includes 52 communities of less than 2,500 population.
[3] Includes 73 communities of less than 2,500 population.

A total of 23 communities in United States possessions had one or more authorized commercial AM stations as of June 30, 1950. Of these, 6 were in Alaska, 5 in Hawaii, 10 in Puerto Rico, and 2 in the Virgin Islands.

As of June 30, 1950, a total of 897 communities or 71.6 percent of all communities in the United States with one or more authorized commercial AM stations had only one AM station. In addition, 825 AM stations or 37.2 percent of the total of AM stations authorized were located in the 140 metropolitan districts.

The table below shows the number of United States communities of specified population size having specified numbers of AM stations on June 30, 1950:

Population	Total number of communities (1940 census)	Number of communities with 1 or more authorized commercial AM stations	Percent of total	Number of communities having—						
				1 station	2 stations	3 stations	4 stations	5 stations	6 stations	7 or more stations
2,500 to 5,000	1,134	[1] 282	24.9	276	6	----	----	----	----	----
5,000 to 10,000	678	356	52.5	332	22	2	----	----	----	----
10,000 to 25,000	413	350	84.7	240	98	10	1	1	----	----
25,000 to 50,000	122	124	100.0	47	41	27	7	2	----	----
Over 50,000	140	140	100.0	2	7	29	29	21	14	38
Total number of communities	2,487	1,252	50.3	897	174	68	37	24	14	[2] 38
Total number of stations	----	[3] 2,218	----	897	348	204	148	120	84	417

[1] Includes 73 communities of less than 2,500 population.
[2] Of the 38 communities with 7 or more stations, 9 had 7 stations; 7 had 8 stations; 3 had 9 stations; 9 had 10 stations; and 10 had 11 or more stations.
[3] Does not include 85 authorized AM stations as follows: 35 operating noncommercially and 50 located in United States possessions.

Twenty-three communities in United States possessions had 50 AM stations distributed as follows: 11 had 1 station; 6 had 2 stations; 3 had 3 stations; 1 had 5 stations; 1 had 6 stations; and 1 had 7 stations.

FM BROADCAST DISTRIBUTION

Of the 732 commercial FM broadcast stations authorized as of the close of the fiscal year, 598 or 81.7 percent were authorized to licensees of AM stations in the same community. The following table presents the number of United States communities of population classification having specified numbers of authorized FM stations on June 30, 1950:

Population	Total number of communities (1940 census)	Number of communities with 1 or more authorized commercial FM stations	Percent of total	Number of communities having—						
				1 station	2 stations	3 stations	4 stations	5 stations	6 stations	7 or more stations
2,500 to 5,000	1,134	[1] 21	1.9	20	1	------	------	------	------	------
5,000 to 10,000	678	40	5.9	40	------	------	------	------	------	------
10,000 to 25,000	413	122	29.5	115	7	------	------	------	------	------
25,000 to 50,000	122	77	63.1	57	18	2	------	------	------	------
Over 50,000	140	124	88.6	29	33	25	14	6	6	11
Total number of communities	2,487	384	15.4	261	59	27	14	6	6	[2] 11
Total number of stations	------	732	------	261	118	81	56	30	36	150

[1] Includes 13 communities of less than 2,500 population.
[2] Of the 11 communities with 7 or more stations, 1 had 7 stations, 2 had 8 stations, 1 had 9 stations, and 7 had 10 or more stations.

Thus, of the 1,272 radio communities in the United States with one or more authorized standard AM or FM broadcast stations, 384 or 30.2 percent had at least one FM station. In addition, of the 732 FM stations a total of 442 or 60.4 percent were located in the 140 metropolitan districts.

No FM stations were authorized in the territories of the United States as of June 30, 1950.

TV BROADCAST DISTRIBUTION

As of June 30, 1950 the 109 authorized TV broadcast stations were distributed in 66 different cities containing approximately half of the Nation's families. These cities were:

Birmingham, Ala.
Phoenix, Ariz.
Los Angeles, Calif.
San Diego, Calif.
San Francisco, Calif.
New Haven, Conn.
Wilmington, Del.
Washington, D. C.
Jacksonville, Fla.
Miami, Fla.
Atlanta, Ga.
Chicago, Ill.
Rock Island, Ill.
Bloomington, Ind.
Indianapolis, Ind.
Ames, Iowa
Davenport, Iowa
Louisville, Ky.
New Orleans, La.
Baltimore, Md.
Boston, Mass.
Detroit, Mich.
Grand Rapids, Mich.
Kalamazoo, Mich.
Lansing, Mich.
Minneapolis, Minn.
St. Paul, Minn.
Kansas City, Mo.
St. Louis, Mo.
Omaha, Nebr.
Newark, N. J.
Albuquerque, N. Mex.
Binghamton, N. Y.
Buffalo, N. Y.
New York, N. Y.
Rochester, N. Y.
Schenectady, N. Y.
Syracuse, N. Y.
Utica, N. Y.
Charlotte, N. C.
Greensboro, N. C.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
Dayton, Ohio

Toledo, Ohio	Pittsburgh, Pa.	San Antonio, Tex.
Oklahoma City, Okla.	Providence, R. I.	Salt Lake City, Utah
Tulsa, Okla.	Memphis, Tenn.	Norfolk, Va.
Erie, Pa.	Nashville, Tenn.	Richmond, Va.
Johnstown, Pa.	Dallas, Tex.	Seattle, Wash.
Lancaster, Pa.	Fort Worth, Tex.	Huntington, W. Va.
Philadelphia, Pa.	Houston, Tex.	Milwaukee, Wis.

BROADCAST INDUSTRY FINANCIAL DATA

GENERAL

The following tables show the comparative calendar year 1948–49 financial data for the AM, FM, and TV broadcast industries:

Item	1948	1949	Percent increase or (decrease)
Revenues:	[$ millions]	[$ millions]	
AM-FM	$408.1	$415.2	1.7
TV	8.7	34.3	294.3
Total	416.8	449.5	7.8
Expenses:			
AM-FM	347.1	362.6	4.5
TV	23.6	59.6	152.5
Total	370.7	422.2	13.9
Income: [1]			
AM-FM	61.0	52.6	13.8
TV	14.9	25.3	----------
Total	46.1	27.3	40.8

[1] Before Federal income tax.

Comparative 1948–49 data for AM and TV operations of Nation-wide networks

(including their owned and operated stations)

Item	1948	1949
Revenues:	[$ millions]	[$ millions]
AM	$104.0	$103.9
TV	4.8	18.9
Total	108.8	122.8
Expenses:		
AM	86.3	85.8
TV	11.2	30.6
Total	97.5	116.4
Income: [1]		
AM	17.7	18.1
TV	[2] 6.4	[2] 11.7
Total	11.3	6.4

[1] Before Federal income tax. [2] Deficit.

NOTE.—The 4 Nation-wide AM networks (ABC, CBS, MBS, and NBC) owned and operated a total of 17 stations in 1948 and 1949. The 4 TV networks (ABC, CBS, Dumont, and NBC) owned and operated a total of 10 stations in 1948 and 13 stations in 1949. Some networks indicated that expense allocations between AM and TV operations were not complete to the extent that certain indirect operating expenses of TV are included under AM operations.

STANDARD BROADCAST (AM) FINANCIAL DATA

The distribution of broadcast revenues and broadcast income (before Federal income taxes) as between networks and stations for the calendar years 1948 and 1949 is shown in the following table:

Distribution of (AM) broadcast revenues and income (before Federal income taxes)

Item	4 nation-wide networks and their 17 stations		3 regional networks and their 10 stations		All other stations [1]		Industry total	
	1948	1949	1948	1949	1948	1949	1948	1949
Revenues from network time sales	$88,273,588	$86,401,088	$2,692,619	$1,959,184	$50,086,146	$46,538,053	$141,052,353	$134,898,325
Revenues from sale of time to national and regional advertisers and sponsors	15,118,952	16,763,960	1,260,124	1,269,055	88,380,685	90,281,492	104,759,761	108,314,507
Revenues from sale of time to local advertisers and sponsors	4,891,375	4,989,432	1,521,791	1,481,059	164,494,999	175,673,810	170,908,165	182,144,301
Revenues from total time sales	108,283,915	108,154,480	5,474,534	4,709,298	302,961,830	312,493,355	416,720,279	425,357,133
Commissions paid to representatives, etc	23,595,353	22,826,553	943,677	910,163	25,753,251	26,570,967	50,292,281	50,307,683
Incidental broadcast revenues:								
Revenues from sale of talent, etc	9,840,499	10,496,580	292,669	134,540	12,063,101	11,367,149	22,196,269	21,998,269
Furnishing material or service	4,446,716	3,642,034	1,701	946	5,640,612	5,816,908	10,089,029	9,459,888
Other incidental revenues	5,065,239	4,459,515	165,559	219,027	3,051,320	2,598,484	8,282,118	7,277,026
Total broadcast revenues	104,041,016	103,926,056	4,990,786	4,153,648	297,963,612	305,704,929	406,995,414	413,784,633
Total broadcast expenses	86,252,005	85,858,668	4,694,606	4,747,280	251,957,119	266,915,770	342,903,730	357,521,718
Total broadcast income or loss	17,789,011	18,067,388	296,180	(593,632)	46,006,493	38,789,159	64,091,684	56,262,915
Investment in tangible broadcast property:								
Original cost	25,349,620	23,164,616	4,981,876	4,930,738	[2] 171,469,479	[2] 200,491,681	201,800,975	230,587,035
Depreciation to date	13,832,180	14,806,195	1,517,232	1,696,588	51,480,114	64,009,960	66,829,526	80,512,743
Depreciated cost	11,517,440	10,358,421	3,464,644	3,234,150	119,989,365	136,481,721	134,971,449	150,074,292

[1] Includes 1,797 stations in 1948 and 1,993 stations in 1949.
[2] Data available from 1,795 stations in 1948 and 1,998 stations in 1949.

Distribution of total (AM) broadcast revenues, 1949

	Amount	Percent of total
4 Nation-wide networks and their 17 owned and operated stations	$102, 926, 056	25. 1
3 regional networks and their 10 owned and operated stations	4, 153, 648	1. 0
1,993 other stations	305, 704, 929	73. 9
Total broadcast revenues	413, 784, 633	100. 0

Distribution of (AM) broadcast income (before Federal income taxes)

	Amount	Percent of total
4 Nation-wide networks and their 17 owned and operated stations	$18, 067, 388	31. 8
3 regional networks and their 10 owned and operated stations	(593, 632)	
1,993 other stations	38, 789, 159	68. 2
Total broadcast income	56, 262, 915	100. 0

Comparative data for 1948–49 are presented below for identical AM stations which were in operation for both full years, i. e., stations which did not change their status during the period with respect to class, time, and whether or not affiliated with a network. The data

AM broadcast stations (excluding 11 key stations of Nation-wide networks	1948	1949	Percent increase or (decrease)
Averages per station:			
Clear channel 50-kilowatt unlimited:			
Number of stations, 53 [1]			
Total broadcast revenues	$1, 119, 612	$1, 083, 585	(3. 22)
Total broadcast expenses	823, 446	807, 396	(1. 95)
Broadcast income	296, 166	276, 189	(6. 75)
Clear channel 5–25-kilowatt unlimited:			
Number of stations, 34			
Total broadcast revenues	349, 768	334, 694	(4. 31)
Total broadcast expenses	302, 280	288, 256	(4. 64)
Broadcast income	47, 488	46, 438	(2. 21)
Clear channel 5–25-kilowatt part-time:			
Number of stations, 3			
Total broadcast revenues	152, 662	166, 309	8. 94
Total broadcast expenses	130. 172	148, 962	14. 43
Broadcast income	22. 490	17, 347	(22. 87)
Regional unlimited:			
Number of stations, 436			
Total broadcast revenues	263, 511	260, 442	(1. 17)
Total broadcast expenses	214, 708	218, 617	1. 82
Broadcast income	48, 803	41, 825	(14. 30)
Regional part-time:			
Number of stations, 284			
Total broadcast revenues	88, 214	96, 721	9. 64
Total broadcast expenses	85, 785	92, 912	8. 31
Broadcast income	2, 429	3, 809	56. 81
Local unlimited:			
Number of stations, 706			
Total broadcast revenues	91, 447	90, 973	(. 52)
Total broadcast expenses	80, 614	83, 494	3. 57
Broadcast income	10, 833	7, 479	(30. 96)
Local part-time:			
Number of stations, 105			
Total broadcast revenues	58, 074	64, 452	10. 98
Total broadcast expenses	54, 910	62, 504	13. 83
Broadcast income	3, 164	1, 948	(38. 43)
All stations:			
Number of stations, 1,621			
Total broadcast revenues	174, 147	173, 550	(. 34)
Total broadcast expenses	144. 951	148, 213	2. 25
Broadcast income	29, 196	25, 337	(13. 22)

[1] Includes 2 stations clear channel 50 kilowatts part-time.

are shown in terms of average per station of broadcast revenues, expenses, and income (before Federal incomes taxes) for each class of station and exclude the Nation-wide networks and their 11 key stations.

FM BROADCAST FINANCIAL DATA

TOTAL FM BROADCAST REVENUES

	1948		1949	
	Number of stations	Total FM revenues	Number of stations	Total FM revenues
FM stations operated by:				
AM Licensee:		*Millions*		*Millions*
Joint AM-FM operation	516	None	452	None
Separate FM operation	77	$0.6	167	$1.2
Non-AM licensee	89	1.1	114	1.6
Total FM stations	682	1.7	733	2.8

TOTAL FM BROADCAST EXPENSES

FM stations operated by:				
Non-AM licensees	89	$4.2	114	$5.1
Industry total		(1)		(1)

TOTAL FM BROADCAST INCOME (BEFORE FEDERAL INCOME TAX)

FM stations operated by:				
Non-AM licensees	89	$(3.1)	114	$(3.5)
Industry total		(1)		(1)

( ) Denotes loss.

[1] AM licensees operating FM stations reported FM station revenues, if any, separately from AM station revenues. In view of the difficulty of making allocations as between AM expense and FM expense, such licensees were not requested to report separately their FM station expenses. Thus, data with respect to FM expense and income (or loss) are available only for FM stations operated by non-AM licensees.

TV BROADCAST FINANCIAL DATA

The following table shows financial data for the television industry for the calendar year 1949.

Item	4 networks and their 13 owned and operated stations	85 other stations [1]	Industry total
Revenues from network time sales	$8,862,399	$1,933,113	$10,795,512
Revenue from sale of time to national and regional advertisers and sponsors	2,965,594	4,309,419	7,275,013
Revenues from sale of time to local advertisers and sponsors	2,295,468	7,164,140	9,459,608
Total revenues from time sales	14,123,461	13,406,672	27,530,133
Commissions paid to representatives, etc.	2,273,333	1,805,394	4,078,727
Incidental broadcast revenues:			
Revenues from sale of talent, etc	4,490,492	1,521,237	6,011,729
Furnishing material or service	2,005,437	1,396,458	3,401,895
Other incidental revenues	547,983	916,943	1,464,926
Total broadcast revenues	18,894,040	15,435,916	34,329,956
Total broadcast expenses	30,635,895	28,956,011	59,591,906
Total broadcast loss	(11,741,855)	(13,520,095)	(25,261,950)
Investment in tangible broadcast property:			
Original cost	19,084,764	36,790,819	55,875,583
Depreciation to date	4,350,273	6,583,841	10,934,114
Depreciated cost	14,734,491	30,206,978	44,941,469

[1] 1 station was an experimental station operating commercially.

Total TV broadcast revenues almost quadrupled between 1948 and 1949. Revenues for the networks and their owned and operated stations and revenues for all other operating stations also increased by the same amount. The following table presents the 1948–49 comparative financial data for the TV broadcast industry:

Item	Networks and their owned and operated stations [1]			All other stations [2]			Industry total		
	1948	1949	Percent change	1948	1949	Percent change	1948	1949	Percent change
	Millions	*Millions*		*Millions*	*Millions*		*Millions*	*Millions*	
Total broadcast revenues	$4.8	$18.9	293.8	$3.9	$15.4	294.9	$8.7	$34.3	294.3
Total broadcast expenses	11.2	30.6	173.2	12.4	29.0	133.9	23.6	59.6	152.5
Total broadcast loss	6.4	11.7	----	8.5	13.6	----	14.9	25.3	----
Investment in tangible broadcast property:									
Cost to respondent	12.1	19.1	57.9	15.8	36.8	132.9	27.9	55.9	100.4
Depreciation to date	2.3	4.3	87.0	2.1	6.6	214.3	4.4	10.9	147.7
Depreciated cost	9.8	14.8	51.0	13.7	30.2	120.4	23.5	45.0	91.5

[1] In 1948 the 4 networks (NBC, CBS, ABC, and DuMont) owned and operated a total of 10 stations; 1949 they owned and operated a total of 13 stations.
[2] Refers to 40 stations in 1948 and 85 stations in 1949.

Whereas in 1948 all networks and stations showed a loss from operations, in 1949 a total of three stations showed a profit from their operations.

Since the above trends reflect the operations of many stations which were in existence for only several months in 1948 or 1949, the data are not indicative of the experience of stations which were in operation for the full years 1948 and 1949. The following table presents comparative financial data in 1948–49 for 13 stations which were in operation for both full years:

Item	Aggregate		Average per station		Percent change
	1948	1949	1948	1949	
Total broadcast revenues	$2,794,374	$5,703,252	$214,952	$438,712	104.1
Total broadcast expenses	7,678,311	8,936,251	590,639	687,404	16.4
Total broadcast loss	4,883,937	3,232,999	375,687	248,692	----

NOTE.—Data excludes the operations of network owned and operated stations.

The proportion of television broadcast revenues to total aural (AM or FM) and video (TV) broadcast revenues in cities served by TV rose from 4.4 percent in 1948 to 10.7 percent in 1949. The following table presents the proportion of TV broadcast revenues to total aural and TV revenues in specified metropolitan districts in 1949. In addition, comparison is made of percentages of TV revenues to total aural and TV revenues for 1948 and 1949 in the same districts.

Metropolitan district	Number of stations		1949—Broadcast revenues [2]		Percent TV of total 1948	Percent TV of total 1949
	AM and FM [1]	TV	Total aural and TV	TV only		
			($000)	($000)		
Baltimore	12	3	$4,405	$916	7.5	20.8
Philadelphia	16	3	8,022	1,596	9.5	19.9
Washington, D. C.	17	4	5,364	1,057	7.7	19.7
Los Angeles	26	7	12,955	2,243	4.5	17.3
New York	37	7	30,291	5,111	8.2	16.9
Columbus, Ohio	5	3	1,656	210	0.0	12.7
Chicago	24	4	17,343	2,122	4.2	12.2
Detroit	12	3	8,526	940	3.4	11.0
Cleveland	9	3	5,020	491	1.7	9.8
Cincinnati	7	3	7,382	543	1.6	7.4
San Francisco	22	3	5,540	235	0.1	4.2
Total 11 TV metropolitan districts	187	43	106,504	15,464	[3] 5.6	14.5
47 other TV metropolitan districts [4]	309	55	95,489	6,179	[5] 2.0	6.5
Total 58 TV metropolitan districts [6]	496	98	201,993	21,643	[6] 4.4	10.7

[1] Jointly operated AM-FM stations counted as 1 station.
[2] Includes network owned and operated stations.
[3] Includes 10 TV metropolitan districts in 1948.
[4] Includes 2 nonmetropolitan communities: Albuquerque, N. Mex., and Bloomington, Ind.
[5] Includes 18 TV metropolitan districts in 1948.
[6] Includes 28 TV metropolitan districts in 1948.

BROADCAST APPLICATIONS

The Communications Act provides that the Commission "may grant licenses, renewals of licenses, and modifications of licenses only upon written application received by it." Consequently, a large part of the Commission's broadcast work involves the processing of applications by prospective and existing broadcasters.

Broadcast application statistics for the fiscal year follow:

AM broadcast applications

	Pending June 30, 1949	Received	Disposed	Pending June 30, 1950
New stations	382	242	347	277
Change in facilities	293	266	304	255
Renewals	201	743	706	238
License	92	381	400	73
Transfers	103	381	417	67
Miscellaneous	115	836	877	74
Total	1,186	2,849	3,051	984

FM broadcast applications

	Pending June 30, 1949	Received	Disposed	Pending June 30, 1950
New stations	65	16	64	17
Change in facilities	50	119	135	34
Renewals	21	154	150	25
License	89	139	188	40
Transfers	15	85	90	10
Miscellaneous	26	540	551	15
Total	266	1,053	1,178	141

TV broadcast applications

New stations	338	28	15	351
Change in facilities	14	26	23	17
Renewals	2	23	16	9
License	9	36	34	11
Transfers	10	15	22	3
Miscellaneous	13	179	186	6
Total	386	307	296	397

All other broadcast applications [1]

New stations	147	628	715	60
Change in facilities	13	141	146	8
Renewals	81	482	307	256
License	33	518	470	81
Transfers	40	85	94	31
Miscellaneous	4	168	155	17
Total	318	2,022	1,887	453

Total broadcast applications

New stations	932	914	1,141	705
Change in facilities	370	552	608	314
Renewals	305	1,402	1,179	528
License	223	1,074	1,092	205
Transfers	168	566	623	111
Miscellaneous	158	1,723	1,769	112
Total	2,156	6,231	6,412	1,975

[1] Includes noncommercial educational, facsimile, international, relay and studio link, experimental and developmental.

BROADCAST DELETIONS

There were 251 deletions of AM, FM, and TV broadcast authorizations during the year, which was 23 less than the year previous. Of this number, 173 were FM stations.

Deletions	AM	FM	TV	Monthly total
1950:				
June	10	14	0	24
May	4	16	0	20
April	1	13	0	14
March	10	15	1	26
February	6	9	0	15
January	1	22	1	24
1949:				
December	9	13	0	22
November	7	15	1	23
October	4	14	1	19
September	5	15	2	22
August	3	16	0	19
July	10	11	2	23
Total	70	173	8	251

ASSIGNMENTS AND TRANSFERS

	Pending July 1, 1949	Received	Disposed	Pending June 30, 1950
AM	103	381	417	67
FM	15	85	90	10
TV	10	15	22	3
Other	40	85	94	31
Total	168	566	623	111

CHAPTER V—RADIO OPERATORS

1. GENERAL

The more than 700,000 operators and stations authorized in these categories constitute the largest group which the Commission administers and covers all persons who personally operate radio transmitters. Included are those who make such operation their vocation as well as those who make it their avocation. It includes the civilian flyer who uses an aircraft radiotelephone and the ordinary citizen who may find radio convenient in his daily activities. The group increased by nearly 60,000 during the fiscal year.

The administrative problems involved in the regulation of these services are great both because of the numbers involved and because these services concern private individuals and, therefore, must face personal problems which are unique and special in each case.

The law requires the Commission to approve the operators of radio transmitting apparatus as well as radio stations as such. (Operators of receiving equipment only do not require Commission authorization.) In accordance with the Communications Act, the Commission prescribes the kinds and classes of radio operators and the qualifications they must possess as a basis for licensing. Examination for the various operator licenses are given regularly at the Commission's field offices and at regular intervals at examination points located throughout the United States (see list appended to this chapter).

2. COMMERCIAL RADIO OPERATORS

Commission supervision of commercial radio operators covers all radio services, both broadcast and nonbroadcast, including common carriers. The term "commercial radio operator" applies to all persons authorized to operate transmitters as part of their livelihood or vocation. There are several grades of commercial operator licenses, each conferring a different degree of operating authority according

to the demonstrated qualifications of the holder. The commercial operator class, therefore, embraces more than 400,000 persons who are generally employed, either part-time or full-time, for the operation of radio transmitters in the many classes of radio stations. Commercial radio operators constitute the largest group of licensees which the Commission regulates.

The duties of a commercial radio operator include not only the handling of communications, the adjustment of transmitters, and the keeping of station logs (if required), but also the performance of any technical duties which may affect the station's authorized operation. Some classes of stations require a fully qualified operator to perform all of these functions; other classes of stations may have such an operator only on call and its routine operation carried on by an operator of lesser qualifications.

It is the responsibility of the Commission to prescribe the qualifications of radio transmitter operators, and to classify and license them according to the duties to be performed. Commercial radio operators are basically classified as radiotelephone and radiotelegraph. There are several grades within each classification, each conferring a different degree of operating authority according to their demonstrated qualifications (and in some cases experience). This grading varies from authorized operation of the most powerful and complicated transmitters to limited and nontechnical operation of simple "push-button" installations.

Revision of the commercial operator examinations to bring them up to date was completed during fiscal 1949, together with several related changes in the commercial operator rules and license structures, and other changes were in prospect. Perhaps the most significant of the changes made was the adoption in May 1950, after hearings and oral argument extending from March 1948, of a final order prescribing the qualifications of persons who are to be permitted to perform or supervise tests and adjustments of ship radar installations during the installation, servicing or maintenance of that equipment after January 1, 1951. The Commission determined that such persons shall be required to hold either radiotelephone or radiotelegraph first- or second-class operator licenses, as an evidence of their knowledge of basic technical and regulatory matters, and shall also be required to additionally qualify for the specialized duties involved by successfully completing a supplementary examination on the subject of ship radar techniques. This supplementary examination will constitute element 8 of the Commission's commercial radio operator examinations, and was expected to be issued shortly.

Another significant amendment to the operator rules was the provision, for the first time, of a standardized procedure for processing

applications for commercial radio operator licenses when submitted by persons having physical handicaps which might detract from their ability to perform all of the duties of a radio operator. Previously, such applications were processed only by the Washington office of the Commission, and on a case-by-case basis, which involved delay and, in some cases, personal hardship. Under the new rules, such applicants, unless afflicted with complete muteness or complete deafness or other inability to transmit and to receive spoken messages in English by radio, are permitted to be examined for any class of license which they may desire. Under the license for which they qualify they are limited in operating privileges only by an appropriate restrictive endorsement when the physical handicap is such as to clearly prevent the performance of all of the normal duties of a radio operator at a station used for protecting life and property at sea or in the air. This amendment became effective on May 1, 1950.

Still another significant change in the operator rules was accomplished just prior to the close of the fiscal year. It effected the rearrangement of the examination material contained in several of the elements composing the commercial radio operator examinations, the establishment of a new operator license entitled radiotelephone third class operator permit, and the revision of both the examination for and the scope of operating authority under the restricted radiotelegraph operator permit which is renamed the radiotelegraph third class operator permit. These provisions, effective September 1, 1950, accomplish one of the major revisions necessary at this time to reorganize the two separate series of radio operator licenses (radiotelephone and radiotelegraph) and to grade them in accordance with the duties to be performed by the respective license holders. The radiotelegraph third class operator permit and the radiotelephone third class operator permit have now been established as nontechnical licenses which will authorize the mechanical operation of certain classes of stations where the constant attendance of a fully qualified technical operator is not deemed necessary. The examinations by which these licenses are obtained are correspondingly limited to nontechnical matters such as correct radio operating practices and procedures, and pertinent rules and regulations governing such operation at stations where these licenses are valid.

In connection with these changes, two new license forms were designed, thus completing the simplification of such documents. These license documents, henceforth, will be of two sizes: one 8 by 10 inches, for the first and second class radiotelephone and radiotelegraph licenses; the other, 6 by 8 inches, for the third class licenses. These sizes were found particularly suitable for framing and posting at the stations where the operators are employed.

One of the individual problems most frequently presented by holders of commercial radio operator licenses concerns renewal of their operating privileges, since such licenses are normally issued only for a period of 5 years. When an applicant for a commercial radio operator license successfully completes the required examination and is issued his license, he may operate stations at which the license is valid, but only during the period of the license. If, at the end of that time, he desires to continue operating, he must again demonstrate his qualifications for that license. However, to demonstrate his qualifications, he may substitute proof of radio operating experience during the term of the license instead of being reexamined. Previously, the rules of the Commission required that, in order to take advantage of this provision, the operator had to submit his application for renewal during the last year of the license term and, further, had to show an aggregate of at least 3 years of service during the term of that license, or at least 2 years under the same conditions when the last year of such service was continuous and immediately prior to the date of application. As a result of reported hardship to operators whose employment was intermittent, the Commission amended these provisions to permit the acceptance of an aggregate of 2 years of service during the license term in lieu of the examination, and to further provide that applications for renewal may not only be submitted during the last year of the license term but may also be submitted during a 1-year period of grace after the license expires, during which period of grace, of course, the license is not valid.

Coincident with the above amendment, the Commission provided that, when the applicant for a renewal of the commercial radio operator license is unable to show sufficient service for a renewal without examination but is able to show an aggregate of at least 1 year of service during the last 3 years of the license terms, he may obtain the renewal upon successful completion of an abridged examination rather than take the entire examination for the class of license sought to be renewed. This action, which increased the service thus required for renewal by examination from 3 months to 1 year, is believed to achieve an equitable balance between the relative value of service under a license as compared with a full examination in demonstrating an operator's qualification to hold a license, and is intended to assure the Commission that the holders of commercial radio operator licenses are qualified for renewal of such licenses.

One of the basic requirement of the Commission, in the issuance of a commercial radio operator license, has long been that the applicant must demonstrate his ability to read and write the English language and to transmit and receive spoken messages in English by telephone or radio. This requirement has been uniformly applied, not only within the continental United States but also within its territories and

possessions. However, the development of local radio communication systems in some of the territories, especially in Puerto Rico where Spanish is the language in common use, appears to make advisable a revision of this requirement to allow the substitution of some language other than English, especially in connection with the issuance of some of the lower classes of licenses which grant only limited operating privileges. This matter was under study at the close of the fiscal year, although the existence of a large number of language minorities within the continental United States itself appears to raise certain problems. As an experiment in this regard, the Commission authorized the issuance of restricted radiotelephone operator permits to a number of residents of Puerto Rico who were proficient in Spanish but had no knowledge of the English language, on assurance that their operation would be limited to a strictly local communication system in Puerto Rico.

During fiscal 1949 there was established a special examination and a special endorsement to be placed on a radiotelegraph first or second class operator license to certify to the special qualifications of the holders to operate radiotelegraph stations on board aircraft. It became necessary to design a new element of the Commission's written commercial radio operator license examinations in order that the examination material might be available before the effective date of that requirement, February 15, 1950. This project was completed, in cooperation with the Civil Aeronautics Administration, in August 1949, at which time the examination, entitled element 7, aircraft radiotelegraph, was made available and a supplement (No. 5) to the "Study Guide and Reference Material for Commercial Radio Operator Examinations" was published. As a result of this action and of the Commission's coincident approval, without examination, of all operators who had served as chief or sole radiotelegraph operators on board Commission-licensed aircraft prior to February 15, 1950, the Commission's radio operator requirements and examinations in this regard were brought into conformity with the recommended standards of the International Civil Aviation Organization without hardship to the individual operators involved.

It is of interest that the number of licensed radio operators continues to increase although the Commission has waived, in a number of rapidly growing services, the requirement of a radio operator to perform the routine operation of small nonbroadcast radio stations, principally in land mobile units. The trend is moving toward the use of radiotelephone rather than radiotelegraph transmissions, with the result that the number of holders of radiotelegraph classes of licenses has apparently reached a maximum and may be decreasing slightly. The number of holders of the higher classes of radiotelephone licenses, on the other hand, continues to increase at the rate of approximately

6,500 per year with radiotelephone first- and second-class operator licenses approaching 58,000 at the end of the fiscal year. Holders of restricted radiotelephone operator permits also continue to grow at the rate of approximately 39,000 per year, with the total of these licenses outstanding at the end of the fiscal year approximating 350,000.

3. SPECIAL AIRCRAFT RADIOTELEPHONE AUTHORIZATIONS

In fiscal 1947 the Commission established a special class of operator authorization for the operation of radiotelephone stations on board private aircraft, in the international as well as the domestic service. This special aircraft radiotelephone authorization is issued not only by all Commission field offices but also as a special convenience to private flyers at airfields by approximately 1,500 aircraft pilot examiners of the Civil Aeronautics Administration who have been designated by the Commission for this purpose. In fiscal 1950 a total of 15,987 such authorizations were issued, which was a decrease of 10,149 from the previous year. However, the number of these authorizations outstanding on June 30, 1950, exceeded 120,000, representing an increase of nearly 16,000 over 1949.

4. AMATEUR RADIO SERVICE

The Amateur Radio Service continues to be one of the largest and most active services administered by the Federal Communications Commission. Amateurs now hold approximately 175,000 station and operator licenses collectively.

At the end of the fiscal year there were nearly 88,000 amateur station licenses and almost 87,000 amateur operator licenses outstanding, an increase from fiscal 1949 of approximately 6,300 and 6,000 respectively. The number of amateur stations remains slightly higher than the number of amateur operators as a result of some operators being licensees of more than one personal station or being licensee-trustees of stations licensed for the use of amateur radio operators in clubs or in military units.

There is no age limit in the Amateur Radio Service. Any United States citizen who passes the prescribed examination and is otherwise qualified may obtain amateur operator and station licenses. Applications were received during the year from persons in their early teens and in their seventies. Women as well as men find amateur radio an interesting avocation as is evidenced by the many feminine names appearing in the Commission's records of amateur licensees.

The amateurs, or "hams" as they prefer to be known, are internationally recognized and their ranks comprise persons in almost every walk of life. Some of them obtain a livelihood from employment in

the radio industry, others from entirely unrelated fields of endeavor. However, they are all joined by a common interest in radio; an interest which is without pecuniary considerations and involves only personal aims. Many of them bring to the amateur service outstanding ability in one or more of the various phases of the art of radio communication. Through the exercise of their respective skills in designing, developing, constructing, and experimenting with radio equipment, developing communication techniques, and by providing scientific observation services as well as the usual handling of third party messages during the past year, they have demonstrated that the privileges which they have been granted have been well justified.

Also, the amateur service has a high degree of national value. It constitutes a pool of self-trained radio technicians and operators upon which the country can draw in time of war and other national need. Further, special networking and other amateur activities have proved highly useful to the national defense program.

Every year brings numerous examples of the use of amateur radio during communications emergencies and fiscal 1950 was no exception. Amateurs volunteered their equipment and services during floods, hurricanes, fires, sickness, and distress aboard ships at sea. In one instance they assisted a "ham" in Australia to obtain 12 grams of aureomycin for his daughter, desperately ill with pneumonia. Within 6 days after the Australian "ham" called for help and a group of amateurs went into action on an international basis, the drug, not then available in Australia, had been delivered from the United States and administered to the patient with the result that she was considered out of danger.

Although the amateur licensees have an enviable record of self-policing, it was necessary, nevertheless, for the Commission to issue a number of citations in cases of frequency deviation or other minor infractions of its rules. It also ordered the suspension of the licenses of six amateurs involved in more serious irregularities and refused to grant a license to an applicant who had previously persisted in trying to operate in the amateur bands without a license despite several warnings.

During the year the Commission amended its amateur rules to clarify the matter of eligibility to apply for and obtain a two-letter call sign; and to provide a year of grace for the renewal of amateur licenses expiring on or after January 1, 1951. The interim authorization for use at amateur stations of narrow band frequency or phase modulation in the bands, 3,850 to 3,900 kilocycles, 14,200 to 14,250 kilocycles, 28.5 to 29 megacycles and 51 to 52.5 megacycles was extended to July 31, 1950.

The provisions for fostering further development in the Amateur Radio Service, as set forth in rule making proposed by the Commission

on April 20, 1949 (docket 9295), continued to be a controversial item. An informal conference was held on October 10 and 11, 1949, between members of the Commission's staff and interested parties. As a result of this get-together, a number of changes were made in the proposals and a new notice of rule making issued. However, certain sections of the amended proposed rules, designed to enhance the status of the amateur service, remained unacceptable to one of the national amateur organizations and the controversy culminated in an oral argument held before the Commission on June 2, 1950. The Commission is now studying the data presented at the oral argument and reviewing the entire docket prior to rendering its decision.

Interference to the reception of television broadcasts continued to be of concern to many amateur licensees in areas served by TV stations and a serious problem to many amateurs located outside the normal service areas of TV stations who are faced with the problem of trying to reduce or eliminate such interference where the owners of TV receivers are using them to receive weak signal programs not intended for their locality and beyond the normal range for which television receivers are designed. The challenge to reduce radiation of harmonics and other spurious emissions which results in interference to TV receivers has been successfully met by many amateurs. However, the Commission is aware of inequities in this situation and is studying the matter with a view to amending its rules to clarify individual responsibilities.

Amateur radio accompanied at least two expeditions to Arctic waters during the year. Amateurs expanded their use of "radio printer" equipment and increased activity was noted in the very high frequency and ultra high frequency amateur bands. Amateur radio's continued growth is reflected in a normal addition of 12,233 new operator and station licenses during the fiscal year and it is expected that, if adopted, the presently proposed rule changes contained in docket 9295 will provide impetus to this growth in the future.

5. CITIZENS RADIO SERVICE

Public demand for a radio service to meet the needs of the individual citizen was recognized by the Commission when it allocated the frequency band 460–470 megacycles to the Citizens Radio Service during its allocation hearing in 1945 and put this service on a regular basis as of June 1, 1949.

It is the purpose of the Citizens Radio Service to provide for private or personal radio communication, radio signaling, control of objects or devices by radio, and other purposes not specifically prohibited by the Commission's rules and regulations.

The Commission has endeavored to allow the widest possible latitude of activity in the Citizens Radio Service and it can be used, for ex-

ample, on farms and ranches for communications to and from men in the fields; to maintain contact with camps and to decrease the hazards of personal travel on board harbor and river craft and private aircraft; physicians may use this service to establish a calling service through which a central physicians' exchange in each city can reach doctors while they are enroute in their cars or otherwise not available by telephone. Also many business enterprises such as department stores, laundries, dairies, and fuel oil dealers might be able to use this service for communicating to and from their vehicles if distance and interference considerations are not too great.

Common carrier operation in the Citizens Radio Service is prohibited and no charge can be made for the transmission of messages or use of the licensed facilities. No protection from interference is afforded citizens radio stations, since citizens radio stations are in a "party line" system, and cooperation of all users is expected in order to avoid interference as much as possible. Stations employed for radio control of devices or objects cannot be used where such operation involves continuous radiation of energy.

For several years, operations in the Citizens Radio Service were conducted under experimental authorizations but on June 1, 1949, when this service was established on a regular basis, newly adopted rules governing its operation also became effective.

Since that date, considerable progress has been made in the development of equipment for this service. For the most part, manufacturers concentrated on the development of small units of the handitalkie type, taking advantage of the ultra-high frequency band utilized by the Citizens Radio Service which makes feasible the design of small compact transmitter-receivers.

A sizable demand has developed for equipment for radio control of objects or devices such as model aircraft, boats, garage door openers, etc., and one manufacturer of radio-control equipment received a type-approval certificate from the Commission during the past year. In addition, other manufacturers have submitted radio transmitters to the Commission's laboratory which have been undergoing tests and will contribute to the available supply of equipment, if they meet type-approval requirements.

Many inquiries and a large number of applications were received during the year from potential users of the Citizens Radio Service who contemplated the use of home-built or war-surplus equipment converted to operate on the citizens frequency band.

The Commission has concluded that there is no simple method existing at this time for compliance with the technical standards of the

Citizens Radio Service by home constructors and experimenters, and that highly specialized engineering in ultra-high frequency techniques is required in the design of equipment to be used in that service. Attempts to convert war-surplus equipment to operate on the citizens frequency band have been unsuccessful and no equipment of this type has been licensed in the regular Citizens Radio Service.

On the other hand, the use of type-approved equipment greatly simplifies the licensee's problem, since the applicant is not required to submit technical data respecting the type-approved transmitter inasmuch as the manufacturer of such equipment has previously met the technical standards under the provisions of the rules whereby manufacturers of radio equipment to be used or operated in this service may obtain type-approval of such equipment.

The licensing requirements under the new rules, which were in effect during the past year, have been reduced to a minimum and any citizen of the United States 18 years of age or over is eligible to apply for citizens station license.

Application for a citizens radio station construction permit and license is submitted on a simple card form obtainable from any engineering field office of the Commission or from the Commission's Washington office.

An operator's license is not required for citizens radiotelephone station operation and only a restricted radiotelegraph operator permit is needed at stations with manually operated radiotelegraph transmitters using any type of Morse code. However, any adjustments to equipment that may result in improper transmitter operation must be made by or under the immediate supervision and responsibility of an operator holding a radiotelegraph or radiotelephone first- or second-class operator license.

On June 21, 1950, the Commission issued a proposal to amend section 19.51 of its rules primarily to permit operation of transmitters used to control remote objects or devices by radio by unlicensed persons, and interested persons were allowed until July 12, 1950 to submit comments thereon. The Commission will consider such comments before taking final action on this matter.

Although the number of citizens radio stations licensed during the past year increased by more than 200 over 1949, the difficulties in obtaining type-approved equipment and failure of non-type-approved equipment in general to receive Commission acceptance prevent the licensing of many potential users of citizens radio.

During fiscal 1950, the Commission licensed 320 stations in the citizens radio service which increased the total number of stations to 335 since establishment of this service on a regular basis. Of the 616 applications submitted to Washington, it was necessary to return 436

applications involving use of non-type-approved equipment as unacceptable because the equipment proposed to be used by the applicant failed to meet technical requirements.

6. STATISTICS

AUTHORIZATIONS

Authorizations held by amateurs, commercial operators, and flyers operating radiotelephone in their aircraft passed the 700,000 mark at the close of the year, which was an increase of nearly 58,000 over the previous period. Comparative figures follow:

	June 30 1949	June 30 1950	Increase
Stations:			
Amateur	81,675	87,967	6,292
Citizens	122	335	213
Total	81,797	88,302	6,505
Operators:			
Amateur	80,721	86,662	5,941
Aircraft radiotelephone	104,569	120,550	15,981
Commercial	[1] 378,500	[1] 408,221	[1] 29,721
Total	563,790	615,433	51,643
Grand total	645,587	703,735	58,148

[1] Estimated.

APPLICATIONS

During the year, nearly 150,000 applications were received from these groups collectively. Compared with the previous year, these figures were:

	1949	1950	Increase or decrease
Amateur	33,604	31,034	(− 2,570)
Citizens	488	596	108
Aircraft radiotelephone	26,136	15,987	(−10,149)
Commercial operators	102,606	100,090	(− 2,516)
Total	162,834	147,707	(−15,127)

RADIO OPERATOR EXAMINATION POINTS

To handle the large number of applicants for radio operator authorizations, examinations are given daily in many engineering field offices (see "Field Engineering and Monitoring"). However, all applicants cannot visit Commission field offices for this purpose. Therefore, as a convenience to applicants, examinations are given periodically, by Commission field representatives, in larger cities scattered throughout the country.

Effective June 3, 1950, the list of places at which examinations for radio operator licenses may be taken was revised as follows:

Quarterly points

Birmingham, Ala.
Charleston, W. Va.
Cincinnati, Ohio.
Cleveland, Ohio.
Columbus, Ohio.
Corpus Christi, Tex.
Davenport, Iowa.
Des Moines, Iowa,
Fort Wayne, Ind.
Fresno, Calif.
Grand Rapids, Mich.
Indianapolis, Ind.
Jackson, Miss.
Knoxville, Tenn.
Little Rock, Ark.
Memphis, Tenn.
Milwaukee, Wis.
Nashville, Tenn.
Oklahoma City, Okla.
Omaha, Nebr.
Phoenix, Ariz.
Pittsburgh, Pa.
St. Louis, Mo.
Salt Lake City, Utah.
San Antonio, Tex.
Schenectady, N. Y.
Sioux Falls, S. Dak.
Syracuse, N. Y.
Tulsa, Okla.
Williamsport, Pa.
Winston Salem, N. C.

Semiannual points

Alburquerque, N. Mex.
Amarillo, Tex.
Bakersfield, Calif.
Bangor, Maine.
Boise, Idaho.
Butte, Mont.
El Paso, Tex.
Hartford, Conn.
Hilo, Hawaii, T. H.
Jacksonville, Fla.
Jamestown, N. Dak.
Manchester, N. H.
Lihue, Kauai, T. H.
Louisville, Ky.
Marquette, Mich.
Portland, Maine.
Roanoke, Va.
Spokane, Wash.
Tallahassee, Fla.
Tucson, Ariz.
Wichita, Kans.
Wilmington, N. C.
Wailuku, Maui, T. H.

Annual points

Billings, Mont.
Cumberland, Md.
Klamath Falls, Oreg.
Las Vegas, Nev.
Rapid City, S. Dak.
Reno, Nev.
Springfield, Mo.

CHAPTER VI—FIELD ENGINEERING AND MONITORING

1. GENERAL

The Field Engineering and Monitoring Division is the principal inspection, examining, enforcement, and engineering fact-finding unit of the Commission. Its field staff inspects all types of radio stations and serves discrepancy notices, gives radio operator examinations and issues operator licenses, monitors the radio spectrum to see that stations are operating on assigned frequencies with prescribed power, locates and closes down unauthorized transmitter operation, investigates complaints of interference to radio services, gathers technical data for use by the Commission, furnishes direction to lost aircraft and provides bearings on ships in distress.

2. FIELD OFFICES

There are 9 regional engineering offices which supervise 23 district offices, 6 suboffices and 3 ship offices, supplemented by 19 monitoring stations. These field offices and monitoring stations are listed in the appendix. The engineering work is directed and coordinated at the Washington office.

3. MONITORING

The Commission operates 11 primary and 8 secondary monitoring stations. Of these, 17 are located in the United States, 1 in Hawaii, 1 in Alaska.

This monitoring and direction-finding network is the only one of its kind in this country and renders service to the Government in general as well as to the Commission in particular. It functions on a 24-hour basis, being linked with Washington by teletypewriter and radio circuits. Monitoring operations, in addition to performing an important engineering measurement function, include "cruising" the spectrum

for violations of law and regulations and detecting illegal or unauthorized transmissions, and monitoring particular cases which involve work ranging from simple listening to recording and analyzing signals. Effective radio location necessitates that radio bearings be taken simultaneously by several direction-finder stations.

A strong or erratic signal may be observed by these "ears" of the Commission or reported to the field offices. The former can listen in on the transmission and plot its origin. Monitoring stations, in general, do not track down an unlicensed operation. That task is performed by field engineers using mobile and portable equipment.

Each radio district headquarters maintains special cars which can be used for this purpose. Some of them are equipped with all-wave receivers and antenna capable of being operated from the car's battery while the vehicle is in motion. Sometimes it is necessary to observe an illicit station over a period of time. In such cases the receiver can be removed from the car and connected with the power supply in an office, house, tourist cabin, or other base of operation.

Here determinations are made of the call letters employed by the operator as well as the station or stations called, the type of emission, the frequency used, the time and duration of the operation, the nature of the communication, and whether it is in voice, telegraph, or code.

With several portable receivers covering an area, it is then possible to "fix" the general location of the illegal station. Without being too technical, it can be said that this procedure involves the same triangulation method used in determining the position of ships at sea.

After that, a small detection apparatus carried in the hand, trouser pocket, or fastened to the vest can be used by an inspector in proceeding from house to house, floor to floor, and door to door, to observe at what point the strongest signals occur. When that point is reached, the offending apparatus itself must be close at hand. The actual arrest is made by cooperating local Federal officials.

Serious cases are referred to local United States district attorneys for prosecution. The Communications Act prescribes a maximum penalty of $10,000 fine or 2 years imprisonment, or both, for violators. The Communications Act requires all non-Government radio transmission to be licensed, and courts have held that such operation anywhere in the United States or its possessions is subject to Commission approval, both of the transmitter and its operator.

Monitoring activities can be grouped under two main headings, service and enforcement. The 1,883 major monitoring cases handled during the fiscal year was 145 more than in the previous year. This reflects the continued increase of interference complaints proportionate to the number of active operating stations. A definite increase in monitoring cases has been experienced annually since 1945 and it is

expected that this will continue as more and more services and stations are authorized.

MONITORING SERVICE

Service to both the military and industry was performed mainly in solving their interference problems by means of monitoring and direction finding. The greater part of the major interference complaints involve interference caused by unidentified signals which must be traced and identified. The mobile services are particularly vulnerable to interference, and since they deal with safety of life and property, the solution of such interference problems must be prompt and relief immediate. If a transmitter is not tuned correctly, its transmissions may interfere not only with its own communications but to the communications of other services as well.

Typical of the aid given to the aeronautical services was a case involving interference over the entire east coast and traced by long-range direction finder bearings and supplemental mobile unit action to an unauthorized station operating in Tennessee.

Another example involved interference to the American Airlines on the west coast caused by what was described as "Chinese language." Long-range bearings indicated the interference was coming from a point in the ocean off the coast and it was finally traced to one of the several vessels turned over to the Korean Government by the United States Navy.

In addition to resolving interference problems for Government and industry, the monitoring stations engaged in several surveys which resulted in the reclaiming of frequencies not being fully used, thereby enabling them to be reissued. One of the surveys was made for the Department of State which was trying to find "holes" in the crowded bands utilized by all countries for high-frequency broadcasting. A similar survey was made for the government of Eire.

Monitoring stations continued to be of service to both civilian and military aircraft. During the year, the division received 116 requests for assistance involving loss or disabled aircraft. While this represents a decrease since the last fiscal year (140), it still represents a sizeable amount of work and aid in furnishing positions derived from the evaluation of long range direction finding bearings.

This service is available alike to the individual pilot or to the large transocean passenger plane. An instance of aid given to a lost Canadian plane by one monitoring station brought a warm note of appreciation from the pilot. Another case involved furnishing "fixes" to a disabled plane over the Pacific which had been forced to turn back to the mainland after developing engine trouble. Among those on board was a West coast Congressman and the Secretary of the Navy. In still another instance, the FCC direction-finding stations

were called upon to establish a "fix" on a search plane which had spotted a flashing light from survivors on a raft who had been forced down in the Atlantic off Florida during a flight of a C–47 from Puerto Rico to New York. In this instance 37 of the 65 persons on board were saved.

MONITORING ENFORCEMENT

Commission monitoring stations also engaged in a systematic monitoring program for violations of the Communications Act, international treaties, and Commission rules and regulations. These activities in 1950 resulted in the issuance of 9,817 violation notices. This represents a decline in the number of notices issued as compared with 11,679 for the fiscal year 1949, and is due to a decrease in available personnel, the press of active interference complaints which did not leave enough time to cover the spectrum as much as desired, also, to the closure of two monitoring stations during the year, one at Juneau, Alaska, and the other at Point Maldonado, P. R. In addition to the issuance of notices, a continuing campaign of preventative monitoring resulted in clearing the spectrum of thousands of undesirable spurious signals before they became the subject of interference complaints. Also, many illegal radio operations were discovered (see "Investigations").

4. INSPECTIONS

BROADCAST STATION INSPECTIONS

The Commission's engineers inspect the equipment of all stations in the broadcast services—AM, FM, and TV—not less often than once during each station's regular license period. These inspections are made to see that each station lives up to the rules and regulations and complies with its license requirements in rendering an adequate technical broadcast service to the listening and viewing public. All technical operation is reviewed, such as maintenance of directional radiation patterns, authorized power, frequency, stability, modulation including quality of voice or music, and proper lighting of the antenna towers for the enhancement of safety to airborne passengers.

The following tabulation shows the number of broadcast stations of three major classes inspected in 1949 and 1950:

Number of broadcast inspections

Broadcast stations inspected	1949	1950
AM	1,663	1,476
FM	267	306
TV	36	104
Total	1,966	1,886

Discrepancies totaling 1,108 were discovered during broadcast inspections in fiscal 1950, while 1,303 were discovered during 1949. Percentagewise, 66 percent of the inspections resulted in discrepancy notices in 1949, while only 59 percent required this action in 1950, indicating a somewhat higher degree of compliance with the Commission's requirements.

SHIP STATION INSPECTIONS

The United States has continued in the forefront since the year 1910 in the enactment of safety legislation and in its enforcement of international laws for the safety of lives and property at sea. By regularly checking the operating condition of radio communication equipment of passenger-carrying and certain other vessels, both United States and foreign, the engineers of the Commission and its predecessor agencies have vigilantly assisted ship owners and operators to maintain the radio apparatus in a condition of instant readiness for emergency needs.

Number of ship inspections

	1949	1950
United States ships	7,991	6,982
Foreign ships	3,041	3,032
Total	11,032	10,014

The decrease noted is due to the shortage of personnel at maritime offices, such as New York City, which made it impossible to inspect as many vessels in 1950 as were inspected during the previous year.

Discrepancies discovered during inspections of ship radio equipment are totaled below:

Number of discrepancies discovered

	1949	1950
United States ships	8,244	6,960
Foreign ships	1,752	1,943
Total	9,996	8,903

A comparison of figures for 1949 and 1950 discloses no noticeable change in the ratio of discrepancies to inspections during 1950 and indicates the continued need of precise and frequent inspection of ship radio equipment to maintain its readiness for emergency use.

The following table shows the number of discrepancies which were corrected immediately by the licensee or his representative and which were, consequently, cleared during inspection:

Discrepancies cleared during inspection

	1949	1950
United States ships	3,000	2,783
Foreign ships	556	513
Total	3,556	3,296

INSPECTION OF OTHER RADIO STATIONS

Inspections of stations in services other than broadcast and ship totaled 12,755 in 1950 as compared with 10,534 in 1949. Technical deficiencies numbering 3,699 were discovered in 1950 as compared with 2,909 discrepancies revealed in 1949.

With the increased use of radio come added field responsibilities and obligations. Each Commission district office keeps a record of the new stations in its district as they are authorized and these stations are scheduled for inspection at the time of the next trip to that vicinity. However, due to the expansion in the number of such new stations due for inspection yearly and the decrease in the Commission's inspectional force, it has been necessary, in lieu of annual inspections as heretofore, to make an inspection of each station once during its regular license period, which results in a 3-year interval in most cases. Further, in order to avoid unnecessary citations, the Commission has adopted a policy whereby minor discrepancies which are discovered during inspections but which are cleared while the inspection is in progress are not formally cited and the incident is recorded as having been "cleared during inspection".

A further step recently taken by the Commission, and also dictated by a shortage of inspectional personnel, is that by which itinerant aircraft are inspected Nation-wide in a "drive" synchronized with the release of a public notice to the owners of private aircraft, advising them of this effort and the need for their obtainment of required operator and station licenses in cases where these documents have not previously been secured.

5. OPERATOR EXAMINATIONS

During fiscal 1950 the engineering field offices issued 101,226 commercial radio operator licenses of all classes, which was 4,227 in excess of the number handled in 1949.

Applications for radio operator authorizations of the various classes continue to be received in the Commission's field offices in large numbers. Many of these authorizations can only be issued as a result of the applicant having passed a thorough and exacting technical examination, while simpler and less comprehensive operating authorizations are issued without the necessity of the applicant passing a writ-

ten test. With the increasing number of broadcast stations, including those in the TV service, examinations for the radiotelephone classes continue at a high level. The demand for authorizations which permit the holder to engage in the operation of smaller radiotelephone stations, such as those used at base stations in the police, taxicab and highway services, continues to mount.

The Commission gives examinations regularly at its field engineering offices, and at Washington. Additionally, examinations are held regularly at various points throughout the United States, its territories and possessions, where the need for such examinations has been indicated by public request. These "field" examinations are held quarterly, semi-annually or annually as regional needs require.

During 1950, Jackson, Miss., and Phoenix, Ariz., were established as new quarterly examination points. Jamestown, N. Dak.; Manchester, N. H.; Tallahassee, Fla.; Louisville, Ky.; Marquette, Mich.; and Wailuku, Hawaii, were established as new semiannual points. Rapid City, S. Dak.; Springfield, Mo.; Las Vegas, Nev.; and Klamath Falls, Oreg., were established as new points for annual examinations. A complete list of radio operator examination points will be found in the chapter on "Radio Operators".

6. INVESTIGATIONS

Mounting investigative activity was noticeable in 1950 due to the increase in the number of new services inaugurated and to the expansion in services already in operation. The phenomenal public interest in TV reception resulted in a flood of interference complaints which are being investigated by Commission engineers as rapidly as time will permit. During 1950, a total of 8,613 investigative complaints were handled as compared with 7,618 in 1949.

As a result of investigative work relative to licensed stations, operator licenses of a number of amateur and commercial operators were suspended.

In addition to investigative work in connection with licensed stations, the Commission's field engineering personnel and facilities guard against illegal radio operation. One hundred and forty-nine unauthorized stations were discovered and closed down during the year.

One unlicensed operation was traced to an inmate of the Mississippi State prison. Other cases involved persons who tried to operate on particular frequencies, even those used by the military. An increase was noted in the activity of persons attempting to "beat the bookies" through illegal radio use at racetracks. Unlicensed installations operated by individuals attempting to broadcast to communities without benefit of license also continued to be uncovered. Such installations

caused interference to legitimate broadcasting and other radio services. Also discovered was a broadcaster who "jumped the gun" by employing facilities other than those applied for and beginning operations prior to receiving authorization. The speedy discovery of such operations is a lesson to those who fail to realize how diligently the radio spectrum is patrolled around the clock.

During the year, three heavy fines were levied for violation of the Commission's "low-power rules," indicating to those who would employ these provisions for illegal purposes that the regulations do have teeth.

The Commission did not seek prosecution and conviction of all operators of illegal stations detected and closed by investigative action. Prosecution is generally recommended in the case of "repeaters" and those who use radio in a flagrant unlawful manner. Six unlicensed station operators were prosecuted during the year, with resultant fines totaling $3,615, in addition to prison sentences amounting to 19 months. Of the cases previously referred to the Department of Justice, three were still in the process of resolution by that agency.

7. TECHNICAL OPERATIONS

With the continuing expansion of radio, there is a corresponding need for new and improved equipment for use in exercising technical surveillance over the operations of radio stations licensed by the Commission and to obtain propagation data and other information which may be required for consideration in allocating frequencies. To meet these needs, sundry items of equipment were purchased and modifications were made in existing equipment to provide improved operation.

During the year, 84 new engineering projects were assigned to the field offices and monitoring stations as a result of requests from the various offices in the Commission and from other Government agencies. In addition, 44 projects were carried over from the previous year. The total of 128 active engineering projects which involved engineering studies, measurements, and investigations was about 8 percent greater than for the previous year and required a total of 8,751 man-days for completion as compared with 8,685 man-days for 1949.

Following are some examples of engineering project assignments:

The directional patterns of 327 different AM broadcast stations were checked to determine whether their antenna systems were being operated in accordance with their licenses. Measurements were made at 15 AM stations to determine compliance with Commission rules concerning performance of station equipment and included measurements of the frequency response and of the degree of distortion introduced by the station's audio system and transmitting equipment.

The long-range broadcast signal intensity recording program was expanded to include recording above 500 megacycles, with recording installations at 11 monitoring stations and two district offices for AM, FM, and TV broadcast stations, and atmospheric noise involving a total of 37 field intensity recorders. Information obtained is used in connection with allocations studies and in determining range of coverage to be expected from the various classes of stations. Special mobile field intensity recordings were made at three offices using recently available test cars.

In cooperation with other Government agencies and with interested nongovernment organizations, field intensity measurements and surveys were made on the ground and in aircraft to obtain data concerning the characteristics of low frequency carrier current communication devices which will be used in considering promulgating rules for the control of such devices.

Installation of equipment was begun in 12 new investigative automobiles which will replace cars in use since 1942 or earlier. The new cars are designed to permit operation of the receiving equipment and the direction finder by one man from the driver's seat and will improve efficiency and convenience of operation.

Other field activities covered construction of special equipment for monitoring, engineering measurements, and other requirements which cannot be fulfilled by commercially available equipment. A number of tests were made to determine the suitability of various items of equipment for use at field offices and monitoring stations.

8. DISASTER EMERGENCY COORDINATION

The managers assigned to the nine geographical regions maintain continuous contact with officials of wire communications companies, licensees of the various classes of radio stations and amateur organizations to keep the Commission informed of plans to meet any communications emergency. To anticipate emergency communication needs, liaison is likewise maintained with officials of organizations such as the United States Coast Guard, United States Army engineers, military amateur nets, and others concerned with the protection of life and property. In the event of a disruption of communication facilities, reliable amateur contacts form a nucleus that can operate and be responsible for dealing with the Commission in requesting the declaration of a state of communications emergency in any affected area.

There is also close collaboration with the American Red Cross. In order to facilitate this coordination, a TWX communications printer has been installed by the Red Cross at the FCC net control in Washington for direct emergency contact.

Experience in emergencies has shown that immediate coordination of all communication facilities by a central coordinating agency is of the utmost importance to prevent confusion and aid relief operations. Regional managers rendered assistance in the case of emergencies which developed during the year, including the South Dakota and Minnesota blizzard, March 7–11, 1950; the flood resulting from the overflow of the Scagit River in the State of Washington, and the Florida hurricane which occurred on August 26–27, 1949.

CHAPTER VII—TECHNICAL AND LABORATORY ACTIVITIES

1. GENERAL

One of the Commission's basic functions under the Communications Act is to regulate the use of the radio spectrum in order that this valuable natural resource may be employed as effectively as possible in the public interest. As a foundation upon which to make proper frequency allocation and assignment, it is necessary to have detailed factual knowledge of radio propagation and the capabilities and limitations of transmitting and receiving equipment.

"Radio propagation" is the term used in reference to radio signals and how they react to terrain, water, atmospheric and climatic conditions. Radio waves have a tendency to run wild, bouncing from earth to sky and back again, depending upon the frequency and its characteristics. In assigning appropriate frequencies to the different types of radio services, the Commission must first know about radio wave behavior at every hour of the day, every season of the year, and during sunspot periods and other atmospheric disturbances.

The rapid growth of the land mobile service, expansion of microwave links, adoption of a coordinated system of electronic aids to air navigation, advent of radio location, extension of marine radar, developments in television, and the increase of radio services generally, have contributed to bring about a critical problem in frequency allocation in the upper radio spectrum, i. e., that portion above 30,000 kilocycles. This requires extensive and exacting technical knowledge in order to allocate space and to adopt rules and standards covering its use.

Responsibility for carrying out the Commission's technical studies and research is assigned primarily to two units within the Office of Engineering. They are the Technical Research Division and the Laboratory Division.

Studies of wave propagation are undertaken by the Technical Research Division, field measurements are made by the Field Engineering

and Laboratory Divisions, and the resulting data analyzed by the Technical Research Division. This information is correlated with related work by other Government agencies, the industry, and various colleges and universities. The findings are presented to the Commission in the form of technical reports which are basic considerations in decisions to insure the most economic and efficient use of the radio spectrum.

2. TECHNICAL RESEARCH DIVISION

On October 24, 1949, the name of the Technical Information Division was changed to Technical Research Division. Commission reorganization in April 1950 placed this division under the Office of the Chief Engineer.

The Technical Research Division acts as an operational group and technical consultant to the Commission. For this purpose it organizes projects for the collection of data by the Field Engineering and Monitoring and the Laboratory Divisions and for obtaining data from other organizations. It also participates in the technical studies incident to international conferences and treaties, and represents the Commission in the coordination of radio research, standardization, and instrumentation with Government and industrial organizations.

During its fourteenth year, the technical research unit continued its long-term projects at a decelerated pace while it stepped up activity on VHF and UHF projects. The outstanding work of the year was that growing out of the television hearing and the ad hoc committee studies related thereto. The division continued to carry on special studies and to collect and analyze basic data concerning radio wave propagation as well as other communication problems, and to make the resulting scientific information available to the Commission for guidance in the promulgation of new rules and the determination of technical limitations and practical engineering standards.

A factual knowledge of equipment capabilities and limitations and of radio wave propagation characteristics is fundamental to frequency allocation. The whole structure of radio regulation depends on the soundness upon which this framework is built.

A judicious allocation of radio frequencies to the various radio services presupposes a knowledge of many highly technical and complicated things, including ionosphere and troposphere propagation, terrain, effects, useful intensities of signal as related to various sources of interference, geographical and frequency separations necessary to alleviate interference in accordance with various requirements, equipment capabilities and limitations, new developments and their possibilities, etc.

The Commission requires a detailed knowledge of the propagation characteristics of radio signals throughout the spectrum in order that the most economic and practical allocation of facilities may be achieved. The propagation characteristics of the band of frequencies allocated to a particular service must be consistent with the operating requirements. The allocation of stations within a service, i. e., the determination of cochannel and adjacent channel distance separations, service ranges, and power limitations must be founded on a knowledge of propagation. Such knowledge is best obtained from deductions arrived at through the study and analysis of long-term field intensity measurements involving the use of carefully calibrated recording equipment and requiring the attention of experienced engineers. It is the primary function of the Technical Research Division to obtain such data and furnish highly reliable solutions to the technical problems involved.

VHF AND UHF PROPAGATION STUDIES

Television and FM.—Continuation of the television "freeze" order through the year, made necessary by the injection of many TV considerations, entailed additioned study of VHF and UHF propagation, particularly as related to TV and FM broadcasting. The division was occupied in several lines of activity involving the current hearings. First, at least one member of the division was in attendance at all hearing sessions and engaged in the presentation of testimony and in assistance where technical advice was needed. Secondly, the nearly 10,000 pages of testimony and nearly 300 exhibits were analyzed, classified, indexed, and assimilated for technical information on color TV and a large number of reports concerning engineering matters were prepared for the Commission and its staff. Thirdly, several division members were associated with the work of the ad hoc committee formed in October 1948 for the purpose of investigating the properties of VHF propagation, with the chief of the division as chairman. This committee consists of engineers and scientists from the industry, from the Central Radio Propagation Laboratory of the National Bureau of Standards, and from among consulting engineers who are specialists in this field of activity in private practice.

Ad hoc committee.—On June 8, 1949, the Commission issued volume I of the report of the ad hoc committee and certain associated reference documents prepared by this committee. With this material as a foundation upon which properly directed programs of measurement and study could be formulated, the Technical Research Division investigated the existing facilities offered by the FM and TV broadcasting industries with respect to schedules of program transmissions,

frequency, power, location, and effective antenna height of the stations in operation, and selected locations available to the Commission for taking measurements under conditions where the maximum amount of useful information could be obtained with the limited amount of modern equipment in possession of the Commission. The division analyzed and interpreted the measurements and reported them to the ad hoc committee along with measurements from other sources.

During the year there were seven formal meetings of the ad hoc committee. Working subcommittees were appointed and members of the Technical Research Division actively participated throughout the year in the work of these subcommittees. The findings of working groups were reported to the main committee at its formal meetings from time to time. By the end of the year, the committee had produced another document designated as volume II of the ad hoc committee report along with 11 highly technical reference papers. New methods of evaluating VHF broadcasting service and interference area problems were developed with special attention directed to the complications which have arisen with respect to the deterioration of the quality of TV picture transmissions caused by several other stations operating on the same frequencies and on different frequencies. New methods of preventing these disturbances were also studied and evaluated.

Measurements.—There are a number of tropospheric and terrain propagation effects which must be resolved from actual measurements obtained by the continuous recording of field intensities at various locations. It has been observed that these effects are different and changeable in different sections of the United States. The magnitudes of these differences must be determined before reliable rules can be made for the allocation of TV channels and frequencies for the various radio services proposed in the VHF and UHF ranges. Several other factors relating to this problem also must be resolved in this manner.

The Field Engineering and Monitoring Division, at the request of and in close cooperation with, the Technical Research Division, placed in operation VHF field intensity recording equipment at the Commission's monitoring stations and offices at Millis, Mass.; Laurel, Md.; Powder Springs, Ga.; Houston, Tex.; Allegan, Mich.; Grand Island, Nebr.; Santa Ana, Calif., and Portland, Oreg. The measurements obtained are being analyzed by the division.

The need for additional measurements of this type on both VHF and UHF has been emphasized many times in the TV and FM hearings and at the meetings of the ad hoc committee. The division is constantly engaged in efforts to develop ways and means of obtaining these measurements. Several projects have been operated by the laboratories of the leaders of the industry from which valuable in-

formation has been obtained. Colleges, universities, and smaller units of the industry have indicated a willingness to cooperate in this matter, but they are not able to furnish special equipment of the type required. In order to obtain badly needed measurements, the Commission, during the year, furnished, on a temporary loan basis, two sets of equipment; one to the United Broadcasting Co. and the other to the University of Connecticut.

Bridgeport UHF-TV project.—In January 1950 the National Broadcasting Co. began experimental operation of the first station in the United States to transmit regular TV programs on UHF. For a number of reasons, a site was selected near Bridgeport, Conn., for this station and a channel was assigned on frequencies between 529 and 535 megacycles.

NBC and RCA have installed more than 50 TV receivers with special adapters in homes in and around Bridgeport in order to obtain information regarding the reliability of such equipment in this type of operation and to determine the usefulness of these ultra-high frequencies as applied to the TV service. Extensive measurements utilizing mobile equipment with captive balloons to support the receiving antennas have already been made in the Bridgeport area. NBC is now in the process of analyzing these measurements.

Members of the division have kept in close contact with these developments and have aided in the planning of projects in order to obtain the type of information which will be most useful to the Commission. As a result, continuous field intensity recorders tuned to this station are in operation at the Commission's monitoring stations at Scituate, R. I., and Millis, Mass., over distances of 88 and 116 miles, respectively, and at the University of Connecticut over a path of 62 miles. The equipment for the latter location was assembled and installed by the Commission's Laboratory Division, and is operated by staff members of the university's Electrical Engineering Department.

Land mobile propagation study.—This project involves frequencies in the band 152–162 megacycles and was inaugurated during fiscal 1950 to provide propagation information for use in connection with the administration of land mobile services.

A set of ground wave and tropospheric wave propagation curves of median and 10 percent field intensities versus distance have been calculated and used to determine the expected variations for different antenna heights with 250-watt power. Additional curves are being calculated showing variation of location probability for service versus distance concerning the clear channel case of one interfering station, and the case of six other interfering stations. These cases are computed for antenna heights of 50, 100, 200, and 500 feet at distances of

25, 50, 75, 100, 150, and 200 miles. With reasonable time allotment it is contemplated that the project will be completed in the near future.

Other VHF and UHF projects.—Although most of the time available for study of VHF and UHF propagation was devoted to activities outlined above, considerable work was completed and further work is planned on the following projects:

1. Research and investigation of new methods of modulation with respect to the relationship between these new methods and propagation conditions affecting frequency allocation problems. In particular, a comprehensive study was made of the use of frequency modulation as applied to TV video carrier transmissions.

2. Study of the sensitivity, selectivity, and noise characteristics of new TV receivers in relation to channel allocation theory, and investigation of new developments in measurement techniques.

3. Study of skywave propagation on frequencies between 25 and 50 megacycles.

4. Study of the time and space correlation of fading of signals transmitted over several different paths.

5. Study of the time continuity of service considering variable interfering signals superimposed upon a variable service signal.

6. Study of results of tests made on equipment developed by the Bureau of Standards for the purpose of automatically integrating and recording field intensity measurements. In a test run at the Laurel monitoring station it was found that considerable time could be saved with this equipment. However, no funds have been available for the purchase of new equipment.

7. When it is possible to obtain new measurements, the study of the terrain effects upon wave propagation will be continued.

MEDIUM FREQUENCY PROJECTS

Sunspot cycle recordings.—Solar activity has a profound effect upon radio wave propagation. During daytime hours, AM broadcast stations are heard over relatively short distances only. At night, skywave signals may be heard from distant States as well as from Mexico and Canada. The cycle of solar activity as indicated by sunspot numbers covers a period of about 11 years; however, the spots of succeeding cycles are of opposite magnetic polarity, so that a 22-year period is involved for definitive testing of these effects. The Commission's sunspot cycle project was inaugurated in 1938 and is still active. Continuous recordings of broadcast signals are being made at Baltimore, Grand Island, Portland, Powder Springs, and from time to time at other points.

These data are needed to supplement that taken in previous years. Additional recordings must be done to cover the full cycle at all loca-

tions and for all frequencies. Coordination of this information with similar data recorded in Canada was continued during the year and will be continued for some time to come.

An extensive analysis of the accumulated data was begun to determine the nature and magnitude of the medium frequency skywave propagation effects corresponding to variations in solar activity during the last sunspot cycle.

Atmospheric noise.—Continuous field intensity recordings of atmospheric noise between 200 and 1,600 kilocycles were continued. This information is analyzed and correlated with thunderstorm data and the results are used in the preparation of a series of noise maps to show characteristic variations with the time of day and a percentage of time for each frequency band and for various latitudes. These maps are used in estimating the signal level required to provide an acceptable radio service in the presence of atmospheric noise and, hence, the possible service ranges when interference from other stations is absent. Because of the pressure of other duties, analyses and map preparation could not be undertaken during fiscal 1950.

TECHNICAL STUDIES AND STANDARDS

General.—The rapid increase in the number and kinds of new radio services has produced a new array of technical problems. Each new service requires the preparation of specific rules including technical definitions, equipment requirements, and operational limitations. This often requires intensive studies involving formation of committees representing other Government agencies as well as industry. Whenever technical difficulties are encountered, the various divisions of the Commission turn to the Technical Research Division for assistance. Problems of this nature have increased to a marked extent. Additional technical standards have become necessary not only in the new radio services but also in the better established services where new techniques and new developments have made changes in the rules and regulations imperative. Due to the large number of receivers being sold, especially in the broadcast field, the number of complaints concerning interference have risen rapidly. This factor alone has forced the Commission to make special studies and set up joint Government-industry committees with a long range view toward the alleviation of the many troublesome interference problems.

Restricted radiation devices and low-power rules.—During the previous year the Commission's low-power rules became the subject of serious consideration, partly because of complaints of interference in the broadcast band from certain low-power systems and devices, and partly from the demand of the industry for clarification of the present rules. The Technical Research Division sponsored a committee to

study the problem and make recommendations to the Commission. This work was organized as a joint effort in which Government agencies and the electronics industry participated. Several Government-industry meetings were held. Extensive experimental programs were carried out in which the Air Force and the Civil Aeronautics Administration, as well as the Bell Laboratories, the Tennessee Valley Authority, and others participated. For the first time the radiation from carrier current lines was measured in the air. This was made possible through cooperative efforts. The Air Force furnished a suitable airplane; the Bell Laboratories furnished measuring equipment; the FCC, TVA and others furnished personnel, transmitters, sites, etc. The data obtained are now being analyzed and gives promise of throwing much light on a previously little explored subject.

Incidental radiation devices.—This subject is being treated as a corollary project with that of restricted radiation devices. Many devices, such as receivers, motors, generators, fluorescent lamps, ignition systems, etc., produce interfering radiations which are purely incidental to the purpose for which they are operated. The amount of interference resulting from such devices has increased so rapidly that it now behooves both industry and the Commission to make extensive investigations of the cause and effectuate remedial measures.

Receiver radiation.—Probably the most prolific offenders in the incidental radiation field are FM and TV receivers. Radiation from FM and TV receivers cause interference not only to FM and TV reception but to certain safety devices such as navigational aids in the aviation service. During the year the FCC held an engineering conference on this matter. A special central committee was set up to work on the problem with standing committees in the radio industry. These groups have since developed suitable methods of measurement and proposed interim standards of performance which give promise of relief from much of this interference. While progress has been made there still remains much work to be done. The Commission will continue to sponsor and encourage better circuit design and more effective suppression methods among the manufacturers of all kinds of radio receivers.

Coordination of technical rules.—With the large number of new radio services recognized by the Commission, the problem of coordinating the various technical phases of the rules for one service with those of other services has become a necessity. The responsibility for such coordination with a view to uniformity throughout all services has been charged to the Technical Research Division. This work will be expanded.

Single side band suppressed carrier studies.—With the ever-increasing demand for frequency space, engineers have turned to the single

side band suppressed carrier method of operation because it offers a saving in the bandwidth requirements. Many technical questions have arisen concerning the actual bandwith needed for various types of modulation, the methods of calculating and specifying power, etc. The study of these problems was accelerated early in the year but, due to the pressure of other work, was left for future attention.

Radiolocation.—The importance of crude oil in the present economy is evident. At present one of the most productive areas lies under water along the continental shelf in the Gulf of Mexico. In prospecting for oil from ships it becomes highly important to be able to locate a previously established point with exceptionally good accuracy. Radiolocation is a radio method which makes such accuracy possible. Since several different radiolocation systems have been developed, and because the Commission has been asked to grant authorizations involving the use of radio frequencies for such systems, it became necessary to make an engineering study of all the systems in use. Additional work will be carried on in order that the necessary technical knowledge will be available when hearings relative to the subject are scheduled.

GOVERNMENT-INDUSTRY COMMITTEES

The Commission is represented by its Technical Research Division on a number of important standing committees of Government and industry. Among these are executive groups of the Central Radio Propagation Laboratory, the URSI (International Radio Scientific Union) and CCIR (International Radio Consultative Committee), committees of the Institute of Radio Engineers and the Radio Manufacturers Association, and panels of the Committee on Electronics of the Research and Development Board. The chief of the division served as chairman of the Central committee which coordinated technical work related to restricted radiation devices. As indicated elsewhere, he continued to serve as chairman of the ad hoc committee on television.

TECHNICAL CONSULTING SERVICE

In addition to furnishing technical advice to the Commission, the division is called upon to answer technical questions of other Government agencies, industry, and private engineers. During the past year demands of this nature increased far beyond those of any previous period, and backlogs in routine work developed.

3. LABORATORY DIVISION

GENERAL FUNCTIONS

The Laboratory Division of the Commission is located near Laurel, Md. This division makes technical measurements and engineering investigations to assist the Commission in allocating frequency bands,

establishing and revising engineering standards and regulations for new as well as existing services, and establishing regulations covering noncommunications type of equipment employing radio-frequency energy which may interfere with the radio communications services.

Examples of the Laboratory Division activities are:

1. Investigation of various methods of transmission and reception to determine which method permits the most efficient utilization of the spectrum and to determine the interference factors which limit the various methods.

2. Tests of transmitters to determine whether interference signals are emitted on frequencies other than the assigned channel.

3. Tests of receivers to determine how close together the Commission might place stations without the listeners receiving several stations at the same time.

4. Tests of receivers to determine what interference they may produce in other nearby receivers either in the same service or in other services.

5. Tests for reliability of operation of equipment such as apparatus involving safety at sea. This type of equipment is required by the Commission's rules and regulations or by treaty.

6. Tests of the accuracy and reliability of monitoring equipment required to be used by stations.

7. Investigation of interference produced by noncommunication uses of radio-frequency energy.

The work of the laboratory generally is directed towards the testing of a type of equipment rather than the testing of individual units. Attempt is made to anticipate interference problems and to have remedial measures taken prior to the manufacture and distribution of a large number of units instead of waiting until the interference occurs in the field and requires numerous individual investigations. After a large number of units have been distributed the solution of the interference problem generally will be only of a "patchwork" nature, and in many cases may be practically impossible of solution without a serious waste of useful frequencies. In some instances type tests are required by the rules and regulations, and formal approval is given. In other cases the laboratory makes type tests not specifically required, in order that the Commission may be aware of the existing service and interference problems encountered in practical operation, so that either the allocation structure may be designed to fit the units available or the Commission may take other action leading to improved equipments which will permit more efficient use of the available radio frequencies. Type testing also is required of certain noncommunications equipment, such as diathermy machines which employ radio frequencies and may cause serious interference

unless the frequencies are properly maintained and the harmonic and spurious emissions sufficiently restricted.

Following is a summary of particular laboratory activities engaged in during the year.

BROADCASTING

Because of the current TV hearing a great amount of effort has been devoted to TV studies. These studies mainly concern TV interference problems since they lie in a no-man's land of which far too little is known. Interference is a most severe problem in the TV broadcast service. Why this is so can be seen from the following discussion.

An ordinary standard (AM) broadcast channel is only 10 kilocycles wide. At 1,000 kilocycles this channel width is 1 percent of the operating frequency. A TV channel is 6 megacycles wide. At 60 megacycles this represents a width of 10 percent of the operating frequency. This indicates that the interference problem in TV may be expected to be some 10 times greater. Although this percentage factor becomes smaller as we go to the upper VHF channels and to the UHF channels, other problems counteract any tendency for the interference problem to decrease. In fact, all indications are that the interference problems will increase.

Laboratory field tests were made on unsynchronized operation and with various values of offset carrier to obtain interference reduction for the several color TV systems proposed. Tests also were made covering the interference to the several proposed systems by other signals and by various propagation phenomena. With regard to the UHF part of the spectrum, tests were conducted on proposed receivers and converters to determine the problems involved. One of the studies indicated that the intermodulation problem may become a factor limiting the allocation in this portion of the spectrum.

Studies have been made of other technical problems involved in the several proposed color TV systems, including the problem of integrating one or more of the proposed systems into the present TV structure. Five exhibits, together with testimony, were presented in the hearing and further studies will be offered in the later phases of the hearing.

In addition, the laboratory made arrangements for the three comparative TV demonstrations, at which the operation of the three proposed systems could be viewed side-by-side under comparable conditions. One of the demonstrations was held at the laboratory. At the first of these demonstrations the Laboratory Division demonstrated an automatic device, developed by two Commission engineers, which when connected to a receiver permitted the reception, in black and white, of either signals transmitted on the present standards (or

on compatible standards), or signals transmitted at a different field and line frequency. A patent application has been filed.

Preliminary investigations are under way at the laboratory with regard to the proposal to use sampling techniques to obtain more efficient use of the spectrum. These tests involve not only the increase which may be expected in the useful information transmitted, but also the problems of interference which may be inherent in the employment of this new process.

A study was made of the problem of reducing the severity of interference to the aviation service caused by oscillator radiation from FM broadcast receivers, which interference is causing severe difficulty with navigational aids for aircraft in a number of areas.

Studies also were made concerning the effects of locations of TV broadcasting or FM broadcasting towers or antennas in the vicinity of directional antenna systems employed in the AM broadcast band.

One modulation monitor and one frequency monitor for AM broadcast station operation were tested and approved during the year.

SERVICES OTHER THAN BROADCASTING

Further studies and measurements are under way in the laboratory on the problem of intermodulation, which severely limits the efficient use in the same geographical area of a large number of stations on the higher VHF and UHF frequencies. Indications are that the adjacent channel selectivity of receivers employed in the various land mobile services has been materially increased in the last year. No such general improvement appears with regard to intermodulation interference effects. As a result, the intermodulation effects may become the limiting factor in allocation rather than the adjacent channel selectivity of the receivers.

Further tests were made on a number of units proposed to be used for distress use on radiotelephone-equipped ships. A number of units intended to operate on the standards proposed by the United States were designed and constructed at the laboratory and furnished the Marine Division for forwarding to foreign governments for testing.

Several models of a proposed keyer for sending the distress signal on radiotelegraph-equipped ships were submitted to the laboratory during the year but they were found not to comply with the Commission's requirements.

A number of laboratory tests were made on equipment submitted by applicants for licenses in the citizens radio band. These tests indicated that much of the converted war surplus equipment could not be expected to operate in accordance with the Commission's rules and regulations.

Numerous other devices in the citizens band, such as garage door

openers, walkie-talkies, etc., were tested during the year but no approvals were given except to a small unit for the control of model aircraft.

PROPAGATION

The laboratory operated a 400-megacycle transmitter at Dan's Rock, Md., for approximately 6 months during the year. Recordings were made at Laurel, together with other measurements at fixed and mobile locations. These measurements were to obtain information at frequencies near those proposed for the UHF TV band and for the operation of land mobile services. The laboratory also installed field intensity recording equipment at a distance of approximately 62 miles from the UHF TV station operating experimentally at Bridgeport, Conn.

CALIBRATION OF APPARATUS

In its enforcement and investigation activities, the Field Engineering and Monitoring Division uses a large amount of technical equipment. During the year 6 field intensity sets and 12 signal generators were calibrated at the laboratory for such use.

NONCOMMUNICATIONS EQUIPMENT

Industrial heating, medical diathermy, and other miscellaneous uses of radio-frequency energy for purposes other than communication have expanded to such an extent that the power used by this classification of equipments exceeds the total transmitter power required for radio communication. Since this noncommunications equipment employs frequencies of the same order as used by the communications industry, severe interference may be expected unless these units are designed and operated properly. Some of these units use power far in excess of the 50 kilowatt maximum permitted AM broadcast stations. Devices in this category are covered by part 18 of the rules and regulations of the Commission. Medical diathermy apparatus which falls within this general category is type approved by the laboratory to insure that the frequency is maintained within one of the specified bands and that the harmonic and spurious radiations are within the limits of the Commission's rules and regulations. During the year 36 submissions of diathermy machines were received for test.

The Laboratory Division has been represented on the following committees which are working toward the reduction of interference from industrial radio-frequency heating equipment: I. R. E. Industrial Electronics Committee, A. I. E. E. Subcommittee on Induction and Dielectric Heating, and A. I. E. E. Subcommittee on Radiation Measurements Above 300 Megacycles.

CHAPTER VIII—FREQUENCY ALLOCATION AND INTERNATIONAL

1. GENERAL

The radio spectrum is a comparatively small part of the electromagnetic spectrum in which waves of electrical energy can be used for communication purposes. These waves are transmitted on frequencies which are measured in "kilocycles" and "megacycles." A megacycle is a convenient way of denoting 1,000 kilocycles.

For convenience, the radio spectrum below 30 kilocycles is known as the VLF (very low frequency) range; from 30 to 300 kilocycles, LF (low frequency); from 300 to 3,000 kilocycles, MF (medium frequency); 3,000 to 30,000 kilocycles, HF (high frequency); 30,000 kilocycles to 300 megacycles, VHF (very high frequency); 300 to 3,000 megacycles, UHF (ultra high frequency); 3,000 to 30,000 megacycles, SHF (super high frequency), and 30,000 to 300,000 megacycles, EHF (extremely high frequency).

Before World War II, the usable portion of the radio spectrum was limited to between 10 kilocycles and 300 megacycles. However, developments spurred by that conflict made it possible thereafter to extend the potentially useful radio spectrum to 30,000 megacycles. However, for practical purposes, the present ceiling for commercial utilization is around 10,000 megacycles (10,000,000 kilocycles). The result is that today's demand for frequencies far exceeds the number available for current practical use.

It is customary to speak of the spectrum space occupied by each radio service as a "band," meaning a group of frequencies allocated for the use of a specified service. These bands are further broken down into "channels" which are, in effect, the traffic lanes assigned for the transmissions of individual stations. Within these channels each station operates on a designated frequency, which means that it transmits so many waves per second.

However, not all channels are the same width. Some types of transmission require wider paths than others. Thus, an FM broadcast

station needs a channel 20 times wider than that used by an AM station, while a TV station requires about 600 times the spectrum space occupied by an AM station. In the nonbroadcast field, too, channel widths differ according to the requirements of the particular service. Also, the nature of a service is an important factor in determining its position in the radio spectrum. Each band has certain characteristics which must be taken into account in deciding the kind of stations which can best use it. Utilization of frequency bands, especially in the upper reaches of the spectrum, is further determined by the development and availability of apparatus able to use those frequencies.

In the early days of radio regulation a few kilocycles one way or another way was of little importance. Later, with the filling of the spectrum, the problems of interference between stations grew proportionately, and it became necessary to define more precise channel boundaries, engineering standards, and other technical requirements.

A fundamental task of the Federal Communications Commission is to allocate the radio spectrum to the various radio services and to write the rules and regulations to govern the operation of stations in those services on the particular frequencies that are assigned to them.

It would be wasteful and chaotic to attempt to operate a broadcast station on one frequency and, say, a police radio station and a ship radio station on adjacent frequencies. There must be respective bands of frequencies for the two score radio services with which the Commission deals, and within these bands assignments of particular frequencies must be made to individual stations. Thus, frequency "allocation" refers to setting up bands of frequencies for the use of the various radio services, while frequency "assignment" pertains to assigning a specific frequency for use by a particular station.

Frequency allocation is a complex subject. It may, in brief, be likened to building communication highways in the spectrum. In ordinary road building there is a wide choice of land routes. However, most of the usable radio lanes are already crowded and, unlike land traffic, radio transmissions cannot be routed by underpasses and overpasses. Neither do they obey traffic signals to allow other traffic to pass, or go just to the point where they are to be heard. They spread out to thousands of other points as well, crossing political and geographical boundary lines in all directions.

As the spectrum becomes more congested, interference grows in seriousness. It can come not only from domestic stations, but also from foreign stations. That is why mutual working arrangements between nations to handle radio's expanded usage is necessary. Foreign merchant ships cannot, for example, employ for radar the bands which the United States uses for television. Consequently, radiotelephone and radiotelegraph bands must be shared by such stations of all na-

tions, and the ship and aeronautical bands must likewise be shared, and so must the broadcasting bands.

The international aspect of radio has developed to such an extent that almost no major frequency allocation can be made without considering world-wide usage. Hence, the primary allocation of frequencies is now determined by international treaty or other agreement. In this connection, the Federal Communications Commission is called upon by the Department of State to do a large share of the preparatory work for international radio conferences, and to furnish a large proportion of United States delegates and advisers to these conferences.

The direction in which a radio signal will travel and the frequency of the radio signal can be controlled. However, the distance a radio signal will travel cannot be controlled. It is this extended travel of radio signals which requires United States participation in international conferences to work out allocation, interference, equipment, and other radio problems, not to mention common carrier rate and regulatory matters.

By international agreement, the radio spectrum is allocated in such a way as to minimize interference between radio stations in different countries. Frequently, interference arises between stations in the United States and stations in other countries because of unusual propagation conditions, congestion in the radio spectrum, and imperfections of radio transmitters and receivers. In order that there be an uninterrupted flow of radiocommunication into and out of the United States, as well as within our own borders, interference cases reported by the Commission's monitoring stations, by the Commission's licensees, and by other governments must be resolved on an international basis.

The Commission examines and transmits to foreign administrations, through the Department of State, and to United States Government radio operating agencies, reports of treaty infractions so noted. Many of these infractions concern safety of life and property, particularly when they involve violations of the regulations regarding distress frequencies.

The international treaties to which this country is a party stipulate certain technical requirements which must be satisfied by equipment used within the various services. These requirements are intended to minimize interfence and to provide for further improvements in radio apparatus so that added uses can be made of the radio spectrum.

2. FREQUENCY ALLOCATION

The events of principal significance in the field of frequency allocations fall broadly into two categories. The first is the various continuing regulatory work of the Commission having to do with frequency allocations and the second is the project in which the United

States currently is engaged in preparing for bringing into force the International Table of Frequency Allocations below 27,500 kilocycles. The Atlantic City Table of Frequency Allocations above 27,500 kilocycles is now in force and part 2 of the Commission's rules contains the Commission's allocation table which is in accordance therewith.

FREQUENCY ALLOCATION BELOW 27,500 KILOCYCLES

The Atlantic City Radio Conference of 1947 adopted a complete set of radio regulations which is appended to the Convention of the International Telecommunication Union. These regulations became operative on January 1, 1949, but a provision stipulated that the table of frequency allocations below 27,500 kilocycles will not come into force until the effective date of the new international frequency list. Committee 6 of the Atlantic City conference was assigned the task of writing a frequency list for bands below 27,500 kilocycles but time did not permit its completion. Therefore, the conference established the Provisional Frequency Board to carry on this project. The board was charged with drafting lists of the world's frequency assignments in the bands generally between 14 kilocycles and 27,500 kilocycles. This work began in January 1948 and continued until February 1950.

Five principal radio services are recognized internationally in this portion of the spectrum, namely: Aeronautical mobile, broadcasting, maritime mobile, fixed, and amateur. The amateur service requires no frequency list but operates in a band allocation. The status of each of the other services, insofar as the PFB is concerned, is outlined in the following paragraphs:

Aeronautical mobile service.—An allotment plan of frequencies for areas was developed for the aeronautical mobile service (air to ground communication). These allotments do not specify specific assignments of individual frequencies to individual stations, but such assignment plans were considered at various International Civil Aviation Organization conferences during fiscal 1950 in preparation for the Extraordinary Administrative Radio Conference scheduled to convene at The Hague in September 1950.

High-frequency broadcasting service.—The Second International High Frequency Broadcasting Conference was held in Mexico City between October 22, 1948, and April 10, 1949. It resulted in an agreement, a final protocol and a basic plan for the distribution of channel hours for high-frequency broadcasting for one of the principal sunspot numbers and seasons. The United States was unable to approve this plan, however, and the Mexico City session provided that subsequent studies be made for other sunspot numbers and seasons.

These studies were undertaken first by a Technical Plan Committee comprising representatives from the United Kingdom, the USSR,

France, Australia, and about a dozen smaller countries with the United States participating as an observer, in Paris from June 22 to December 5, 1949, and by a second session of the High Freqency Broadcasting Conference in Italy in April 1950. This latter conference was in session at the close of the fiscal year.

Maritime mobile service.—The Provisional Frequency Board completed the drafting of a plan of assignments for the maritime mobile (telephone) and coastal telegraph stations of the world and has submitted these plans for consideration of the forthcoming Extraordinary Administrative Radio Conference.

Fixed service.—The Atlantic City Table of Frequency Allocations represents a reduction of spectrum space for the fixed service in order to provide more space for high-frequency broadcasting service, exclusive bands for the aeronautical mobile and maritime mobile services, and for other reasons. Outlining the responsibilities of the Provisional Frequency Board proved to be a most difficult task, principally because the various administrations requested far more frequency assignments than could be accommodated. As a result, the board did not complete the drafting of an assignment plan for the fixed service but reports of its various working groups concerning individual frequency bands are being made available to the Extraordinary Administrative Radio Conference.

It was agreed at Atlantic City that, when assignment plans for the several high-frequency services had been completed, a special conference of the ITU would be called for the purposes of approving the international frequency list for the bands below 27,500 kilocycles. Since a complete draft was not prepared in the time allotted, the Administrative Council of the ITU provided that an Extraordinary Administrative Radio Conference would be convened during September 1950, in lieu of the special conference envisaged at Atlantic City.

In addition to providing for drafting assignment plans for the four principal high-frequency services described above, the Atlantic City conference left to the three regions of the world the planning for implementation of the so-called regional frequency bands which lie generally below 4,000 kilocycles. The American hemisphere falls in region 2 for frequency allocation purposes. A conference of region 2 countries was held in Washington from April 25 to July 9, 1949. The proposal of the United States was, in effect, adopted by this conference, and provided that each country would prepare a list of its own assignments for coordination with such countries as may receive harmful interference from the assignments proposed. After coordination, these lists will be submitted to the ITU for inclusion in the first edition of the new international frequency list.

The following represents the status of the work done in the United States since the close of the region 2 conference:

The Commission prepared a list of non-Government stations and integrated it, on an engineering basis, with the corresponding United States Government lists, to form a United States frequency list for certain regional frequency bands. The frequency bands involved 150–415, 415–535, and 1,605–2,000 kilocycles.

In the band 535–1,605 kilocycles, no initial technical coordination is contemplated, since the region 2 conference provided for furnishing ITU the lists of assignments of the individual countries, taking into account bilateral and multilateral agreements, and since the assignment plans for the broadcasting service in this band for North America are currently scheduled to be considered at the North American Regional Broadcasting Conference to be held in Washington in September 1950. It is expected that whatever assignments for the United States result from this conference will be furnished the ITU for inclusion in the first edition of the new international frequency list.

The Commission has, since January 1948, provided the secretariat for the Washington Provisional Frequency Board Liaison Committee. This group (WPFBLC) assisted the Department of State in providing liaison between United States representative to the Provisional Frequency Board at Geneva and United States agencies interested in that work. During the fiscal year, until February 28, 1950, the PFB was engaged in compiling a list of world frequency assignments as a step toward implementing the Atlantic City Table of Frequency Allocations below 27,500 kilocycles.

NATIONAL FREQUENCY ALLOCATION

The domestic table of frequency allocations, which is in conformity with the Atlantic City Radio Regulations, was adopted as a portion of part 2 of the Commission's rules. Since the table came into force, some 20 amendments have been adopted. The list follows:

Frequency band	Amendment No.	Date	Description—Section number
.....	.....	7- 1-49	Effective date, pt. 2 revised to 27 Apr. 1949.
.....	37344 (2-2)	7-14-49	Order amending sec. 2.405 "Operation during emergency" to prohibit transmission "on frequencies other than, or with power in excess of, that specified in the instrument of authorization" during such emergency.
1,750–1,800 kc.....	38735 (2-3)	8-11-49	Order amending sec. 2.104 (a) extending temporary allocation to the Radiolocation service to 2-17-50.
.....	40988 (2-4)	11- 9-49	Revised appendix to pt. 2 containing list of laws, treaties, agreements, and arrangements relating to radio to bring list up to date.
148.14 Mc.....	36059	6-15-49	P. N. proposing amendment of (pt. 9 and) secs. 2.1 and 2.104 (a) to add definitions of Civil Air Patrol land and mobile stations and to make the frequency 148.14 Mc. available to these stations (includes new US21 footnote.)
148.14 Mc.....	40998 (2-5)	11- 9-49	Order adopting amendments as proposed in P. N. 36059 (6-15-1949).
148.14 Mc.....	(2-10)	4-25-50	Correction of (2-5) for omission of US 17.

Frequency band	(Amendment No.) P. N.	Date	Description—Section number
35.2–36.0, 43.2–44.0 Mc..... 3,500–3,700, 6,425–6,575, 11,700–12,200 Mc.	39781 39781	9- 7-49 9- 7-49	Proposed amendment sec. 2.104 (a) to subdivide the allocation of these bands to agree with actual licensing practice; and to restrict land stations using these bands (by proposed NG 12 footnote) to communication with mobile (except TV pick-up) stations, and; amendment section 2.1 revising definitions of industrial scientific and medical equipment and meteorological radar station, and; amendment sec. 2.103 revising clause permitting use of frequencies on temporary basis in exception to the table of frequency allocations and revising clause permitting use of frequencies by experimental stations.
35.2–36.0, 43.2–44.0, 3,500–3,700, 6,425–6,575, 11,700–12,200 Mc.	43565 (2–6)	1- 5-50	Order adopting amendments to pt. 2 as proposed in public notice 39781 (9–7–1949).
420–460 Mc.....	44409	1–11–50	PN proposing amendment sec. 2.104 (a) footnote US 11 to permit extension of use of band by aeronautical radionavigation service to Feb. 15, 1953.
	45702 (2–7)	2- 8-50	Order extending date (to Feb. 15, 1953) after which the aeronautical radionavigation service will not be permitted use of the band (footnote US 11).
420–450 Mc.....	45704 (2–8)	2- 8-50	Order extending amateur peak power limitation (50 watts) in this band to Feb. 15, 1953, amending footnote US 18, sec. 2.104 (a).
1,750–1,800 kc.....	45772 (2–9)	2–15–50	Order amending sec. 2.104 (a) footnote (2) extending the temporary allocation of this band to the Radiolocation service to 8–17–1950.
162–174, 406–420 Mc.....	50889 (2–12)	6–22–50	Order amending sec. 2.104 (a) adding new footnote US 25 to these Government bands, containing list of frequencies available for non-Government use for transmission of hydrological and meteorological date.
140.58 Mc.....	50890 (2–12)	6–22–50	Order amending sec. 2.104 (a) deleting footnote US 7 effective 9–1–1950. This deletes interim emergency aeronautical mobile calling frequency 140.58 Mc which is in a Government band since regular emergency calling frequency 121.5 Mc will be fully implemented by 9–1–1950.
.....	48763 (2–11)	5–15–50	Order amending appendix to pt. 2 making certain additions and deletions to the List of Treaties, Arrangements and agreements to bring list up to date.
940–952 Mc.....	42077	11–25–49	Proposed amendment to (pt. 4 and) sec. 2.104 (a) to delete footnote NG 13 as proposed Part 4 would list specific assignable frequencies.
162–174 Mc.....	51019	6–27–50	Proposed amendment to sec. 2.104 (a) footnote US 19 to permit non-Federal conservation agencies to use 2 of the frequencies in this band previously available only to non-Federal forest fire fighting agencies.
10–535–Kc, 535–1605 kc, 1605 kc.	38578	7–29–49	Adopted order separating the (low power rules) docket into 4 parts; A—Incidental radiation devices; B—Carrier current communication systems and restricted radiation devices (10–535 kc., C—Restricted radiation devices above 1605 kc, D—Restricted radiation devices, 535–1605 kc. The ablve will affect the provisions of Section 2.103 of Part 2.
1750–1,800 kc.....	47525	3–23–50	Public notice setting date for informal conference on the proposed "disaster service" and setting forth basis for future rules. The above will affect Section 2.104 (a) of pt. 2 of the Rules.

3. INTERDEPARTMENT RADIO ADVISORY COMMITTEE

The Commission does not license United States Government radio stations or assign their frequencies. Such frequency assignments are made by the President upon recommendation of the Interdepartment Radio Advisory Committee (IRAC), composed of 11 Federal agencies. The Commission provides the secretariat of the IRAC.

During the fiscal year the IRAC approved 6,966 new and deleted 1,574 regular assignments, bringing the total of outstanding regular assignments to 64,265. In addition, it approved 863 changes in assignments, 2,363 temporary assignments, and 470 deletions of temporary assignments. In all, it processed a total of 12,439 applications.

4. FREQUENCY REGISTRATION AND NOTIFICATION

The past year required extensive changes in the Commission's frequency records. A large majority of the estimated 50,000 frequency card records (exclusive of government records) comprising the Commission's Master Frequency Record were changed to conform to the Atlantic City Radio Regulations, modified licenses were issued and the ITU notified accordingly.

Each new authorization issued by the Commission is incorporated into the Master Frequency Record by the preparation of a card record for each frequency, and each succeeding authorization is compared with the terms of the preceding one and the changes incorporated into the original card record. From these cards, intermixed with those produced from lists furnished by the several Government agencies, the frequency notifications to the ITU are prepared to safeguard the priority of frequency use by United States stations. In addition, cards and notifications are prepared to keep the station lists published by the ITU up-to-date as far as the United States is concerned.

The task of converting all of the present cards in the master frequency record to the format and column numbering system specified in the Atlantic City radio regulations, and bringing this record into agreement with the international frequency list, remains to be accomplished.

The following tabulation is a summary of the past year's activities, other than routine notifications. The dates shown are those of the radio service bulletins in which they were recorded:

Aug. 1, 1949——Notification of bandwidths of emission was initiated.

Oct. 1, 1949——Change of card records and notifications of FM broadcasting stations from "Special for FM" emission to "F3" was begun.

Nov. 1, 1949——Resumption of notification of Commission licensed aeronautical stations for publication in the list of aeronautical and aircraft stations. (Notification of Government aeronautical stations and all aircraft stations has not yet been resumed.)

Dec. 15, 1949——(*a*) Frequency notification for Commission authorized international broadcasting stations on special service authorization was made.

(*b*) Bandwidth of emission was notified for all international fixed telegraph stations.

Jan. 1, 1950——Change of card records and notifications of FM broadcasting stations to 180F3 emission was begun.

Jan. 15, 1950——Change of the "name of station" of all broadcasting station card records and notifications from transmitting sites to studio locations.

Feb. 1, 1950——(*a*) Frequency notifications for all Commission authorized aeronautical fixed stations in the international service were sent to Geneva.

Feb. 1, 1950 (Con.) (*b*) Notifications for Commission authorized aeronautical radiolocation stations were prepared for the list of radiolocation stations.

1950 The task of collecting statistics of the numbers of Commission authorized and Government stations of the several classes, and the numbers of messages transmitted during the calendar year 1949 was initiated.

5. INTERNATIONAL

TREATY ACTIVITIES

Cooperation with Canada.—With the rapid occupancy of VHF non-Government fixed and mobile bands, a serious problem of interference arose in the case of United States and Canadian assignments made near the border of the two countries. In cooperation with the Department of State, discussions were held in Ottawa. As a result, the Commission and the Canadian Department of Transport, on May 3, 1950, announced the adoption of a coordination procedure for the exchange of engineering information and comments concerning proposed frequency assignments to civil fixed- and mobile-radio services in certain VHF and UHF frequency bands.

The purpose of this procedure is to enable Canada and the United States to ascertain, in advance of making assignments to stations not previously authorized to use such frequencies, whether a proposed assignment would be one which would be likely to cause or suffer harmful interference from a previous assignment by the other country. It is believed that this procedure will materially minimize interference between stations of the two countries.

International interference cases.—During the fiscal year, 315 new cases of international interference came to the Commission's attention. These, plus some 70 cases which existed at the beginning of the fiscal year, were handled by the Commission's frequency allocation and treaty division, in some cases with the assistance of the Department of State and other divisions of the Commission. Because of the long-term nature of the negotiations involved, some 100 cases remained unsolved at the end of the year. A new procedure was put into effect which greatly shortens the time formerly required by the Commission's staff to handle complaints of international interference involving United States Government stations.

Reports of treaty infractions.—The currently effective Atlantic City Radio Regulations provide that the different nations shall report infringements of the convention or radio regulations to the responsible administrations. An internationally standard report form is prescribed. A total of approximately 3,000 treaty infraction reports prepared by the Commission's Field Engineering and Monitoring Division were forwarded to the appropriate telecommunication agencies in 147 foreign countries. Prior to forwarding, these reports were

processed to insure that citations were based upon the appropriate treaty provision. A procedure was put into force during the year whereby the former total of about 400 reports per month received, processed and forwarded, was reduced to about 150 per month.

Special studies were conducted by the Frequency Allocation and Treaty Division concerning the future international consideration of the problem of VHF assignments and their growth in view of the propagation conditions which frequently cause international interference over great distances.

Studies were begun relating to the United States proposals to be prepared for the revision of the general technical provisions of the radio regulations (Atlantic City, 1947). Studies, preparation of proposals, and coordination between various divisions of the Commission were participated in with regard to the continuing actvities of the International Radio Consultative Committee (CCIR), including participation in many technical meetings of the Government-industry preparatory committees of the Department of State.

FOREIGN TECHNICAL ASSISTANCE PROGRAMS

During the fiscal year, a considerable number of foreign communications officials visited the Commission to study and observe United States communications regulatory methods, monitoring procedures, and American techniques in the communications art. Appropriate programs of study, technical training, observational tours, inspection of facilities, conferences and interviews with officials in both Government and private industry were arranged. In this connection, the Commission collaborated with Government and other agencies, such as the Economic Cooperation Administration, the Supreme Commander of the Allied Powers of the Pacific (SCAP), the United Nations, and with various private communications companies. The Commission is a member of the Interdepartmental Committee on Scientific and Cultural Cooperation, operating under the Department of State.

INTERNATIONAL CONFERENCES

The Commission assisted in the United States preparation for and participated in 19 international meetings and conferences. These conferences were either world-wide or regional and for the most part were convened either under the aegis of the International Telecommunication Union or the International Civil Aviation Organization, both of which are specialized agencies of the United Nations.

It should be borne in mind that these international sessions concern all types of electrical communication media operating between this country and foreign points. They affect international telephone and telegraph common carriers, as well as other overseas and between-

country radio services. Treaties and other agreements reached (see list in appendix) involve rates, regulations, and technical standards applicable to international or regional traffic. Particular references to the common carrier, safety and special services, and broadcast service phases will be found in those respective chapters.

The International Telecommunication Union first came into being as a European body called the International Telegraph Union following the signing of a treaty in Paris in 1865. In 1906 the International Wireless Telegraph Convention of Berlin entrusted the union with duties relating to radiotelegraphy, and at an international conference in Madrid in 1932 the International Telecommunication Union (ITU) was created. As a result of an agreement signed at Atlantic City in 1947, the ITU became one of the specialized agencies of the United Nations. Its headquarters are at Geneva, and its membership now includes 81 nations.

The International Civil Aviation Organization (ICAO), seated at Montreal, was established under the Convention on International Civil Aviation concluded at Chicago in 1944, and the organization came into being in 1947 following ratification of the convention by the twenty-sixth State. For the preceding period of nearly 2 years, an interim organization, the Provisional International Civil Aviation Organization (PICAO), similar in structure to ICAO, carried out many of the functions of and prepared the way for the permanent organization. ICAO was established to develop the principles and techniques of international air navigation and to foster the planning and development of international civil aviation so as to insure its safe and orderly growth by promoting uniformity in regulations, standards, and procedures throughout the world. Its present membership comprises 58 nations.

The need and general desirability of convening regional conferences, concluding regional agreements, and forming regional organizations is recognized by the Atlantic City Convention of 1947 for the purpose of settling telecommunication questions which are purely regional in character and therefore more susceptible of being treated on a regional rather than a world-wide basis, provided agreements so reached are not in conflict with the world convention. The American countries have observed this principle over a period of years, as is reflected by inter-American agreements reached at Havana in1937, Santiago in 1940, Rio de Janeiro in 1945, and Washington in 1949. Meetings, which may be termed subregional, have been held to solve problems peculiar to Central, South, or North America. Typical of these are the so-called NARBA, or North American Regional Broadcasting Agreement conferences, convened in Havana in 1937, Washington in 1941, and Montreal in 1949. In addition to these hemispheric and

geographic subdivisions, the radio regulations of Atlantic City divided the world into three regions for frequency allocation purposes. Allocation conferences have been held and agreements reached for each of these regions. The first conference of ITU region 2 was convened in Washington in April 1949. Likewise, initial meetings were held by the nations of regions 1 and 3, which in May following separately convened at Geneva for the purpose of drawing up frequency assignment plans.

In fiscal 1950, the Commission furnished 3 chairmen, 4 vice chairmen, 1 delegate, 1 chief observer, 1 chief technical adviser, and 35 advisers, as well as some staff assistance for the United States delegations to 12 ITU and regional telecommunications conferences:

1. Preparatory group for second session of International Administrative Aeronautical Radio Conference, ITU, Washington, March 15 to July 9, 1949.
2. Fourth Inter-American Radio Conference, Washington, April 25 to July 9, 1949.
3. ITU region 2 conference, Washington, April 25 to July 9, 1949.
4. International Telephone and Telegraph Conference, Paris, May 18 to August 5, 1949.
5. ITU region 1 conference, Geneva, May 18 to September 17, 1949.
6. ITU region 3 conference, Geneva, May 18 to November 4, 1949.
7. Technical Plan Committee of International High-Frequency Broadcasting Conference, Paris, June 22 to December 5, 1949.
8. Conference for Revision of 1945 Bermuda Telecommunications Agreement, London, August 1949.
9. Second session, International Administrative Aeronautical Radio Conference, Geneva, August 1 to October 14, 1949.
10. Third North American Regional Broadcasting Agreement Conference, Montreal, September to December 8, 1949.
11. Provisional Frequency Board, Geneva, January 1, 1948 to February 28, 1950.
12. Second International High Frequency Broadcasting Conference, Florence and Rapallo, Italy, April 1, 1950 (in session on June 30, 1950).

The Commission also furnished one chairman, four vice chairmen, one delegate, and two advisers for delegations to seven ICAO conferences:

1. European-Mediterranean Aeronautical Fixed Telecommunication Special Meeting, Paris, November 8 to December 8, 1949.
2. European-Mediterranean Aeronautical VHF Informal Meeting, Paris, November 8 to December 8, 1949.
3. Special Meeting on Aeronautical Fixed Services in African-Indian Ocean and Middle East Regions, Paris, March 21 to April 11, 1950.
4. African-Indian Ocean/Middle East Frequency Assignment Planning Meeting, Paris, March 21 to April 11, 1950.
5. South East Asia Frequency Assignment Planning Meeting, New Delhi, April 18 to May 10, 1950.
6. Second Caribbean Regional Air Navigation Meeting, Havana, April 11 to April 27, 1950.
7. Caribbean/South American/South Atlantic Frequency Assignment Planning Meeting, Havana, April 11 to April 27, 1950.

In addition to the above multilateral conferences, there were many bilateral meetings with Mexico, Cuba, and Canada, concerning such problems as broadcasting, aeronautical communications, and interference, as well as the coordination of frequency lists.

The Commission also assisted in the preparation of the United States position for the following meetings:

1. ICAO Fourth Assembly, Montreal, May 30, 1950.
2. European-Mediterranean Frequency Assignment Planning Meeting, Paris, June 6, 1950 (ICAO).

At the end of the fiscal year there were projected 24 conferences and meetings for which the Commission's staff was engaged in preparatory work:

1. Extraordinary Radio Conference (ITU), The Hague, September 1, 1950.
2. Second Session of Third North American Regional Broadcasting Agreement Conference, Washington, September 6, 1950.
3. ICAO Second Middle East Regional Air Navigation Meeting, Istanbul, October 17, 1950.
4. United States-Canada conference to draft treaty covering ship radio requirements for the Great Lakes, Ottawa, fall, 1950.
5. ICAO Third European-Mediterranean Regional Air Navigation Meeting, Paris, February 27, 1951.
6. ICAO Communications Division, Fourth Session, Montreal, April 3, 1951.
7. International Telephone Consultative Committee (ITU), Italy, spring, 1951.
8. International Radio Consultative Committee (ITU), Prague, spring, 1951.
9. International Telegraph Consultative Committee (ITU), Holland, spring, 1951.
10. Several Special Air Navigation Meetings of ICAO, site undertermined. 1951.
11. ICAO Search and Rescue Division, Third Session, Montreal, October 2, 1951.
12. ICAO Combined South American-South Atlantic Regional Air Navigation Meeting, Buenos Aires, November 15, 1951.
13. ICAO Combined North Pacific-South Pacific Regional Air Navigation Meeting, site undetermined, early 1952.
14. ICAO Third North Atlantic Regional Air Navigation Meeting, site undetermined, early 1952.
15. ICAO Second Southeast Asia Regional Air Navigation Meeting, site undetermined, late 1952.
16. Plenipotentiary Conference of ITU, Administrative Telegraph, Telephone and Radio Conferences (ITU), Buenos Aires, 1952.
17. Fifth Inter-American Radio Conference, Montevideo, 1952.
18. Special meeting of ICAO, site undetermined, late 1952.
19. ICAO African-Indian Ocean Second Regional Air Navigation Meeting, site undetermined, early 1953.
20. Special meeting of ICAO, site undetermined, early 1953.
21. ICAO Fourth European Mediterranean Regional Air Navigation Meeting, site undetermined, late 1953.
22. ICAO Third Caribbean Regional Air Navigation Meeting, site undetermined, late 1953.
23. ICAO Communications Division, Fifth Session, site undetermined, late 1953.
24. Two special meetings of ICAO, site undetermined, late 1953.

APPENDIX

1. FIELD OFFICES
2. PUBLICATIONS
3. TREATIES AND OTHER INTERNATIONAL AGREEMENTS

1. FIELD OFFICES

The Commission maintains 65 field installations geographically distributed throughout the United States and its possessions. Sixty of these are engaged in engineering work, comprising 9 regional offices, 23 district offices, 6 suboffices, 3 ship offices, and 19 monitoring stations. There are also 4 Common Carrier Bureau field offices, and 1 Bureau of Law Field office. The complete list follows:

FIELD ENGINEERING AND MONITORING DIVISION

Regional offices	*Headquarters*
North Atlantic	506 Federal Building, New York 14, N. Y.
South Atlantic	411 Federal Annex, Atlanta 3, Georgia.
Gulf States	332 U. S. Appraisers Building, Houston 11, Tex.
South Pacific	323–A Customhouse, San Francisco 26, Cal.
North Pacific	801 Federal Office Building, Seattle 4, Wash.
Central States	876 U. S. Courthouse Building, Chicago 4, Ill.
Great Lakes	1029 New Federal Building, Detroit 26, Mich.
Hawaiian	P. O. Box 1142, Lanikai, Oahu, T. H.
Alaskan	52 Post Office and Courthouse, Anchorage, Alaska.

District offices	*Address*
1	1600 Customhouse, Boston 9, Mass.
2	748 Federal Building, New York 14, N. Y.
3	1005 U. S. Customhouse, Philadelphia 6, Pa.
4	508 Old Town Bank Building, Baltimore 2, Md.
5	402 New Post Office Building, Norfolk 10, Va. (ship office) 106 Post Office Building, Newport News, Va.
6	411 Federal Annex, Atlanta 3, Ga. (suboffice 214 Post Office Building, Savannah, Ga.
7	312 Federal Building, Miami 1, Fla. (suboffice) 409–410 Post Office Building, Tampa 2, Fla.
8	400 Audubon Building, New Orleans 16, La. (suboffice) 324 Courthouse and Customhouse, Mobile 10, Ala.
9	324 U. S. Appraisers Building, Houston 11, Tex. (suboffice) 329 Post Office Building, Beaumont, Tex. (ship office) 406 Post Office Building, Galveston, Tex.
10	500 U. S. Terminal Annex Building, Dallas 2, Tex.

11	539 U. S. Post Office and Courthouse Building, Los Angeles 12, Calif. (suboffice) 230 U. S. Customhouse and Courthouse, San Diego 1, Calif. (ship office) 326 U. S. Post Office and Courthouse, San Pedro, Calif.
12	323–A Customhouse, San Francisco 26, Calif.
13	307 Fitzpatrick Building, Portland 5, Oreg.
14	801 Federal Office Building, Seattle 4, Wash.
15	521 Customhouse, Denver 2, Colo.
16	208 Uptown Post Office and Federal Courts Building, St. Paul 2, Minn.
17	3200 Fidelity Building, Kansas City 6E, Mo.
18	246 U. S. Courthouse, Chicago 4, Ill.
19	1029 New Federal Building, Detroit 26, Mich.
20	328 Federal Building, Buffalo 3, N. Y.
21	609 Stangenwald Building, Honolulu 1, T. H.
22	322–323 Federal Building, San Juan 13, P. R.
23	7–8 Shattuck Building, Juneau, Alaska (suboffice), 53 U. S. Post Office and Courthouse Building, Anchorage, Alaska.

Primary monitoring stations	*Secondary monitoring stations*
Allegan, Mich.	Searsport, Maine
Grand Island, Nebr.	North Scituate, R. I.
Kingsville, Tex.	Spokane, Wash.
Millis, Mass.	Twin Falls, Idaho
Santa Ana, Calif.	Fort Lauderdale, Fla.
Laurel, Md.	Lexington, Ky.
Livermore, Calif.	Muskogee, Okla.
Portland, Oreg.	Bay St. Louis, Miss.
Powder Springs, Ga.	
Lanikai, Oahu, T. H.	
Anchorage, Alaska.	

COMMON CARRIER BUREAU FIELD OFFICES

Atlanta, Ga., 733 Hurt Building.
New York, N. Y., 624 Federal Office Building.
St. Louis, Mo., 334, 815 Olive Street.
San Francisco, Calif., 555 Battery Street.

BUREAU OF LAW FIELD OFFICE

Los Angeles, Calif., 1031 South Broadway.

2. PUBLICATIONS

In general, the Federal Communications Commission's printed publications are sold by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., and are not distributed by the Commission.

Following is a list of such publications which are available from that source, at the prices noted, unless otherwise indicated:

Title	Price
Communications Act of 1934, with amendments and index, revised to Sept. 1, 1948	$0.20
Federal Communications Commission reports (bound volumes of decisions and orders exclusive of annual reports):	
Volume 3. July 1936. to Feb. 1937	2.00
Volume 4. Mar. 1937. to Nov. 15, 1937	1.50
Volume 5, Nov. 16, 1937, to June 30, 1938	1.50
Volume 6, July 1, 1938, to Feb. 28, 1939	1.50
Volume 7, Mar. 1, 1939, to Feb. 29, 1940	1.50
Volume 8, Mar. 1, 1940, to Aug. 1, 1941	1.50
Volume 10, Apr. 1, 1943, to June 30, 1945	2.00
Volume 11, July 1, 1945, to June 30, 1947	3.75
Volume 12, July 1, 1947, to June 30, 1948	[1]
Annual reports of the Commission:	
First Annual Report—Fiscal year 1935	.15
Twelfth Annual Report—Fiscal year 1946	.20
Thirteenth Annual Report—Fiscal year 1947	.25
Fourteenth Annual Report—Fiscal year 1948	.30
Fifteenth Annual Report—Fiscal year 1949	.35
Sixteenth Annual Report—Fiscal year 1950	[1]
Statistics of the Communications Industry:	
For the year 1939	.25
For the year 1940	.20
For the year 1942	.35
For the year 1943	.30
For the year 1944	.40
For the year 1945	.50
For the year 1946	.55
For the year 1947:	
Sections A and B	.75
Section B (broadcast only)	.25
For the year 1948:	
Sections A and B	1.00
Section B (broadcast only)	.35
For the year 1949:	
Sections A and B	[1]
Section B (broadcast only)	[1]

[1] In the process of printing—available at Government Printing Office at a later date.

Title	Price
Report on Public Service Responsibility of Broadcast Licensees, 1946	$0.25
An ABC of the FCC, 1949	.05
The Safety and Special Radio Services—a Public Primer, 1950	.15
Telephone and Telegraph—a Public Primer, 1949	.10
An Economic Study of Standard Broadcasting, 1947	.40
Study Guide and Reference Material for Commercial Radio Operator Examinations, revised to July 1, 1948	.25
Digest of Radio Regulations and Instructions for Restricted Radiotelephone Operators	.05
Standards of Good Engineering Practice:	
Concerning Standard Broadcast Stations, revised to Oct. 30, 1947	1.00
Section 26, Sunrise and Sunset Table	.10
Concerning FM Broadcast Stations, revised to Jan. 18, 1950	.10
Concerning Television Broadcast Stations, Revised to Dec. 19, 1945	.15
Rules and Regulations:	
Part 0, Organization, Delegation of Authority, etc	(1)
Part 1, Practice and Procedure, revised to Dec. 29, 1949	.20
Part 2, Frequency Allocations and Radio Treaty Matters; General Rules and Regulations, revised to Apr. 27, 1949	.20
Part 3, Radio Broadcast Services, revised to Jan. 6, 1949	.20
Part 4, Experimental and Auxiliary Broadcast Stations, effective Sept. 10, 1946	(1)
Part 5, Experimental Radio Services, revised to Jan. 16, 1948	.10
Part 6, Public Radiocommunication Services, revised to Apr. 27, 1949	.10
Part 7, Coastal and Marine Relay Services, revised to Sept. 30, 1945	(1)
Part 8, Ship Service, revised to May 31, 1943	.15
Part 9, Aeronautical Services, revised to July 1, 1947	.10
Part 10, Public Safety Radio Services, revised to Apr. 27, 1949	.10
Part 11, Industrial Radio Services, revised to Apr. 27, 1949	.10
Part 12, Amateur Radio Service, revised to Nov. 18, 1948	.15
Part 13, Commercial Radio Operators, revised to Mar. 30, 1949	.05
Part 14, Radio Stations in Alaska (other than Amateur and Broadcast) revised to Apr. 2, 1942	.05
Part 15, Restricted Radiation Devices (recodified July 21, 1948)	(1)
Part 16, Land Transportation Radio Services, revised to Apr. 27, 1949	.10
Part 18, Industrial, Scientific and Medical Service, revised to Jan. 25, 1950	.05
Part 19, Citizens Radio Service, effective June 1, 1949	.05
Part 31, Uniform System of Accounts for Class A and Class B Telephone Companies, revised to May 12, 1948	.35
Part 33, Uniform System of Accounts for Class C Telephone Companies, revised to May 12, 1948	.25
Part 34, Uniform System of Accounts for Radiotelegraph Carriers, revised to Oct. 14, 1949	.20
Part 35, Uniform System of Accounts for Wire-telegraph and Ocean-cable Carriers, revised to Oct. 14, 1949	.25
Part 41, Telegraph and Telephone Franks, revised to Dec. 4, 1947	.05
Part 43, Reports of Communication Common Carriers and Their Affiliates, revised to July 21, 1948	.10

[1] Obtainable temporarily from the Federal Communications Commission, Washington 25, D. C., without charge.

Title	Price
Part 45, Preservation of Records of Telephone Carriers, effective Oct. 1, 1950	(1)
Part 46, Preservation of Records of Wire-telegraph, Ocean-cable and Radiotelegraph Carriers, effective Oct. 1, 1950	(1)
Part 51, Classification of Telephone Employees, effective July 25, 1944	$0.05
Part 52, Classification of Wire-telegraph Employees, effective July 11, 1944	.05
Part 61, Tariffs, Rules Governing the Constuction, Filing and Posting of Schedules of Charges for Interstate and Foreign Communications Service, revised to Aug. 1, 1946	.10
Part 62, Applications under sec. 212 of the Act to Hold Interlocking Directorates, revised to May 23, 1944	.05
Part 63, Extension of Lines and Discontinuance of Service by Carriers, revised to Dec. 30, 1946	(1)
Part 64, Miscellaneous Rules Relating to Common Carriers, revised to July 16, 1948	.10

Purchasers of the Commission's Rules and Regulations are furnished a form by the Superintendent of Documents which, when filled out and forwarded to the Commission, entitles the purchaser to receive any future amendments to the part or parts purchased until a complete revision thereof is reprinted. In the event any exception is made in this procedure, rule purchasers will be advised by letter where the amendments may be obtained. All Standards of Good Engineering Practice and most of the rule parts are printed on 8 by 10½-inch pages and punched to fit standard three-ring binders.

The Commission is no longer able to supply lists of radio stations but, on request, will furnish a fact sheet about commercial sources of such lists, also one on commercial radio publications and services.

[1] Obtainable temporarily from the Federal Communications Commission, Washington 25, D. C., without charge.

3. TREATIES AND OTHER INTERNATIONAL AGREEMENTS

International treaties, agreements, and arrangements relating to radio and telecommunications which were in force and to which the United States was a party as of March 31, 1950 are listed below. Unless otherwise indicated, copies of these documents may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. (TS relates to Treaty Series, EAS to Executive Agreement Series, and TIAS to Treaties and Other International Act Series.)

Date	Series	Subject
1910		Ship Act of 1910 as amended in 1912. (Radiocommunication on the Great Lakes.)
1925	TS 724-A	Arrangement with Great Britain, Canada, and Newfoundland to prevent broadcast interference by ships.
1928-29	TS 767-A	Arrangement with Canada concerning private experimental radio communication.
1929	TS 777-A	Arrangement with Canada, Cuba, and Newfoundland relating to high-frequency assignments.
1929	TS 910	Safety of Life at Sea Convention (London).
1930	TS 921	Amendment to Regulation XIX of Annex 1 of Safety of Life at Sea Convention.
1934	EAS 62	Arrangement with Canada concerning amateur and private experimental communication.
1934	EAS 66	Arrangement with Peru concerning amateur communication.
1934	EAS 72	Same, with Chile.
1937	EAS 109	Agreement with Canada concerning issuance of radio licenses (largely suspended by TS 777-A, TS 962, EAS 227 and TIAS 1553).
1937	TS 962	North American Regional Broadcasting Agreement (Havana), (Supplemented by EAS 227 and TIAS 1553).
1937	TS 938	Inter-American Radio Communications Convention (First Inter-American Conference, Havana). (Amended by TIAS 1802.)
1938	TS 948	General Radio Regulations (Cairo Revision 1938); annexed to Telecommunications Convention (Madrid, 1932). (See TIAS 1901.)
1938	EAS 142	Agreement with Canada concerning radio communications between Alaska and British Columbia.
1938	TS 949	Regional Radio Convention (Guatemala—in behalf of the Canal Zone).
1938	EAS 136	Arrangement with Canada concerning broadcasting.
1939	EAS 143	Arrangement with Canada concerning civil aeronautical services.
1940	EAS 231	Inter-American Radio Communications Agreement (Second Inter-American Conference, Santiago, Chile).
1940	EAS 196	Agreement with Mexico concerning broadcasting.
1941	EAS 227	Supplementary North American Regional Broadcasting Agreement (Washington). (See TS 962 and TIAS 1553.)
1944	EAS 400	Wartime agreement with Canada re broadcasting stations in Northwestern Canada.
1945		Inter-American Telecommunications Convention (Third Inter-American Conference, Rio de Janeiro). (Not yet ratified by United States.) (Not available from Government Printing Office.)
1946	TIAS 1553	North American Regional Broadcasting Interim Agreement (Modus Vivendi), Washington. (Amended by TIAS 1802.)
1946	TIAS 1527	Agreement with U. S. S. R. concerning commercial radio teletype communication channels.
1947	TIAS 1726	Agreement with Canada concerning FM broadcasting in 88-108 Mc.
1947	TIAS 1670	Interim arrangement with Canada concerning mobile transmitters.
1947	TIAS 1901	Telecommunication Convention, Final Protocol, and Radio Regulations, Atlantic City, 1947. (Since the United States is not a party to the Additional Radio Regulations, they are not included in TIAS 1901 and are available only through the International Telecommunication Union, Geneva, Switzerland.)
1947	TIAS 1652	Agreement with Great Britain concerning standardization of distance measuring equipment.
1947	TIAS 1676	Agreement with the United Nations concerning its headquarters' use of radio.
1948	TIAS 1802	Arrangement with Canada on engineering standards applicable to allocation of standard broadcast stations.
1949		Agreement between United States and certain British Commonwealth governments (London). (To be published by Government Printing Office.)
1950		Arrangement with Ecuador concerning third-party amateur communication. (To be published by Government Printing Office.)
1950	TIAS 2052	Convention of World Meteorological Organization (Washington, 1947); effective Mar. 23, 1950.

In addition, the United States is bound by certain other treaties and agreements which are generally considered as superseded because certain of the contracting countries other than the United States did not become a party to subsequent treaties and agreements. The United States is, in such instances, bound to the original document with respect to its relations with those particular countries. These include the following:

Date	Series	Subject
1912	TS 581	International Radiotelegraph Convention (London).
1927	TS 767	International Radiotelegraph Convention and General Regulations (Washington).
1932	TS 867	International Telecommunications Convention; General Radio Regulations (Madrid).
1937	EAS 200	Inter-American Arrangement concerning Radio Communications and Annex (Havana, 1937), was replaced by Inter-American Agreement concerning Radio Communications (Santiago, 1940, EAS 231).

The following treaties, agreements, and arrangements have been signed by the United States and are included for informational purposes because of their importance or the imminence of their effective dates:

Date	Subject
1948	International Convention on Safety of Life at Sea (London), effective Jan. 1, 1951.
1949	Inter-American Radio Agreement between the United States, Canada and other American republics.[1] (Fourth Inter-American Conference), (Washington), effective Apr. 1, 1950. (Not yet available from Government Printing Office; available through ITU, Geneva.)
1949	Telegraph Regulations (Paris Revision, 1949) annexed to International Telecommunication Convention (Atlantic City, 1947) and Final Protocol to the Telegraph Regulations (Paris), effective July 1, 1950. Subject to United States ratification. (Not yet available from Government Printing Office; available through ITU, Geneva).

[1] In addition, certain resolutions and recommendations were adopted by a number of member countries of the ITU in region 2 at Washington, July 9, 1949. (Not yet available from Government Printing Office but available through ITU, Geneva.)

There are, in addition to the foregoing, certain treaties, agreements, or arrangements primarily concerned with matters other than the use of radio but which affect the work of the Federal Communications Commission insofar as they involve communications. Among the most important of these are the following:

Date	Series	Subject
1944	TIAS 1591	International Civil Aviation Convention (Chicago).
1946		Special Radio Technical Meeting (COT), Montreal.[1]
1946		ICAO Regional Air Navigation Meetings, Communications Committee, Final Reports.[1]
1947		
1948		
1949		
1950		
1946		ICAO Communication Division, Second Session, Montreal.[1]
1949		ICAO Communication Division, Third Session, Montreal.[1]

[1] Not available from Government Printing Office; available from Secretary General of ICAO, Dominion Square Bldg., Montreal, Canada.

SEVENTEENTH ANNUAL REPORT

FEDERAL COMMUNICATIONS COMMISSION

FISCAL YEAR ENDED JUNE 30, 1951

(With introductory summary and notation of subsequent important developments)

UNITED STATES GOVERNMENT PRINTING OFFICE • WASHINGTON • 1952

COMMISSIONERS

MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION

(as of June 30, 1951)

CHAIRMAN

WAYNE COY

(Term expires June 30, 1958)

PAUL A. WALKER
(Term expires June 30, 1953)

ROSEL H. HYDE
(Term expires June 30, 1952)

EDWARD M. WEBSTER
(Term expires June 30, 1956)

ROBERT F. JONES
(Term expires June 30, 1954)

GEORGE E. STERLING
(Term expires June 30, 1957)

FRIEDA B. HENNOCK
(Term expires June 30, 1955)

LETTER OF TRANSMITTAL

FEDERAL COMMUNICATIONS COMMISSION,
Washington 25, D. C.

To the Congress of the United States:

Pursuant to section 4 (k) of the Communications Act of 1934, as amended, there is herewith submitted the seventeenth annual report of the Federal Communications Commission.

Though this report concerns the Commission's activities for the fiscal year ended June 30, 1951, primarily, the introductory summary includes convenient reference to subsequent events up to the time of going to press.

This year, in particular, I cannot emphasize too strongly the fact that, because of reduced appropriations and consequent loss of manpower, the Commission cannot take care of its regular functions, not to mention duties added by the national defense program. Consequently there is a mounting backload of work in various categories which seriously affects the economy of the various communications industries and, in fact, the economy of the country generally.

Respectfully,

WAYNE COY, *Chairman.*

TABLE OF CONTENTS

INTRODUCTORY SUMMARY

1. HIGHLIGHTS OF THE FISCAL YEAR

GENERAL

Though television and other broadcast matters continued to monopolize popular interest, the seventeenth year of Federal Communications Commission operation witnessed even more significant developments in the safety and special radio field and a growing complexity of problems affecting both wire and radio common carriers. These nonbroadcast services are of equal concern to the public, since they help to protect life and property, aid commerce and industry, provide employment and other individual benefits, and involve the rates paid by users of telephone and telegraph communication.

Commission consideration of radio subjects ranged from continuing to seek room in the congested spectrum for new and expanding services to means of dealing with mounting interference, especially from noncommunication devices which radiate energy. Its regulation of common carrier facilities and operations extended from land wires to cable and radio adjuncts. Some of these matters had international as well as domestic implications. The Commission was called upon by the military and other agencies for further and increasing assistance in tying various types of communication facilities to the national defense program.

Because of reduced appropriations, and consequent loss of manpower, the Commission was hard pressed to take care of its growing normal workload, not to mention priority projects requiring immediate attention. Necessary curtailments were evidenced in some routine field operations, also in delays and backlogs in processing certain types of applications.

An idea of the Commission's present job is only partly reflected by the number of outstanding radio authorizations under its jurisdiction. These increased more than 100,000 during the year and now approximate 885,000. Moreover, it should be pointed out that some

radio operations cover the use of many transmitters. Consequently, the present number of such authorizations reflect the use of approximately 425,000 transmitters, of which more than 115,000 are fixed and nearly 310,000 are mobile.

At the year's end nonbroadcast radio authorizations approached 179,000 as compared with about 4,600 in broadcast. In addition, there were more than 700,000 authorizations for various classes of radio operators.

Applications received by the Commission during the year amounted to 268,000, which was 48,000 more than in the year previous. These figures do not include legal filings, periodic reports and tariff schedules. Common carriers filed some 21,000 tariff schedules and annual reports. More than 1,100,000 pieces of correspondence were received or sent by the Commission in that period.

Broadcast matters continued to account for about 90 percent of the Commission's hearings. There were 541 cases on its docket at the close of the year.

NATIONAL DEFENSE

The Commission gave increasing cooperation to Government agencies engaged in the national defense effort, and with organizations and other elements of industries affected. Specific activities are classified and, therefore, cannot be reported. However, it can be said in general that this work affects all types of electrical communication. It covers plans for the control of electronic emissions during possible air raids, monitoring for possible subversive radio activity, meeting needs of civil defense communication, authorizing expansion of communication circuits, aiding experimentation looking to war-time applications of radio, making special technical studies, and safeguarding facilities used for communication purposes.

During the year, the Commission created a Disaster Communications Service, to enable Government and non-Government stations to set up emergency communication; authorized non-Government stations to use Government frequencies in an emergency; reactivated the State Guard Radio Service, which affords radio facilities for State Guards in States where the National Guard has been called into Federal service; and liberalized the commercial operator rules to deal with the scarcity of certain operators, especially on board ships.

Its already established services include the Special Emergency Radio Service, which is concerned with the protection of life and property under emergency conditions; the Public Safety Radio Services, devoted to normal police, fire, forestry-conservation and highway protection; the Civil Air Patrol, a civilian adjunct of the Air Force; and the Amateur Radio Service, which has long provided regional

networks for emergency use and now has a military amateur radio system functioning with the military.

At the same time, the Commission continues to maintain regional disaster emergency coordination with the Coast Guard, Navy, Army, Air Force, Red Cross, amateur radio operators, and State and municipal police organizations.

INTERNATIONAL

World communication matters continued to exact much time and attention of the Commission. In liaison with the Department of State, the Commission prepared for and participated in 20 international sessions during the year, meanwhile doing the preliminary work for a score of future scheduled meetings of this nature. These conferences, most of which are held abroad, involve consideration of overseas telegraph and telephone service, and utilization of air and sea radio navigational aids, as well as broadcast problems.

In the mounting world-wide use of radio, there must be mutual agreement between nations on allocating bands of frequencies for specific services, means for preventing interference by stations of one country with those of another and, in general, uniformity of operation to obtain the most practical and economical use of the limited radio spectrum. Common carrier traffic further requires agreement on rates and handling processes.

During the year, 14 amendments to national frequency allocations were made applicable by the Commission to the United States. There was the usual exchange of notifications of new station authorizations through international and regional correlating agencies. More than 400 cases of foreign radio interference affecting this country were handled by the Commission, which also prepared notices of treaty infractions to be sent to the nations concerned.

COMMON CARRIERS

The outstanding development with respect to all common carriers was the increase in volume of business enjoyed by them, together with the resulting improvement in profits. For the telephone industry, this was accompanied by a continuation of the rapid growth of the past several years, with over 1 billion dollars in facilities added during the year.

The Bell system reported an increase of 49 percent in net income for the calendar year 1950 over that for the previous year. Operating 82 percent of the 43 million telephones in this country, the Bell system now has more than 10 billion dollars gross invested in telephone facilities, and the investment of the entire telephone industry is estimated to be over 11½ billion dollars. Telephone calls handled

by the Bell system reached a record high of 51 billion, which produced revenues of over 3.2 billion dollars. Mobile radio telephone service to vehicles on land, inaugurated on a regular basis on July 1, 1949, is now in operation in more than 250 cities with service authorized to more than 26,000 mobile units.

On January 19, 1951, the Commission instituted an investigation to determine whether rates should be reduced for interstate and foreign telephone service furnished by the Bell system.

Domestic telegraph revenues during the calendar year 1950 were about 15 percent over those for 1949, resulting in profitable operations for the first time in several years. The benefits of improvements in facilities and operations, as well as a rigid economy program, were largely responsible for the improvement in Western Union earnings. It completed a program to mechanize large switching centers and made progress in installing other mechanical and operating improvements.

International telegraph carriers also benefited from the improvement in business. For the calendar year 1950, the gross operating revenues of the principal international telegraph carriers were 9.1 percent higher than in 1949. In the same year, net operating revenues before Federal income taxes were $4,900,000 as against $400,000 for 1949. International telegraph service was furnished directly to 82 foreign countries and United States Territories, and through them to nearly every other country. The volume of paid traffic amounted to 518 million words.

International radiotelephone service was furnished directly to 53 other nations and our own Territories, and directly or indirectly to a total of 88 foreign countries and United States possessions. The volume of such radiotelephone calls reached a new high of 744,650 in calendar year 1950, an increase of 13 percent over the previous year.

On February 21, 1951, the Commission adopted a decision granting two applications and denying another in the case of international radio-telegraph carriers seeking competing circuits to foreign points already served by direct circuits of another United States radiotelegraph carrier. The guiding policy adopted in this decision is that the Commission will authorize a competing direct radiotelegraph circuit if the applicant demonstrates that such competition is reasonably feasible. The carrier operating the original circuits appealed this decision to the courts.

SAFETY AND SPECIAL RADIO SERVICES

Radio services which are neither broadcast nor common carrier in nature are grouped in what is known as the Safety and Special Radio Services. Authorizations in this group totaled nearly 178,000 at the

close of fiscal 1951, which was an increase of more than 23,000 over the previous period. These authorizations represent the use of more than 392,000 transmitters, of which number 280,000 are portable or mobile.

The Safety and Special Radio Services are made up of some 40 different classes of radio stations operating on the land, on the sea and in the air.

Six types of aircraft and ground stations are covered in the aeronautical services, which had more than 34,000 authorizations for the use of about 3,200 fixed and 32,500 mobile transmitters. More than 25,000 of these stations were on aircraft.

Nearly 30,000 authorizations in the marine services reflected the use by half a dozen services of some 1,300 fixed and 28,000 mobile transmitters. Ship stations accounted for 25,500 transmitters and 1,400 radar installations.

Six classes of public safety stations held 9,100 authorizations for the operation of 6,500 fixed transmitters in conjunction with over 80,000 mobile units. The police service had the largest number—6,200 authorizations to link 4,300 fixed and 60,000 mobile tranmitters.

Almost 5,000 authorizations in the land transportation services denoted the utilization of radio by railroads, streetcars, buses, taxicabs, highway trucks, and automobile emergency vehicles. This group had approximately 3,700 fixed transmitters and 75,000 mobile units. The taxicab industry was the largest user, with 3,000 fixed stations directing the operation of 63,500 radio-equipped vehicles.

Eight classes of industrial stations had 9,500 authorizations involving the use of 6,500 fixed transmitters and 64,000 mobile units. The power and petroleum industries, with 7,400 authorizations, operated more than 55,000 transmitters.

The numerically largest individual radio service is that of the amateur. Nearly 89,000 self-styled "hams" held licenses and operated more than 90,000 amateur stations.

The past year saw the establishment of the Disaster Communications Service and the State Guard Radio Service, previously mentioned; Aeronautical Advisory Stations, for air-ground communication at small air fields; and two new classes of amateur licenses, including one for the beginner.

EXPERIMENTAL RADIO SERVICES

In promoting new uses for radio, the Commission authorizes three general classes of experimental operation. These stations engage in research, testing, and development of apparatus and techniques looking to the improvement of radio in general or the practicability of new services. At the close of the year there were more than 400 ex-

973537—52——2

perimental authorizations, representing the use of some 200 fixed and 1,300 mobile transmitters.

BROADCAST

For the first time, broadcast revenues in the calendar year 1950 passed the half-billion mark. Broadcast profits of $59 million were more than double those of the previous year. AM and FM revenues of $444.5 million were the highest on record. TV revenues of $105.9 million tripled the 1949 figure. AM–FM profits of $68.2 million were about 30 percent over 1949, while TV's loss was reduced from $25.3 million to $9.2 million.

The fiscal TV year was marked by the Supreme Court, on May 28, 1951, upholding the Commission's adoption of the field sequential color system. This enabled such colorcasts to start on June 25.

Proceedings to augment and improve present television service entered their final phase—consideration of assignment of channels to individual communities on a national basis. This determination is necessary before the Commission can remove its present "freeze" on new TV station construction.

Meanwhile, 107 operating TV stations continued to bring video programs to 63 cities and metropolitan areas with a population of approximately 87,000,000 people in 43 States.

In the standard (AM) broadcast field, the difficult process of arriving at an international agreement regarding assignments and rules for the sharing of channels approached realization in the signing, on November 15, 1950, of the Third North American Regional Broadcasting Agreement (NARBA). This pact was awaiting Senate ratification at the close of the fiscal year.

The number of authorized AM broadcast stations in this country increased to 2,385, or 82 more than the previous year.

Commercial frequency modulation (FM) broadcast authorizations decreased to 659, a loss of 73 since the year previous. However, the number of licensed commercial FM stations rose from 493 to 534.

Authorizations for noncommercial educational FM broadcast stations increased from 82 to 95. In contrast to the deletions of regular FM broadcast operation, no noncommercial educational FM station having once started programming on the air has yet been deleted.

During the year the Commission amended certain rules to encourage facsimile broadcasting, but little interest was shown by FM broadcast licensees in providing this service.

The number of international broadcast stations in this country, which beam the "Voice of America" programs abroad for the Department of State, remained at 40.

Of the nearly 4,600 authorizations in the broadcast service, about 1,300 were for auxiliary services, such as remote pickup, studio-transmitter links, and developmental. Many auxiliary television stations were using microwave for pickup, studio-transmitter connections, and temporary intercity relay purposes.

The industry estimated that more than 102,000,000 broadcast receiving sets were in use, which was five-eighths of the total for 128 countries throughout the world. Of 42,520,000 occupied dwellings in the United States, 95 percent had one or more receivers.

Rule making during the year which affected broadcast services generally included arrangements to have licenses expire by groups of stations on a geographical basis; relaxation of main studio location requirements and also to permit dual city coverage; enabling Commission field offices to act on AM and FM station requests for temporary operation with operators of lesser grade than normally required; clarified requirements for the construction, marking, and lighting of antenna structure; and a policy to be followed in connection with violation by an applicant of laws of the United States other than the Communications Act, such as monopoly, restraint of trade, unfair competition and other matters.

COMMERCIAL RADIO OPERATORS

More than 612,000 commercial radio operator authorizations were outstanding. They covered various classes of radiotelephone and radiotelegraph operation. Approximately 83,000 new authorizations were issued during the year, which closed with a net gain of nearly 75,000.

To meet Government and industry need for operators, certain licensing requirements were relaxed. Means were set up whereby a radio operator could qualify for a radar endorsement on his license. An agreement was reached with Canada to permit citizens of either country to operate mobile stations across the border.

FIELD ENGINEERING AND MONITORING

The Commission's primary inspection, examination, enforcement, and engineering fact-finding activities continued to be exercised by its field engineering staff. Nine regional offices supervised this work through 23 district offices, 6 suboffices, 3 ship offices, and 18 monitoring stations.

As a result of more than 10,800 inspections of radio installations on domestic and foreign vessels, 5,800 deficiency notices were served. Some 1,500 broadcast station inspections brought 885 discrepancy notices. More than 13,500 inspections of other types of radio stations revealed over 3,700 discrepancies.

Commercial operator licenses issued in the field, as a result of examinations given in the field, exceeded 139,000, which was an increase of 38 percent over 1950.

More than 9,600 complaints required field investigation. Most of them concerned the technical operation of authorized stations and largely involved interference to TV reception. However, interference to existing services, though in smaller proportion, warranted important consideration. Also, 101 illegal radio operations were discovered and closed, which was 48 under the previous year's figure.

Nearly 2,500 major monitoring cases handled during the year further reflected the increase in interference complaints. Monitoring activities resulted in more than 8,800 violation notices being served on radio stations and operators, both domestic and foreign.

In the same period, the Commission's monitoring network was called into action on 168 occasions in aid of lost or disabled air and sea craft.

TECHNICAL RESEARCH

The Technical Research Division, which studies problems of wave propagation, operating standards, and kindred subjects, gave increased attention to the VHF and UHF part of the spectrum and collected and evaluated much data with respect to television. Other studies concerned FM and TV receiver radiation, and interference from restricted and incidental radiation devices.

In collecting information on radio propagation and atmospheric noise, the division maintained close liaison with the Central Radio Propagation Laboratory of the National Bureau of Standards. It also participated in technical studies incident to international conferences, and represented the Commission in coordinating radio research, standardization and instrumentation with Government and industrial organizations.

LABORATORY ACTIVITIES

The Commission's laboratory, near Laurel, Md., pursued technical studies to aid the Commission in allocating frequency bands and formulating standards and regulations for the operation of radio services in those bands.

One current activity is in connection with the prospective regulation of noncommunications equipment capable of emitting energy which can interfere with regular radio services. The use of industrial and other apparatus using radio-frequency energy has increased to such an extent that the power employed by this group exceeds the total transmitter power required by all forms of electrical communication.

The work of the laboratory is largely one of anticipating interfer-

ence problems and having remedial measures taken prior to the manufacture and distribution of a large number of units. Hence, it tests types of proposed new equipment for approval before the apparatus is marketed.

INTERFERENCE AND ANTENNA RULES

In seeking to minimize interference from industrial, scientific, and medical apparatus which come under part 18 of its rules, the Commission continued to work with manufacturers and distributors of such equipment in ironing out mutual problems. In this connection, it postponed the application of a new part of those rules governing welding apparatus employing radio frequency energy.

At the same time, by proposed rules and like cooperative effort, the Commission is tackling the problem of interference from other equipment which presently does not require licensing under part 15 of the rules dealing with restricted radiation devices. This is prompted by the growing number of "college campus" wired-broadcast circuits, industrial signalling, and communications systems, phone oscillators, garage door openers, remote control of model planes, and other like operations.

New rules (part 17) relating to the construction, marking and lighting of antennas became effective February 1, 1951. Worked out with Government and private aviation interests, they enable prospective applicants for radio stations to determine whether any proposed antenna structure will constitute an aeronautical hazard.

COMMISSION

There was no change in Commission membership during the year Commissioner George E. Sterling began a new term on July 1, 1950. Renominated on May 22, 1951, Chairman Coy was confirmed by the Senate on June 14, and on June 27 was sworn in for a 7-year term starting July 1.

The Commission continued to reorganize its staff on functional instead of professional lines. On May 1, 1951, a separate Broadcast Bureau was created. In the light of the establishment of this bureau, and of two other bureaus (Common Carrier and Safety and Special Radio Services) in 1950, the duties of the General Counsel, Chief Accountant and Chief Engineer were redefined as of May 2, 1951.

On June 30, 1951, the number of persons employed by the Commission totaled 1,205, which was 80 less than the year previous. Approximately one-third of them were in the field, mostly engaged in engineering.

The Commission operated with an appropriation of $6,600,000. This was $129,345 under the 1950 figure.

Among legislative proposals made by the Commission during the year was one for the addition of a radio and wire fraud statute to the United States Criminal Code, and amendments to the Communications Act which would authorize the Commission to purchase land and construct buildings for monitoring and research purposes, provide reimbursement by the States for the salaries and expenses of Commission employees loaned as consultants or witnesses in common carrier State regulatory matters, and eliminate the requirement for first securing a construction permit in licensing certain types of radio facilities.

Of 24 cases involving the Commission in the Federal courts, the Commission was upheld in 11 (including 1 in the Supreme Court), was reversed in 1 (Court of Appeals), and 3 cases were dismissed or withdrawn. Three court injunctions were secured by the Commission against illegal radio operation.

2. SUBSEQUENT EVENTS

National Defense

On October 24 the President signed a bill (S. 537) which amended Section 606 (c) of the Communications Act, concerning emergency powers of the Chief Executive, to provide for the control of electromagnetic radiations which could serve as navigational aids to an enemy, and to prescribe penalties for violations. An Executive Order of December 10 empowered the Federal Communications Commission to draft and enforce regulations in this connection.

On December 19, the Commission proposed to establish a Radio Amateur Civil Emergency Service in which amateur radio stations and operators could provide radiocommunication for civil defense purposes during the present emergency.

COMMON CARRIERS

In a report and order issued August 24, 1951, the Commission found that Western Union needed additional revenues to meet company wage increases which became effective July 1 of that year. Accordingly, it permitted Western Union to revise rates for interstate message telegraph and money-order services which were expected to produce additional net annual revenue of approximately $9,800,000. The new rates went into effect September 1.

On August 17, the American Telephone & Telegraph Co. inaugurated telephone service over the final link in its coast-to-coast microwave system. On September 4, this system was used for a special Nation-wide telecast of the Japanese peace treaty session at San Francisco, and was placed in commercial TV relay operation on Sep-

tember 28. This is the first transcontinental radio relay system and the largest facility of its kind in existence.

On July 11, the Commission concluded that, with respect to utilization of the band 470–500 megacycles, the needs of television broadcasting were greater than those of the common carrier mobile service and, in consequence, it added that band to the proposed new TV channels. Common carriers were invited to consider alternative means of deriving additional channels, such as effecting adjacent channel assignments on closer frequency separations, use of improved operational techniques such as single side band transmission and multiplexing, and geographic sharing of frequencies assigned to other services.

Test of a "Telemeter" subscriber television system was authorized by the Commission on October 10 under conditions which previously prescribed for tests of the "Phonovision" and "Skiatron" systems.

On October 17, the Commission proposed a revised plan for apportioning local telephone exchange costs between intrastate and interstate telephone service which would have important effects on local and long distance telephone rates. These contemplated changes in the separations procedures were accepted the following day by the National Association of Railroad and Utilities Commissioners (NARUC) in convention at Charleston, S. C., and then transmitted by the latter to State utilities commissions for their individual action. The effect of the revision is to transfer to interstate operations of the Bell System about $90 million of exchange plant book cost and $22½ million of associated annual expense (now charged to intrastate operations). This change reduces the Bell System's revenue requirements applicable to state operations and increases its interstate long distance service revenue requirements. Because of the resulting substantial reduction in the level of Bell's interstate earnings, the Commission, on November 21, thereafter, postponed indefinitely its pending investigation of the Bell System's rates for interstate and foreign communication services (docket 9889), in order to observe the effects on Bell's operating results of the separations revision and of rate adjustments proposed to be made by Bell in interstate rates in order to compensate, in part, for the reduction in its rate of interstate earnings.

The Commercial Pacific Cable Co., on November 15, received permanent authority to cease its transpacific cable operations because of radiotelegraph competition, age and condition of the cables, and cost of maintenance. On the following November 22 commercial radiotelephone service between the continental United States and the Island of Guam was opened by the American Telephone and Tele-

graph Co., on the mainland, and RCA Communications, Inc., on Guam.

Trail of long distance telephone dialing started on November 10 when a call was made from Englewood, N. J., to Alameda, Calif.

During July and August, the Commission prescribed depreciation rates for the Northwestern Bell, Illinois Bell, Ohio Bell, and Southwestern Bell telephone companies, effecting a net reduction of more than $2,500,000 annually in such charges of those four companies collectively.

SAFETY AND SPECIAL RADIO SERVICES

Use of mobile relay stations in the industrial and railroad radio services was authorized by the Commission on August 15, 1951, effective September 24 for those therein showing a special need for this type of communication.

Previously, on July 5, the Commission proposed to amend its rules to permit microwave operation in the Low-Power Industrial Radio Service, for mobile communication similar to that in other industrial radio services.

On July 18 the Commission referred to the Joint Technical Advisory Committee (JTAC), for study and comment, questions of further reduction of separation of frequencies in the 152–162 and 450–460 megacycle bands used for land mobile operation, and the relative merits of FM and AM for such operation.

On July 11, the Commission proposed to permit the use of the frequency 122.8 megacycles for private aircraft engaged in civil-defense activities, and to allow unattended operation of radio-beacon stations in the 200–400-kilocycle band.

An Industrial Radiolocation Service, to be used primarily in geographical, geological, and geophysical activities, was authorized by the Commission on December 19, to become effective February 1, 1952.

BROADCAST

Television.—Because of the great length of time that oral hearing would consume, and in view of the urgent need for lifting the television "freeze" at the earliest practicable date, the Commission on July 13, 1951, proposed to adopt, in principle, a form of written hearing urged by the National Association of Radio and Television Broadcasters and others to deal with the final phase of the TV proceedings—the proposed assignment of TV channels to individual communities. As the result of a formal prehearing conference on July 20, in which more than 200 parties participated, the Commission on July 25 canceled further oral hearings and prescribed a procedure whereby written statements and written replies would be filed by

geographic groups between August 27 and November 26, after which time the Commission hoped to prepare its final report (dockets 8736 et al.).

Pursuant to a fifth report in the TV proceedings, released July 26, many existing TV stations were able to increase their power under specified conditions and subject to the ultimate determination of these television matters.

The Commission, on September 26, postponed until February 25, 1952, the start of its hearing on the allocation of frequencies and the promulgation of rules and regulations for a proposed theater television service (docket 9552).

July 1, which marked the tenth anniversary of commercial TV broadcasting, saw 107 stations on the air and 415 applications for new stations pending. The 108th TV station started operating on September 30. As of November 1, the number of TV sets in use in the United States was estimated by the industry to be in excess of 14½ million.

The first transcontinental television program was sent on September 4 when President Truman opened the Japanese peace treaty conference at San Francisco. It was carried over the telephone company's coast-to-coast microwave relay system (see common carriers). The first two-way cross-country TV relay took place on September 23, and regular transcontinental telecast service began on September 28.

Because of the materials shortage, a National Production Authority order of November 20 prohibited the manufacture of color TV sets or attachments, but permitted the manufacture of color TV equipment for experimental, defense, industrial, and certain hospital and educational uses.

A "Code of Practices for Television Broadcasters" was adopted by the Television Board of the National Association of Radio and Television Broadcasters on December 6.

A United States agreement with Mexico respecting the assignment of channels for TV stations along the border, to preclude interference and otherwise mutually protect operation, was announced by the Department of State on October 26, and on November 11 was made a subject of Commission procedure.

Frequency modulation.—On July 13, the Commission announced that it is "not considering the deletion of the FM band or any part of it" or "allocating the FM band or any part of it to any other service", adding:

> The approximately 700 stations now operating in the FM band is real testimony to the strength of the service, particularly when one considers that many manufacturers do not make sets and none of them have carried on continuously aggressive sales campaigns. In almost every area in the country there is an unfilled demand for FM receivers.

General.—By actions on August 8 and 27, the Commission designated for consolidated hearing, to start January 15, 1952, various applications involving Paramount, DuMont, and Balaban & Katz interests, including a proposed merger of the American Broadcasting Co. and United Paramount Theaters, Inc. (dockets 10031 et al.).

On July 15, the Commission finalized rule-making to relax temporarily operator requirements for AM and FM broadcast stations in individual cases, effective September 1.

The Commission, on October 26, announced a policy to be followed in processing applications in conformity with the new North American Regional Broadcasting Agreement (NARBA).

AMATEURS

The new novice class of amateur radio operator authorization became available July 2, 1951. In the first week, 500 out of 600 applicants qualified. Their ages ranged from 12 to 86 years, the average being about 25.

On July 16, the Commission reminded amateurs that those who have filed timely applications for renewal of licenses may continue operating their stations beyond the normal expiration date pending receipt of Commission notification of action on their renewal applications.

CHAPTER I—GENERAL

1. AUTHORITY

The Federal Communications Commission operates under the authority of the Communications Act of 1934, as amended.

That statute coordinated in the Commission broadcast regulatory functions previously exercised by the Federal Radio Commission; supervision of certain telephone and telegraph operations formerly vested in the Interstate Commerce Commission; jurisdiction over Government telegraph rates which had been under the Post Office Department, and some powers of the Department of State with respect to licensing ocean cables. It also gave the Commission additional powers, including supervision of rates of interstate and international common carriers, and domestic administration of international agreements relating to wire and radio communication.

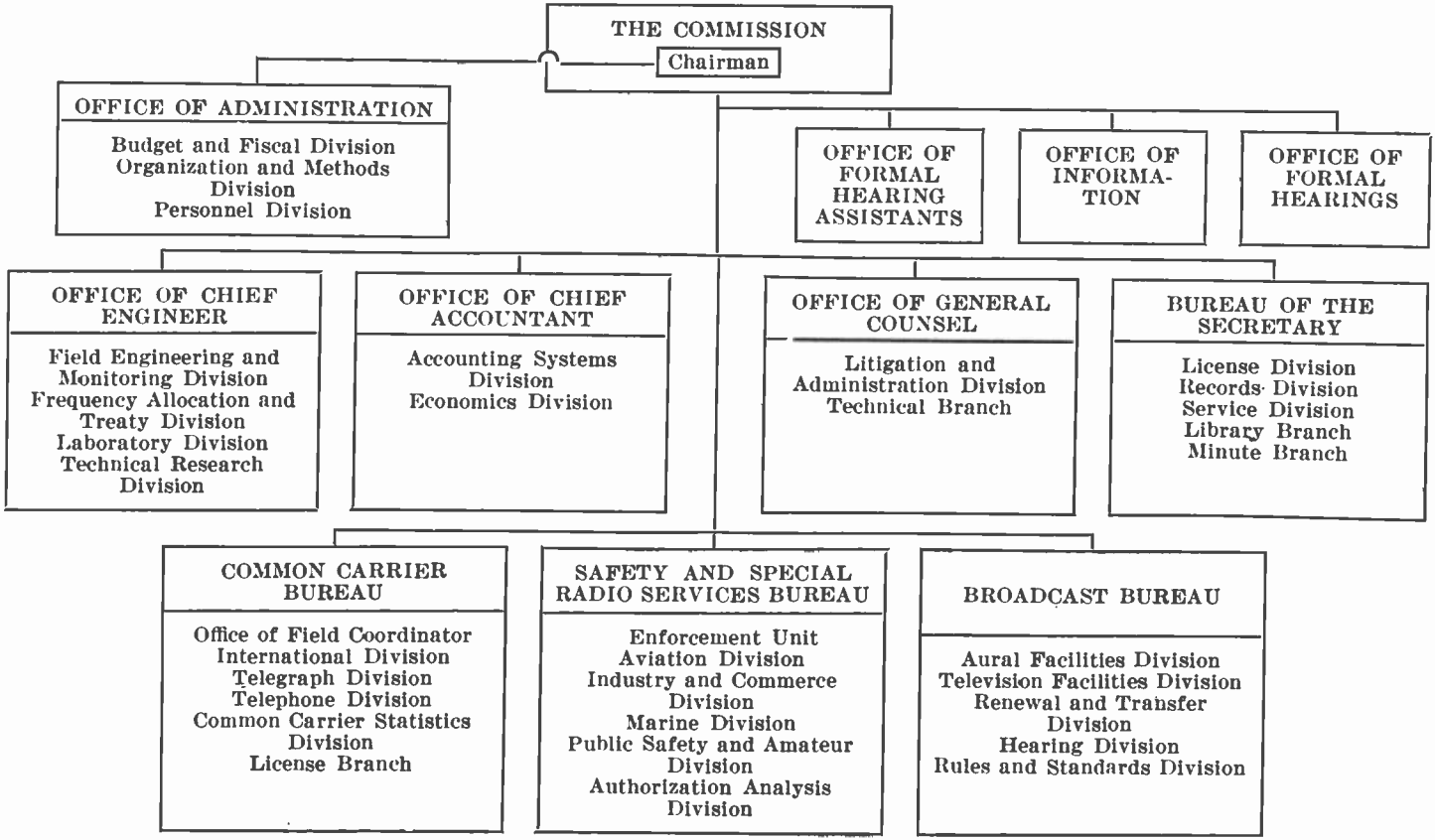
2. COMMUNICATIONS ACT OF 1934

Title I of the Communications Act defines the purposes of the statute, the terms and duties of the Commissioners, and confers general powers.

Title II of the act embodies provisions applicable to common carriers engaged in interstate and foreign communication by wire and radio.

FEDERAL COMMUNICATIONS COMMISSION

ORGANIZATION CHART



Title III contains provisions relating to radio and is divided into two parts. Part I deals with radio licensing and regulation. Part II pertains to use of radio on board certain ocean-going ships.

Title IV contains procedural and administrative provisions.

Title V deals with penalties and forfeitures for violators.

Title VI prohibits unauthorized interception and publication of communications and confers certain powers upon the President in event of war or other national emergency.

The authority of the Commission under the act extends to United States Territories and possessions, but not to the Canal Zone.

The act limits licensing by the Commission to citizens of the United States. It further denies the license privilege to corporations of which any officer or director is an alien, or of which more than one-fifth of the capital stock is owned or controlled by foreign interests.

Communication facilities operated by the Federal Government are not under Commission jurisdiction.

3. FEDERAL COMMUNICATIONS COMMISSION

As an independent Federal agency established by Congress, the Commission reports directly to Congress.

It is composed of seven Commissioners appointed by the President, subject to confirmation by the Senate. The Chairman is designated by the President. Not more than four Commissioners can be members of the same political party. The normal term of a Commissioner is 7 years with the termination dates so staggered that not more than one Commissioner's term expires in any year.

4. FUNCTIONS

The Commission is, in general, charged with regulating interstate and international communication by telephone and telegraph, and broadcast and other forms of radio services.

Its duties fall into three major categories—those affecting common carrier services (telephone and telegraph by means of radio and wire, including submarine cable); those dealing with nonbroadcast radio services (safety and special); and those relating to broadcast (program) services.

Commission regulation involves supervision of rates and services of common carriers subject to its jurisdiction; allocation of radio frequencies; licensing of non-Government radio stations and radio operators; promoting safety through the use of radio on land, water, and in the air; encouraging more effective and widespread utilization of radio; participating in the formulation and domestic administration of wire and radio provisions of treaties and other international agreements to which the United States is a party; and helping co-

ordinate the many forms of electrical communication with the national security effort.

These regulatory functions include the establishment and enforcement of rules and regulations, and engineering standards, and making and carrying out policies to meet expansion and developments in this field. In so doing, the Commission must conform to the Administrative Procedure Act which prescribes uniform rule-making practices for Federal agencies to follow.

No fee or charge of any kind is exacted by the Commission in connection with its licensing and regulatory functions.

5. COMMISSIONERS

The Commissioners function as a unit, directly supervising all activities of the Commission, with delegations of responsibility to boards and committees of Commissioners, individual Commissioners, and the Commission staff. (See accompanying organization chart.)

Since June 2, 1949, the Chairman has, pursuant to Commission authorization, exercised additional administrative responsibilities. The Office of Administration is directly responsible to and aids the Chairman in discharging these added duties.

Since the same date, the Office of Formal Hearing Assistants, comprising a special legal and technical group, has assisted the Commission as a body in matters pertaining to hearings.

Because of the mounting workload and growing complexity of problems requiring policy consideration, provision was made in early fiscal 1950 for an attorney adviser to each Commissioner.

Chairman Wayne Coy was, on May 22, 1951, renominated by the President and confirmed by the Senate on June 14 for a 7-year term, starting July 1, 1951. On July 1, 1950, Commissioner George E. Sterling began a new term under Presidential reappointment. An Executive order of December 21, 1950, exempted Commissioner Paul A. Walker from compulsory retirement for age during his present term. (A list of the Commissioners and their terms is contained in the front part of this report.)

6. STAFF ORGANIZATION

During the year the Commission continued to reorganize its staff on functional instead of professional lines.

By orders of May 2, 1951, the Commission redefined the duties of the Offices of General Counsel, Chief Accountant and Chief Engineer which (on April 3, 1950) had been established as major staff units. The effect was that, as of June 4, they have the major responsibilities here listed:

Office of General Counsel.—(1) Advise and represent the Commission in matters of litigation; (2) advise and represent the Commission, and coordinate and make recommendations to the Commission on proposed legislation and international agreements with which the Commission is concerned; (3) interpret the statutes, international agreements and international regulations affecting the Commission; (4) prepare and make recommendations and interpretations concerning procedural rules of general applicability; review all rules for consistency with other rules, uniformity, and legal sufficiency; (5) conduct research in legal matters as directed by the Commission; (6) in conjunction with the Chief Engineer, participate in, render advice to the Commission, and coordinate the staff work with respect to general frequency allocation proceedings and other proceedings not within the jurisdiction of any bureau, and render advice with respect to rule-making matters and proceedings affecting more than one bureau; (7) perform all legal functions with respect to (*a*) international broadcast stations; (*b*) rules, establishment of technical standards, encouragement, authorization and regulation of experimentation in the electronic arts or the incidental use of them for general research and scientific purposes; provided, that experimentation which has the primary purpose of improving the established classes of services shall continue to be handled by the bureau responsible under the rules for the administration of such services, and provided that nothing herein shall affect the Field Engineering and Monitoring Division's inspection functions; (*c*) restricted and incidental radiation devices, including the conduct of studies of uses of such devices by industry and the general public with a view toward eliminating interference to established services, including the development and promulgation of rules, the testing and type approval of equipment, the review of complaints of interference to established radio services, and such other activities as are necessary in carrying out responsibilities in connection with this function; and (*d*) regulation of commercial radio operators, including the development and promulgation of rules and regulations governing the licensing of radio operators, maintaining examination requirements on a current basis, reviewing citations with respect to commercial operators, and such other matters necessary to the carrying out of this function; (8) in other matters (*a*) maintain liaison with other agencies of Government; (*b*) provide representation for the Commission on Commission-wide and interdepartmental committees; and (*c*) deal with members of the public and of the industries concerned; (9) exercise such authority as may be assigned or referred by the Commission pursuant to section 5 (e) of the Communications Act of 1934, as amended; and (10) perform such other duties as may be assigned or referred by the Commission.

The Office of General Counsel functions with a Litigation and Administration Division and a Technical Branch.

Office of Chief Accountant.—(1) Recommend the accounting principles which shall be observed; (2) conduct research in and advise the Commission on economic matters to be considered in policy determinations; (3) advise the Commission and its bureaus regarding accounting, economic, and statistical matters; (4) maintain liaison with other agencies of Government on common-carrier matters; (5) provide representation for the Commission on Commission-wide and interdepartmental committees; (6) deal with members of the public and of the industries concerned; (7) perform such other duties as may be assigned or referred by the Commission; (8) exercise such authority as may be assigned or referred by the Commission pursuant to section 5 (e) of the Communications Act of 1934, as amended.

The Accounting Systems Division, under the Chief Accountant, (1) recommends the formulation, revision, and amendment, in collaboration with the Common Carrier Bureau, of the (*a*) Commission's Uniform Systems of Accounts, (*b*) regulations for the preservation of records, (*c*) reporting requirements and related rules and regulations; (2) recommends the formulation, revision, and amendment, in collaboration with the Broadcast Bureau, of the forms of financial and statistical reports required to be filed with the Commission, and related rules and regulations; (3) interprets the (*a*) Commission's Uniform Systems of Accounts, (*b*) regulations for the preservation of records, (*c*) reporting requirements and related rules and regulations; (4) participates in activities and work of the National Association of Railroad and Utilities Commissioners' Committee on Accounts and Statistics; corresponds with members on accounting matters of mutual concern; and prepares for and participates in periodic conferences.

The Economics Division, under the Chief Accountant, (1) conducts economic research activities: (*a*) prepares and compiles economic data and coordinates the compilation of regular economic reports to the Commission on condition and status of the industries subject to the Commission's jurisdiction; (*b*) studies the social and economic factors affecting the public demand with respect to communications; (*c*) prepares studies, or suggests studies to the bureaus, in order to provide an over-all view of the structure and operations of the communications industries, for the assistance of the Commission, the industry, and the public; (*d*) serves as a clearing house for the staff on sources for obtaining pertinent economic data within the Commission and available from governmental and private organizations; (2) provides statistical consultation and economic information service: (*a*) reviews and advises the bureaus on content and form of statistical schedules

required by the Commission of communications companies and of statistical reports prepared by the Commission; (*b*) provides technical advice and assistance to the staff and the Commission on statistical aspects of questionnaires, sampling, industry economic trends, national economic trends and statistical methods; (*c*) reviews statistical reports and prepares digests to inform the Commission on basic industry developments; (*d*) serves as Commission representative on interagency statistical projects.

Office of Chief Engineer.—(1) Advise the Commission and the various bureaus on matters of applied technical research; (2) advise and represent the Commission on the allocation of radio frequencies including international agreements pertaining to frequency allocations; (3) collaborate with the bureaus in the formulation of standards of engineering practice and the rules and regulations related thereto, and advise the Commission on such matters; (4) in conjunction with the General Counsel, participate in, render advice to the Commission, and coordinate the staff work with respect to general frequency allocation proceedings and other proceedings not within the jurisdiction of any bureau, and render advice with respect to rule-making matters and proceedings affecting more than one bureau; (5) perform all engineering functions with respect to (*a*) international broadcast stations; (*b*) rules, establishment of technical standards, encouragement, authorization and regulation of experimentation in the electronic arts or the incidental use of them for general research and scientific purposes; provided, that experimentation which has the primary purpose of improving the established classes of services shall continue to be handled by the bureau responsible under the rules for the administration of such services, and provided that nothing herein shall affect the Field Engineering and Monitoring Division's inspection functions; (*c*) restricted and incidental radiation devices, including the conduct of studies of uses of such devices by industry and the general public with a view toward eliminating interference to established services, including the development and promulgation of rules, the testing and type approval of equipment, the review of complaints of interference to established radio services, and such other activities as are necessary in carrying out responsibilities in connection with this function; and (*d*) regulation of commercial radio operators, including the development and promulgation of rules and regulations governing the licensing of radio operators, maintaining examination requirements on a current basis, reviewing citations with respect to commercial operators, and such other matters necessary to the carrying out of this function; (6) in other matters (*a*) maintain liaison with other agencies of Government; (*b*) provide representation for the Commission on Commission-wide and interdepartmental committees;

973537—52——3

and (*c*) deal with members of the public and of the industries concerned; (7) exercise such authority as may be assigned or referred by the Commission pursuant to section 5 (e) of the Communications Act of 1934, as amended; and (8) perform such other duties as may be assigned or referred by the Commission.

The Field Engineering and Monitoring Division, Technical Research Division, Frequency Allocation and Treaty Division, and Laboratory Division are retained in the Office of the Chief Engineer.

By action of May 1, 1951, also effective June 4, the Commission created a separate Broadcast Bureau to unify work pertaining to radio broadcasting which had previously been handled by various legal, accounting and engineering units, and transferred their personnel to the new bureau. The latter's functions are:

Broadcast Bureau.—Assist, advise, and make recommendations to the Commission with respect to the development of a regulatory program for the radio-broadcast services and be responsible for the performance of any work, function, or activities to carry out that program in accordance with applicable statutes, international agreements, rules and regulations, and policies of the Commission, except insofar as functions are specifically delegated to other bureaus or staff offices of the Commission; and, specifically (1) examine applications in the radio-broadcast services and make recommendations to the Commission thereon; (2) participate in hearings involving applications, rule making, and other matters which pertain to the radio-broadcast services; (3) make recommendations to the Commission concerning the promulgation of rules and standards in the radio-broadcast services; (4) participate in international conferences with respect to radio-broadcast services; (5) study frequency requirements in the radio-broadcast services and make recommendations with respect to the allocation of frequencies and the drafting of frequency assignment plans in such services; (6) confer with Government and industry groups interested in the problems of radio-broadcast services; (7) study and establish technical requirements for equipment in the radio-broadcast services in accordance with standards established by the Commission; (8) perform all other functions or activities essential to carrying out the above duties and responsibilities; (9) exercise such authority as may be assigned or referred by the Commission pursuant to section 5 (e) of the Communications Act of 1934, as amended.

In addition to its Office of the Chief, the Broadcast Bureau functions with five divisions as follows:

Aural Facilities Division, which exercises responsibility with respect to the standard (AM) and frequency modulation (FM) broadcast services.

Television Facilities Division, which administers to the TV and auxiliary broadcast services.

Renewal and Transfer Division, which handles applications for renewals of licenses, transfer of control and assignment of licenses or construction permits and enforces applicable statutes, rules, and regulations and orders of the Commission.

Hearing Division, which deals with applications which have been designated for hearing and revocation of licenses or construction permits in the broadcast services. (The duties of this division are apart from the work of the Commission's Office of Formal Hearings, in which hearing examiners function pursuant to the provisions of the Administrative Procedure Act, and that of the Office of Formal Hearing Assistants, which directly serves the Commission.)

Rules and Standards Division, which is concerned with the development or revision of rules and standards, international conferences, and special projects in the radio-broadcast services.

The License Division in the Office of the Secretary issues broadcast licenses upon approval of the Broadcast Bureau.

Creation of the Broadcast Bureau is the result of a survey undertaken by the Commission on November 9, 1950. It is the third of a series of self-instituted organization studies by the Commission. The two preceding surveys resulted in the establishment of two unified bureaus—the *Common Carrier Bureau*, which began operations on April 3, 1950, and the *Safety and Special Radio Services Bureau*, which started functioning July 31 of the same year. (Duties of these bureaus were detailed in the 1950 annual report.) On June 21, 1951, the Commission awarded a contract to McKinsey & Co., management consultants, to conduct two remaining management surveys—i. e., the Field Engineering and Monitoring Division and miscellaneous staff offices not covered by the previous reorganization. These actions follow out Commission policy, adopted in 1949, of reorganizing its operating staff on functional instead of professional lines.

On December 18, 1950, the Commission changed the name of its State-Local Government and Amateur Division of the Safety and Special Radio Services Bureau to the Public Safety and Amateur Division in that same bureau.

The *Bureau of the Secretary* is under the Secretary of the Commission, who is custodian of the Commission's official records, processes correspondence and official papers, signs instruments of authorization for the Commission, and has certain service functions.

The Office of Administration is headed by the Executive Officer who, under the supervision and direction of the Chairman, reviews in cooperation with other staff units the programs and procedures of the

Commission, and plans, coordinates and manages Commission activities relating to personnel, budget, and planning.

The *Office of Formal Hearings* (which was established May 28, 1947, as the Hearing Division and renamed December 15, 1949) consists of hearing examiners, functioning pursuant to the Administrative Procedure Act, who conduct hearings, hold prehearing conferences, act on motions and petitions and prepare initial decisions containing detailed findings and conclusions. Initial decisions take the place of and serve the same purpose as proposed decisions, which were issued by the Commission prior to June 2, 1949.

The *Office of Formal Hearing Assistants* is a separate unit, responsible directly to the Commission. It reviews initial decisions and exceptions thereto, prepares summaries to assist the Commission during oral argument and drafts, pursuant to Commission direction, final decisions and orders dealing with petitions for reconsideration or rehearing.

The *Office of Information* releases public announcements by the Commission and is contact point for the press and public in the matter of general information relating to Commission activities.

An organization chart of the Commission, as of June 30, 1951, appears as a separate page of this report.

7. PERSONNEL

As of June 30, 1951, the number of persons employed by the Commission totaled 1,205, which was 80 less than the year previous. Approximately one-third of all its employees were in the field. Personnel distribution was as follows:

Office or bureau	Washington	Field	Total
Commissioners	35	0	35
Formal hearing assistants	6	0	6
Formal hearings	17	0	17
Information	4	0	4
Administration	40	0	40
Secretary	161	0	161
General counsel	22	2	24
Chief accountant	25	0	25
Chief engineer	133	380	513
Common carrier	95	32	127
Safety and special	130	0	130
Broadcast	123	0	123
Total	791	414	1,205

8. APPROPRIATIONS AND EXPENDITURES

The Commission operated with an appropriation of $6,600,000 for the 1951 fiscal year. This was $129,345 less than the year previous. A breakdown of 1951 income and expenditures follows:

Appropriation		*Expenditures*	
Regular appropriation (salaries and expenses)	$6,625,000	Personal services	$5,908,513
Savings under sec. 1214	25,000	Travel	85,439
		Transportation of things	20,351
		Communication services	151,063
Total funds available	6,600,000	Rents and utilities	60,412
		Printing and reproduction	33,807
		Other contractual services	91,784
		Supplies and materials	136,505
		Equipment	111,821
		Refunds, awards, and indemnities	123
		Total obligations	6,599,818
		Savings, unobligated balance	182
		Total	6,600,000

The appropriation and expenditures were authorized by Public Law 759, Eighty-first Congress, approved September 6, 1950.

9. LITIGATION

Section 401 of the Communications Act confers upon the district courts of the United States jurisdiction to enforce the Communications Act and the orders of the Commission. Judicial review of Commission actions is provided for in section 402 of the act. Section 402 (a) gives jurisdiction to the courts of appeals (under Public Law 901, 81st Cong., effective, except for pending litigation, on January 28, 1951) over suits to enforce, enjoin, set aside, annul, or suspend any order of the Commission with the exception of orders granting or refusing applications for licenses. Section 402 (b) provides for direct appeal from such other orders of the Commission to the United States Court of Appeals for the District of Columbia Circuit. The great majority of cases involving review of Commission action is instituted in the latter court.

During the fiscal year, there were 24 cases in which the Commission was a party in the Federal courts. Of this total, nine were instituted during the fiscal year—four in the Court of Appeals for the District of Columbia Circuit, and five in district courts. The other 15 cases were pending at the beginning of the fiscal year.

The Supreme Court upheld the Commission in the one case brought before it on appeal from a three-judge district court decision affirming the Commission. In the Court of Appeals for the District of Columbia Circuit, the Commission was sustained in five cases and reversed in one case, two cases were dismissed by agreement of the parties, and one case was dismissed for failure to prosecute. In the district courts,

one complaint against the Commission was withdrawn, one decision was issued affirming the Commission (later affirmed by the Supreme Court), and three interlocutory injunctions were secured by the Commission against the illegal operation of radio equipment. (One of these cases was later dismissed by stipulation.)

As of June 30, 1951, five cases were pending in the Court of Appeals for the District of Columbia Circuit, and five cases were pending in United States district courts.

The status of litigation for the fiscal year may be tabulated as follows:

Court	Total	Decisions affirming Commission	Decisions reversing or remanding case	Dismissed by agreement of parties	Cases pending June 30, 1951
Supreme Court	1	1	0	0	0
Court of Appeals for District of Columbia Circuit	14	6	1	2	5
District courts	[1] 9	[2] 4	0	[3] 1	5
Total	24	11	1	3	10

[1] One of these cases was later affirmed by the Supreme Court.
[2] The district court affirmed the Commission in 1 of these cases, and was later sustained by the Supreme Court. Interlocutory injunctions were secured by the Commission in 3 of these cases. The injunction was made final in 1, and 1 was later dismissed by stipulation. The fourth case is therefore technically pending and is listed as pending.
[3] This case, which was brought to secure an injunction against Commission action, was withdrawn.

The following cases decided during the fiscal year were of particular interest:

1. In *Radio Corporation of America, et al.* v. *United States*, 341 U. S. 412, 71 Sup. Ct. 806 (1951), the Supreme Court upheld the Commission's establishment of the first engineering standards for color television. After an extensive hearing the Commission had adopted standards for color television based on the field sequential system proposed by the Columbia Broadcasting System, Inc., and rejected the Radio Corp. of America's dot sequential system. Over the contention of RCA that the Commission's action exceeded its power and was not based on substantial evidence, the court affirmed the decision of the District Court for the Northern District of Illinois (95 F. Supp. 660), granting summary judgment for the Commission. The court held that the Commission had authority to adopt a single, exclusive set of standards, and that the record supported its rejection of the RCA system and the adoption of the CBS system as worthy of acceptance for public use. (There is further discussion of color television in the chapter on Radio Broadcast Services.)

2. In *Scripps-Howard Radio, Inc.* v. *Federal Communications Commission*, 342 U. S. App. D. C. 830, F. 2d — (1951), the Commission had granted a construction permit for a new standard broadcast

station in Cleveland, Ohio, to Cleveland Broadcasting, Inc., and had denied the mutually exclusive application of the appellant for the same facilities. The Commission, after a comparative hearing, had found both applicants financially and otherwise qualified, and had made the grant on the basis of the superiority of Cleveland Broadcasting with respect to local residence of stockholders, degree of integration of ownership and management, and diversification of control of the media of mass communications, concluding that both applicants had meritorious and similar program proposals and that the elements with respect to which Cleveland Broadcasting was superior outweighed appellant's greater broadcasting experience and the somewhat more efficient use of the frequency it proposed. The Court of Appeals held that the Commission had properly determined that it must consider all of the points of difference between the applicants, that its findings were supported by the record, and that its judgment as to which applicant would better serve the public interest was based on reasonable grounds.

3. In *Huntington Broadcasting Co.* v. *Federal Communications Commission*, — U. S. App. D. C. —, 192 F., 2d 33 (1951), the Commission had granted the application of Coast Radio Broadcasting Corp. for a construction permit for a new standard broadcast station to be located in Los Angeles, and had denied the mutually exclusive application of Huntington Broadcasting Co. for a new station in the city of Huntington Park, an independent municipality which is an integral part of the Los Angeles metropolitan district. The Commission based its decision on the ground that since both applicants had applied for regional stations which would serve substantially all of the Los Angeles metropolitan district they were to be judged on their comparative qualifications to serve this area, rather than on the basis of whether Huntington Park had a greater need for a new station than the city of Los Angeles, and the further finding that Coast Radio was better qualified to serve the entire area in the public interest. The Court of Appeals sustained the Commission's position and held that the Commission had correctly determined "that the choice was not as to which of the two communities showed the greater need for a new station, but was rather which of two applicants would better serve the one large community which both desired to cover." The court also held that the Commission had properly chosen Coast Radio on the basis of the greater local residence of its stockholders and its proposed greater integration of ownership and management.

4. In *City of Jacksonville, Jacksonville, Fla.* v. *Federal Communications Commission*, — U. S. App. D. C. —, — F. 2d (1951), the Commission had denied the city of Jacksonville a first extension of its construction permit for a new television station in Jacksonville, Fla.,

because the permittee had failed to proceed diligently to construct the station and had not been prevented from completing construction, and having the station ready for operation, within the authorized time by causes beyond its control or other matters sufficient to justify an extension. Over arguments by appellant that the Commission had unfairly discriminated against it and that the record did not support the Commission's conclusions, the Court of Appeals sustained the Commission in a per curiam opinion. This case therefore upheld the Commission's standard of judging applicants for extensions of construction permits by their conduct during the period of time the construction permit is in effect.

5. In *Easton Publishing Co.* v. *Federal Communications Commission*, — U. S. App. D. C. —, 185 F. 2d 987 (1950), writs of mandamus and prohibition were sought by Easton Publishing Co. and Allentown Broadcasting Corp. to prevent the Commission from reopening the record and holding a further hearing in a case where the Court of Appeals had previously remanded the matter to the Commission to make findings upon the comparative needs of two communities (from which there were mutually exclusive applicants) for new radio service and the relative abilities of the applicants to serve the greater need. The court denied the writs, holding that the Commission is the body charged by Congress with the duty of applying the statutory criteria of the public convenience, interest or necessity, and that the Commission might, in the exercise of this duty, conclude that the original record did not contain sufficient information for a proper determination of the issues before it. Arguments that the further hearing might in certain respects be erroneously conducted were rejected as a basis for the writs. The court held that such alleged errors might be the subject of review upon an appeal from any subsequent Commission decision but could not be the basis for preventing the Commission from holding the further hearing.

6. *In Radio Station WOW, Inc.* v. *Federal Communications Commission*, —, U. S. App. D. C. —, 184 F. 2d 257 (1950), the Commission had granted the application of Star Broadcasting Co. for a new station on the same frequency as station WOW, after a hearing in which WOW did not seek to participate, upon the testimony and representations of Star, which were based on the ground conductivity maps in the Commission's Standards of Good Engineering Practice Concerning Standard Broadcast Stations, that objectionable interference would not be caused to WOW. The ground conductivities shown in the standards are rebuttable, but accepted by the Commission in the absence of contrary evidence. Upon discovering a year later that the operation of the Star station actually caused objectionable interference to station WOW, the latter filed a petition, based on actual

measurements allegedly showing such interference, requesting the Commission to require Star to show cause why its license should not be modified to eliminate the interference. It also petitioned that Star's application for renewal of license be set for hearing. Both petitions were denied by the Commission, and WOW appealed each denial under section 402 (b) of the Communications Act.

The Court of Appeals held that it had no jurisdiction of the appeal from denial of the appellant's petition for a show-cause order why Star's license should not be modified since section 402 (b) (1) affords jurisdiction only upon an appeal by a licensee from denial of an application for modification of its own license. However, the court held that it had jurisdiction of the other appeal under section 402 (b) (2) since WOW was aggrieved and adversely affected by grant of Star's renewal application. Since section 307 (d) of the Communications Act provides that action of the Commission with reference to renewal applications "shall be limited to and governed by the same considerations and practice which affect the granting of original applications", the court held that matters as to which bona fide error was originally made are open for reconsideration where renewal applications are up for consideration. The Commission was, therefore, in error in not granting WOW a hearing in respect to Star's renewal application, and its order was reversed and the matter remanded to the Commission.

7. *In United States* v. *Yonkers Cabinet Corporation* (U. S. D. C., S. D. N. Y.), the Commission secured a preliminary injunction, after hearing, restraining the defendant from operating electronic heating equipment which, as a result of incidental radiations, was causing interference to radio reception of the United States Coast Guard, in violation of the Communications Act and the Commission's rules. On July 10, 1951, this injunction was made permanent, the defendant being in default.

10. LEGISLATION

During the fiscal year Congress enacted one law which directly affected the Commission. This was Public Law 901 of the Eighty-first Congress, which was finally approved on December 29, 1950, becoming effective 30 days thereafter, which had been introduced by Mr. Hobbs as H. R. 5487. This new law provides that appeals from final orders of the Commission, made reviewable in accordance with the provisions of section 402 (a) of the Communications Act, shall be taken to the United States Circuit Court of Appeals of the appropriate circuits or to the United States Court of Appeals for the District of Columbia Circuit, and that subsequent appeals to the Supreme Court shall be upon writs of certiorari. This changed the previous

procedure for section 402 (a) cases, which provided for review by a specially constituted three-judge United States District Court, with subsequent direct appeal to the Supreme Court as a matter of right. The Commission presented extensive testimony on this legislation before the Judiciary Committees of both the House and the Senate, and amendments offered by the Commission were incorporated in the bill as it was finally enacted.

Various proposals were also submitted to the Bureau of the Budget as part of the Commission's legislative program. These proposals included (1) an amendment to section 4 (g) of the Communications Act, which would authorize the Commission to purchase land and construct buildings to be used for monitoring and research purposes; (2) the addition of a radio and wire fraud statute to the United States Criminal Code; (3) an amendment to section 410 (b) of the Communications Act to provide for reimbursement to the Commission by the States for the salary and expenses of Commission employees when they are made available to State commissions to act as consultants or witnesses in common carrier regulatory matters pending before such commissions; and (4) an amendment to section 319 of the Communications Act, which would simplify the procedure for securing licenses to operate certain types of radio facilities by eliminating the requirement of first securing a construction permit from the Commission, as is presently required.

The Commission's proposal with respect to authorizing purchasing of land for monitoring and research activities has been included as one of the provisions of S. 658, introduced by Senator McFarland, which passed the Senate on February 5, 1951. The proposal was also introduced by Mr. Crosser as H. R. 1760, which passed the House on February 19, 1951. H. R. 1760 also passed the Senate on March 12, 1951, but only after it had been extensively amended, and no final action on the bill had been taken by Congress.

Mr. Celler introduced the Commission's proposal for a radio fraud statute as H. R. 2948, and the bill passed the House on June 4, 1951, after Committee hearings at which the Commission presented testimony. This proposal also constituted one of the provisions of S. 658.

Mr. Crosser introduced the Commission's proposals to amend sections 410 (b) and 319 of the Communications Act in the House as H. R. 1729 and H. R. 2794, respectively. No action had been taken on either of these bills.

Congress considered numerous other bills which directly or indirectly affected the Commission and on which it submitted comments to Congress. The most important of those was S. 658, introduced by Senator McFarland, which would amend the Communications Act in numerous important respects and make substantial changes in the

Commission's organization and procedure. This bill was passed by the Senate on February 5, 1951, and members of the Commission presented extensive testimony at hearings before the House Committee on Interstate and Foreign Commerce. S. 1379 and H. R. 4240, introduced by Senator Johnson (Colo.) and Mr. Mansfield, respectively, would amend section 315 of the Communications Act with respect to providing equal radio-broadcasting facilities for candidates for public office. S. 537, the so-called electromagnetic radiation control bill, also introduced by Senator Johnson, contains provisions for the greater security and defense of the United States against attack. A member of the Commission presented testimony on this bill before a Senate committee. H. R. 4309, introduced by Mr. Rogers of Florida, would amend sections 2 (b) and 221 (b) of the Communications Act so as to make specific reference to certain telephone services utilizing radio.

There were a number of bills and resolutions introduced at the close of the Eighty-first Congress and in the Eighty-second Congress dealing with the allocation of television frequencies and television programming, with particular emphasis on the use of television for noncommercial educational programs. The Special Senate Committee to Investigate Organized Crime in Interstate Commerce introduced three bills (S. 1563, 1564, and S. 1624) which are intended to place restrictions on the use of communications facilities for interstate transmission of gambling information. The Chairman of the Commission presented extensive testimony before the Special Senate Crime Committee with respect to the problems with which these bills are concerned.

In addition to drafting numerous legislative proposals, presenting testimony before various congressional committees and commenting extensively on the legislation discussed above, the Commission prepared reports and comments for the Congress and the Bureau of the Budget on more than 30 proposed bills which concerned the functions and duties of the Commission.

11. NATIONAL DEFENSE

Regulation of interstate and foreign communication by wire and radio to aid the national defense, as well as promote the safety of life and property in general, is among the stated purposes of the Commission under section 1 of the Communications Act. In event of war, or public peril or disaster, or other national emergency, special powers relating to such communication are conferred upon the President by section 606 of that act.

The Commission is, in effect, the established medium for executing the national communications policy. Thus, in carrying out the pro-

visions of the act, it is to a large extent responsible for coordinating Government and private activities in the communications field.

Because the Interdepartment Radio Advisory Committee (IRAC) assigns frequencies for the President to Government stations and the Federal Communications Commission assigns frequencies to non-Government stations, there must be mutual understanding and working arrangements. The importance of radio for quick contact with overseas points and the increased use of land, water, and air mobile radio by the military and industry, amid changing scenes which add to interference and other problems, are of common concern to Government and non-Government services.

The role of the Commission in national defense has multiplied since the President on December 15, 1950, declared a state of national emergency. Because of their classified nature, emphasized by section 4 of the Communications Act which specifically authorizes the Commission to withhold publication of information affecting the national security, the Commission is unable to detail publicly its activities in the current defense program. However, in general, it can be reported that the Commission is cooperating closely with the armed services and other Government agencies engaged in such work, and with organizations and other elements of industries affected.

The defense effort requires work which cuts across many fields that are regulated by the Commission. Radio, already essential to the sea and air navigation, land transportation, public communication, protection of life and property, and industrial processes and services, has taken on additional civilian and military significance in the present emergency.

Because electronic emissions can be used to guide enemy aircraft and air missiles, it is necessary to render these signals useless for navigational purposes by any foe and yet have radio continue to play its important part in mass and specialized communication.

Accordingly, the Commission has been called upon by the National Security Council, National Resources Planning Board, Central Intelligence Agency, Civil Defense Administration, Department of Defense, Department of State, National Production Authority, and other military and civilian agencies to work on numerous national defense projects affecting all types of electrical communication.

They cover highly technical plans for the control of electronic emissions during possible air raids, monitoring for subversive radio activity, meeting needs for civil defense communication, authorizing expansion of communication circuits, aiding experimentation with war-time applications of radio, making special technical studies, and safeguarding plants used for communication purposes. Particular

Government cooperation on military and civilian defense plans is effected through the IRAC (previously mentioned) and the Telecommunications Coordinating Committee.

On November 24, 1950, the Commission announced:

> The Federal Communications Commission in cooperation with the Department of Defense and the radio industry is studying the use of radio in event of war. In connection with this study, experiments are being conducted with new uses of radio. In furtherance of this work, the Commission, from time to time, will issue national defense-emergency authorizations pursuant to the provisions of section 2.407 of the Commission's Rules and Regulations authorizing special experimental operations by existing stations. National security requires that these authorizations be classified and not be made public. Stations directly affected by the experimental operations will be informed as fully as possible consistent with security regulations.

Mounting use of radio by the Army, Navy, Air Force, Civil Aeronautics Administration, and private industry has intensified the interference problem. One task of the Commission is to locate the sources of interference and to see that corrective measures are taken to protect vital overseas and domestic radio communication. In addition to policing the spectrum on a 24-hour basis, its monitoring service is providing direction-finding service to an increasing number of lost or disabled planes and ships.

Effective and rapid communication between Federal, State, and local civil defense organizations require the establishment of emergency networks, local communication systems, air-raid warning systems, and the pooling of equipment, services, and operators.

In the common carrier field, the Commission processes classified applications to provide the military organizations with new telephone and telegraph facilities. It also acts on applications by international communication companies to serve new foreign points during the emergency. Since the Armed Forces lease telephone and telegraph facilities, they consult the Commission about available circuits and often request help in establishing additional circuits.

In opening up new radio services and augmenting existing facilities, the Commission has to find and allocate frequencies for their use in an already crowded spectrum, write the rules to govern their functioning under present conditions, license their operation, and monitor their performance in a technical sense.

During the fiscal year the Commission announced the creation of a Disaster Communications Service, which enables Government and non-Government stations to engage in emergency communication; new rules to permit non-Government stations to use Government frequencies in an emergency; reactivation of a State Guard Radio Service, affording radio facilities for State Guards in States where the National Guard has been called into Federal service; and liberalization of com-

mercial operator rules because of the scarcity of certain operators, especially on board ships. More information about these subjects will be found elsewhere in this report.

Its already established services include the Special Emergency Radio Service, which is concerned with public safety and the protection of life and property under emergency conditions; the Public Safety Radio Services, devoted to normal police, fire, forestry-conservation and highway protection; the Civil Air Patrol, a civilian auxiliary of the Air Force; and the Amateur Radio Service, which has long provided regional networks for emergency use and now has a military amateur radio system operating in conjunction with the Army and Air Force.

At the same time, the Commission continues to maintain regional disaster emergency coordination with the Coast Guard, Navy, Army, Air Force, Red Cross, amateur radio operators, and State and municipal police organizations.

12. HEARINGS

When the Commission is not satisfied that the public interest warrants a grant of an application on the basis of the information contained in the application, or when there is more than one applicant for the same facilities, a hearing must be ordered. The great majority of the Commission's hearings concern broadcast matters.

Applications in hearing may be disposed of in three ways—by a decision after hearing; by removing from the docket and granting when the application has been amended to eliminate the issues which necessitated a hearing; or, by dismissal of the application at the request of the applicant.

Docket statistics for the 1951 fiscal year follow:

Class	Pending June 30, 1950	Designated for hearing	Disposed of without hearing	Disposed of following hearing	Pending June 30, 1951
Broadcast:					
AM	342	197	170	109	260
FM	16	3	7	5	7
TV	181	1	0	3	179
Other	6	3	2	2	5
Safety and special	16	19	20	4	11
Common carrier	27	73	25	6	69
Joint and general	7	9	4	2	10
Total	595	305	228	131	541

13. LICENSES AND OTHER AUTHORIZATIONS

At the close of the year the Commission had more than 885,000 licenses and other authorizations outstanding. This was a net increase of more than 100,000 over the number for the previous year.

There were 39 times as many nonbroadcast radio authorizations (nearly 179,000) as there were broadcast authorizations (nearly 4,600). However, the largest group comprised commercial radio operators (over 612,000).

Radio station authorizations, collectively, represented the use of some 425,000 transmitters, of which number more than 115,000 were fixed and nearly 310,000 were mobile.

14. APPLICATIONS AND OTHER FILINGS

During the year the Commission received approximately 268,000 applications of all kinds, which was 48,000 more than in 1950. Of this total, over 150,000 concerned radio operators, 108,000 others were in the nonbroadcast services, 5,700 concerned broadcast, and nearly 4,000 were from common carriers.

These figures do not include legal filings, periodic reports, or tariff schedules. Common carrier and holding companies filed more than 19,100 tariffs and nearly 2,100 annual reports requiring Commission attention. There was a reduction in international tariff filings of 2,000 under the previous year, due to international conferences and rate changes which have taken place.

15. CORRESPONDENCE, RELEASES, AND PUBLICATIONS

Nearly 1,115,000 pieces of correspondence in the form of letters, telegrams, etc., were received or dispatched through the Commission's Mail and Files Branch during the year. Of this number, about 780,000 were incoming and 335,000 were outgoing.

The Commission's regulatory and administrative procedure required the issuance, during the same period, of mimeographed public notices, orders, decisions, opinions, and rule-making. These necessitated the use of nearly 56,000 stencils, 9,128,000 sheets of paper, and more than 14,380,000 impressions. The Commission issues no "press releases".

The Commission makes no public distribution of its printed publications. The latter are processed by the Government Printing Office and are sold by the Superintendent of Documents. A list of those currently available appears in the appendix to this report.

CHAPTER II—COMMON CARRIERS

1. REGULATION

Interstate and foreign communication by telegraph and telephone—whether by wire, ocean cable, or radio—is subject to Commission regulation.

The Communications Act, among other things, requires that every subject common carrier furnish service upon reasonable request and at reasonable charges. No carrier may add or acquire facilities, or curtail or discontinue service, without Commission approval. All charges, practices, classifications, and regulations in connection with interstate and foreign communication service must be just and reasonable and nondiscriminatory. To implement this requirement, the common carriers concerned file tariff schedules with the Commission, and those schedules are subject to Commission review and regulation.

Rates for interstate telephone and telegraph services, as well as rates for such services between the United States and foreign and overseas points, are regulated by the Commission, which also reviews the adequacy and quality of these services.

The Commission is further empowered to prescribe the forms of records and accounts kept by these carriers. Under this authority, it has established uniform systems of accounts for them to follow.

The Commission is required by law to approve construction of new lines and extensions or supplementations of lines of common carriers engaged in interstate communcations where such lines are to be used for or in connection with interstate service, before any such construction may be undertaken. Further the Commission regulates the interlocking of officers and directors of subject common carriers, it being unlawful for any person to hold office in more than one carrier unless specifically authorized by the Commission. The Commission also passes upon applications of such telephone and telegraph carriers for authority to merge or consolidate.

Common carrier wire service which is purely intrastate in character is not, in general, subject to Commission jurisdiction. However, operation of common carrier radio facilities come under provisions of the act which require the licensing of all radio transmitters.

The Commission receives applications to land or operate submarine cables connecting the United States with other countries, and advises the President with respect to the granting of such licenses, after receiving the approval of the Secretary of State.

2. DOMESTIC TELEPHONE

GENERAL

The annual reports of the Commission have for the past several years emphasized the rapid development and expansion of the domestic telephone industry since World War II. The addition of facilities and public demand for service continued at a rapid pace during fiscal 1951.

In the 1950 calendar year, the Bell system alone expended nearly 900 million dollars for new plant, bringing its total gross plant at the end of that year to more than 10 billion dollars, a net increase of about 669 million dollars as compared with 1949. The non-Bell, or so-called independent telephone companies, also made substantial additions to plant. As of December 31, 1950, the investment in telephone plant of the independent industry was estimated by the United States Independent Telephone Association to be approximately 1.2 billion dollars, an increase of about 133 million dollars during that year. Thus, the total gross telephone plant investment of the telephone industry in the United States was estimated to be approximately 11.5 billion dollars as of December 31, 1950.

More than 43 million telephones were in service in the United States at the end of 1950, over 35.3 million of which were operated by Bell system companies and approximately 7.7 million by the independents. This is double the number of telephones in service prior to World War II and 15 million more than 5 years ago. The number of telephones in the Bell system, which operates about 82 percent of the telephones in this country, was increased by approximately 1,900,000 telephones during the calendar year 1950. Unfilled orders for telephone service held by the Bell system approximated 800,000 on December 31, 1950.

Telephone conversations handled by the Bell system again reached a new record high, increasing from 44 to approximately 46 billion local and toll calls for the calendar year 1950 over 1949. Toll accounted for approximately 2 billion calls, which is about the same figure reported for 1949. However, it is significant to note that ex-

tensive increases in so-called extended area service have resulted in many calls for relatively short distances, previously classified as toll, now being classified as local. In addition, the volume of Teletypewriter Exchange Service calls increased approximately 15 percent in the Bell system for 1950.

Operating revenues for the Bell system reached $3,261,528,000 for 1950, an increase of almost 13 percent from the previous year's operating revenue of $2,893,273,000. The high level of operations also produced increased earnings, with the Bell system reporting net income of 359 million dollars for the year ended December 31, 1950, an increase of 49 percent over the net income of the previous year. Bell system earnings amounted to $12.58 per share of AT&T stock in 1950, the highest per share earnings in any year since 1929.

The continued expansion of the Bell system is illustrated in the following tabulation:

Calendar year	Number of telephones	Plant investment	Revenues	Employees
1940	17,483,981	$4,701,177,364	$1,174,322,517	275,317
1945	22,445,519	5,702,056,557	1,930,889,452	287,300
1946	25,709,458	6,294,419,079	2,093,664,941	496,438
1947	28,506,795	7,348,802,865	2,224,582,932	524,120
1948	31,364,493	8,618,842,204	2,624,827,067	546,723
1949	33,388,258	9,432,749,584	2,893,273,356	515,854
1950	35,343,440	10,101,521,562	3,261,528,032	523,251

The dial conversion program of the Bell system continued during calendar 1950, resulting in an increase in dial operated telephones in the system from 73 percent at the end of 1949 to 76 percent on December 31, 1950. Extended area service, permitting subscribers to dial their calls to nearby communities, was expanded to the point that this service was available to 3.5 million telephone users at the close of 1950. The operator toll dialing program discussed in the Commission's previous annual report was also extended, more than one-third of all toll and long-distance calls now being dialed straight through to the distant telephone by the operator. In addition, the Bell system announced that subscriber toll dialing would be inaugurated during the calendar year 1951 at three exchanges in the Englewood, N. J., area, which will permit subscribers in those exchanges to dial their own long-distance calls through to the distant telephone without the assistance of a toll operator. Substantial additions to the Bell system intercity television transmission network were also made during fiscal 1951.

DOMESTIC TELEPHONE SERVICES

Construction of facilities.—As previously indicated, the telephone industry continued to construct new facilities for the expansion,

replacement, and modernization of exchange and toll plant, expending, as it did in 1949, over a billion dollars for these purposes. Most of these expenditures were for central-office equipment, buildings, exchange lines, and station apparatus. However, the number of authorizations requested for the construction, lease, or acquisition, and operation of wire and cable toll facilities (including installations of carrier equipment) for use in connection with interstate and foreign telephone and special services and the total amounts involved, increased substantially in fiscal 1951 compared to fiscal 1950. During fiscal 1950, 161 such applications were received by the Commission, involving estimated expenditures of over 19 million dollars. Two hundred and thirty-five such applications were received during fiscal 1951 with estimated equipment and construction costs totaling 59 million dollars. The Commission granted 240 of these applications (including 10 held over from fiscal 1950) during fiscal 1951. It is estimated that the total construction thus authorized will cost nearly 46 million dollars.

The annual blanket application of AT&T and certain of its associated companies for the calendar year 1951 requested authority for long lines construction estimated to cost $33,893,000. Of that amount, $16,107,000 was authorized during fiscal 1951. The following table shows the estimated cost and amounts of wire and cable construction authorized by the Commission since 1943.

Fiscal year	Projects	Cost	Sheath miles of cable	Tube miles of coaxial units	Conductor miles of open wire
1944	121	$9,582,239	574.8	----------	7,968
1945	210	70,091,140	2,378.3	7,902	2,963
1946	239	78,896,450	3,193.8	16,580	12,261
1947	289	126,325,771	5,587.7	23,490	15,976
1948	348	127,162,499	2,637.5	46,080	16,373
1949	313	38,638,919	1,370.5	1,323	7,278
1950	141	13,230,678	399.3	----------	3,491
1951	218	45,795,686	957.1	2,704	5,461

During fiscal 1951, the Commission also received applications from Bell system companies for authority to construct nine major microwave radio relay projects for toll telephone and television intercity relay services. The estimated equipment and construction costs involved are over 14 million dollars. As of June 30, 1951, the Commission had granted authority for six of these projects, representing estimated expenditures of almost $6,500,000. Prior to fiscal 1951, the Commission had granted the Bell system authority for 17 microwave radio relay construction projects (including the transcontinental system) with estimated equipment and construction costs totaling over 49 million dollars.

In this connection, it is significant to note that the Bell system estimates that by the end of 1953 about half of its broad-band channels will be on microwave radio relay systems, the balance being on coaxial cable systems. In the past, microwave systems have been used by the Bell system primarily for television intercity relaying, with only occasional and emergency use for telephone service. However, such systems will be utilized extensively in the future for long haul telephone and telegraph (TWX) services, as well as for television program transmission.

At the end of fiscal 1951, the Bell system had over 20 million miles of toll message circuits in operation, 570,000 of which were added during that fiscal year. Two-thirds of the increased mileage was obtained by means of carrier systems. Authorizations for the construction of 2,742 miles of coaxial units were granted by the Commission during fiscal 1951, including 2,000 miles requested during fiscal 1950. (It was erroneously reported in the Commission's sixteenth annual report that no authorizations for coaxial construction were requested during 1950.) Requests for authorizations to construct an additional 3,352 miles were received in fiscal 1951 and were pending at the close of that period.

Discontinuance, reduction, or impairment of service.—During fiscal 1951 the Commission granted five applications for authority to discontinue telephone service, including one held over from fiscal 1950, and two applications for emergency authority resulting from storm damage. Three applications for discontinuance of toll service were pending at the close of fiscal 1951. Two applications received from miscellaneous [nontelephone] companies to discontinue domestic public land mobile radio service in Boston, Mass., and in San Luis Obispo, Calif., were also granted.

The joint application filed during fiscal year 1949 by Western Union to discontinue its public message toll, private line, and program telephone service; by the AT&T and certain Bell system companies to acquire the telephone business and certain telephone property of Western Union located in 30 States; and by the Pacific Telephone & Telegraph Co. and the Bell Telephone Co. of Nevada to discontinue all message telegraph service rendered by them in California, Oregon, Washington, Idaho, and Nevada (docket 9235) was, after extensive formal proceedings, granted by the Commission in April 1951.

Channels for TV program transmission.—Bell system intercity video transmission facilities have been extended during the past 3 years to interconnect 43 cities in the eastern half of the United States, including cities as far south as Atlanta, Jacksonville, and Birmingham, and as far west as Omaha and Kansas City. In addition, the Omaha-San Francisco microwave radio relay system was nearing com-

pletion at the end of fiscal 1951, and was to be in operation for both telephone and television transmission services by September 1951, thus completing the transcontinental radio relay system. As of June 30, 1951, the Bell system had in operation over 18,500 channel miles of video channels, about half of which were on coaxial cable and half on radio relay systems.

In spite of the extensive development of intercity video transmission facilities during the past few years there are still insufficient common carrier channels to meet the requirements of the rapidly growing and expanding network television broadcasting industry for service. This has created several problems requiring the attention of the Commission.

In docket 9806, the Commission designated for hearing a complaint filed by Allen B. DuMont Laboratories, Inc., against the Bell system companies in connection with the allocation by them of the usage of Bell system channels among customers for video transmission service, where insufficient channels are available to meet all requests for service. In docket 9816, on petition of American Broadcasting Co., the Commission ordered an investigation into the lawfulness of the tariffs of the Bell system companies providing for allocation of usage of video channels and the allocations made pursuant thereto, and designated the matter for hearing concurrently with the proceedings in docket 9806.

A series of conferences among representatives of the national television broadcasting network, A T & T, and members of the Commission's staff resulted in agreement among the network customers on a plan for allocation designed to reconcile conflicting requirements of the networks for service, in advance of the placing of orders with the common carriers. Hearings in dockets 9806 and 9816 were, therefore, postponed pending observation of the results of operation of the plan.

In the sixteenth annual report, reference was made to an investigation (docket 9539) to determine whether or not it is necessary or desirable in the public interest to require interconnection of the video transmission channels of the Bell system companies with existing and proposed video transmission channels of Western Union. An initial decision issued by a hearing examiner on January 11, 1950, held generally that such interconnection is not necessary or desirable in the public interest. Oral argument was to be heard by the Commission en banc on July 16, 1951.

In an effort to alleviate problems arising from the insufficiency of common carrier intercity video channels, the Commission has been authorizing private intercity relaying by TV broadcasters utilizing microwave frequencies, assigned primarily for television studio-to-transmitter links and television remote pickup facilities, on an interim

basis pending availability of adequate common carrier channels. Six such private relay systems are currently in operation.

Speed of service.—The speed of service on telephone toll calls is a measure of the time interval from the appearance of the recording signal at the toll board to the start of conversation or, in the case of person-to-person calls, to a report of delay in reaching the desired party, excluding calls encountering such a report of delay as "busy" or "don't answer" at the called station. The average speed of service required to complete toll calls on the Bell system was 1.8 minutes during June 1951 as compared to 1.6 and 1.7 minutes during the same periods in 1950 and 1949, respectively. The increase in the number of toll circuits, the increased use of toll dialing equipment, and the continuing conversion of manual exchanges to dial operation have had important effects in maintaining substantially the same quality of service despite a marked increase in telephone toll traffic loads.

Foreign attachment cases.—An initial decision on the complaint of *Hush-A-Phone Corp., et al.* v. *American Telephone & Telegraph Co., et al.* (docket 9189), which attacked the lawfulness of the so-called foreign attachment provisions of the defendants' tariffs insofar as they were construed to prohibit the telephone subscriber's use of the Hush-A-Phone device in connection with interstate and foreign telephone service, was issued on February 16, 1951. It proposed to deny the relief requested and to dismiss and terminate the proceeding, upon the basis of findings and conclusions sustaining the lawfulness of the tariffs as applied to Hush-A-Phone. Exceptions were taken and oral argument will be heard in the near future.

Concurrent hearings in *Jordaphone Corporation of America, et al.* v. *American Telephone & Telegraph Co., et al.* (docket 9383), and *In the Matter of the Use of Telephone Answering Devices in Connection With Interstate and Foreign Telephone Service* (docket 9701), both involving the lawfulness of the foreign attachment provisions as applied to the use of automatic telephone-answering devices in connection with interstate and foreign telephone service, were concluded on March 28, 1951. The matter was awaiting issuance of an initial decision by a hearing examiner.

Domestic Public Land Mobile Radio Service.—This service provides communication facilities for hire, primarily between fixed points and mobile units on land. Secondarily, the service is afforded to vessels and remote fixed points. Under some circumstances, a non-telephonic signaling service is offered. The service is of two general classes; that furnished by land line telephone common carriers interconnected with the land line telephone system; and that furnished by others than the land line telephone companies and which do not provide direct connection with the land line telephone system.

The service was established on a regular basis as of July 1, 1949, and has shown continuous growth and public acceptance. During the fiscal year, the telephone companies (Bell system and independent) extended this service so as to make it available in 163 cities (in 38 States, the District of Columbia, and Territory of Hawaii). Service to 17,208 mobile units was authorized. Service was provided by nontelephone company licensees in 152 cities (in 35 States, the District of Columbia, and Territory of Hawaii). The latter group was authorized to provide service to an aggregate of 8,966 mobile units.

As part of a plan to meet the problem of providing additional frequencies for this service so as to make it available to a larger number of subscribers, the Commission determined two pertinent proceedings commenced in the previous fiscal year.

One of these (docket 9648) involved the establishment of a policy of effecting adjacent channel assignments (60 kilocycles separation) between miscellaneous (nontelephone company) carriers, in lieu of the former practice of making assignments on an alternate channel basis (120-kilocycle separation). Thus, the number of channels available to the miscellaneous licensees was doubled. A similar step had, some time previously, been undertaken by the telephone company licensees.

The second matter (dockets 8736 et al.) was considered in connection with the proposed establishment of television broadcasting facilities in the ultra high frequency portion of the spectrum. In this proceeding the Commission considered a petition of Bell Telephone Laboratories, Inc., requesting the allocation of approximately 40 megacycles of frequency space between 400 and 500 megacycles for the development of a broad band multichannel system of public mobile operation from which there might be derived as many as 150 additional 2-way communications channels. Specifically, the Commission considered whether the band 470–500 megacycles could be allocated to such use.

Continuing study was given to the development of a sound policy relative to the provision of service to vessels through the land mobile radio facilities. In this connection, particular attention is being given to the need for such communication facilities on certain inland waterways, including the Hudson River-Erie Canal and the Mississippi, Ohio, and Illinois Rivers.

Because of the relatively limited number of frequencies available to mobile telephone service and the large number of applicants for such frequencies in certain areas, resulting in mutually conflicting applications, it was necessary to hold hearings in a number of cases to determine which, if any, of the applicants should be selected for grants. During the fiscal year hearings were held to consider non-

telephone company mobile telephone service applications in the New York City area (dockets 9761 et al.), Chicago area (dockets 9837 et al.), Los Angeles area (dockets 9723 et al.), and the Dallas-Fort Worth area (dockets 9844 et al.). Decisions had not been issued on these cases by the close of the year. Similar proceedings scheduled for the Houston area (dockets 9779 et al.) were canceled as a result of the applicants deleting their conflicting applications, thereby enabling a grant of the resultant requests.

Hearings were held with respect to conflicting applications for the single frequency available to one-way signalling service in Washington, D. C. (dockets 9825 et al.), and Los Angeles (dockets 9847 et al.). These cases were awaiting initial decisions at the close of the year. A similar hearing scheduled for Chicago (dockets 9845 et al.) was continued when one of the parties withdrew, and disposition of a petition by the remaining party requesting a grant of its application was pending.

At the end of the fiscal year the only case designated for hearing in this service and not yet tried related to conflicting applications in the St. Paul-Minneapolis area (dockets 9882 et al.).

Theater television.—Toward the close of the fiscal year substantial interest developed in the use of theater television portrayals of certain sporting events, principally boxing. The transmission of these programs from the point of origin to the subscribing theaters was accomplished by using facilities of the communications common carriers. Scheduled formal hearing proceedings involve issues which, among others, relate to the use of common carrier facilities for theater TV.

Rural Subscriber and Short Haul Toll Radiotelephone Service.—These services, which are designed to provide short distance service in areas where rugged terrain, etc., make it impractical to construct wire lines, continued to be expanded.

Radiocommunication service in Territories (except Alaska).—Mutual Telephone Co. of Hawaii filed a petition requesting, in substance, that the Commission give attention to the special communication problem of that Territory and recognize that existing frequency allocations which are tailored to meet the specific requirements of operations within the continental United States should not be applied to the Territories and possessions. An appropriate study has been undertaken.

Coastal and Alaskan Services.—Coastal and Alaskan radiocommunications, though largely authorized on a common-carrier basis, are discussed in a separate chapter on Safety and Special Radio Services because of their close relationship to radio aids for the safety of life and property.

RATES AND TARIFFS

Rate schedules.—At the close of the year, 261 telephone carriers had tariffs and concurrences on file with the Commission, an increase of 29 over the previous year. New carriers in the Domestic Public Land Mobile Radio Service accounted largely for the increase. During the year a total of 15,919 tariff publications establishing new rates or modifying rates, regulations, practices, and classifications of services were filed. Of these, 40 were rejected for failure to comply with the Commission's rules, and 63 were suspended pending further investigation.

Special permissions.—Eleven applications for special permission to make changes in tariffs to become effective on less than statutory notice, or involving waiver of certain rule requirements, were received. Of these, nine were granted and two denied.

Charges "based on cost".—The tariffs of the telephone carriers provide in many instances that when special types of facilities are furnished to meet the service needs of certain customers, the charges will be based upon the costs involved. During the year much progress was made in eliminating such situations by publishing specific charges for many types of special equipment.

"Other line" charges.—Previous annual reports made reference to the number of interstate message toll telephone routes between points within the United States where the service over the portion of the route provided by an independent telephone company was charged for on an "other line" basis. In 1944 there were approximately 1,000 such routes, but through continued efforts of the companies to eliminate such situations there are now only 17 routes on which "other line" charges apply.

Unlawful use of telephone facilities.—Last year's annual report noted the complaint of Harry and Bertha Katz against the American Telephone & Telegraph Co. and the Chesapeake & Potomac Telephone Co. alleging the unlawfulness of the Bell system companies' tariff regulations which provide for discontinuance of telephone service upon notification to the telephone company by a law enforcement official that the service is being or will be used for an unlawful purpose. On November 3, 1950, an initial decision was issued upholding the lawfulness of this tariff regulation. Complainants filed exceptions and oral argument was held before the Commission on May 4, 1951. The matter was awaiting a final decision by the Commission.

Investigation of Bell system rates.—In the calendar year 1950 the Bell system telephone companies experienced a substantial rise in their level of earnings from interstate and foreign communication services as an outgrowth of the increases in traffic volumes and revenues result-

ing from the high level of business activity combined with the Bell system's continued program of plant additions and station installations. In the light of these developments and the questions posed as to the reasonableness of the Bell system's rates and earnings levels, the Commission on January 19, 1951, ordered an investigation into the interstate and foreign rates and charges of the Bell system companies, and directed the Bell system to show cause why, on the basis of the companies' current level of earnings as reported to the Commission, their rates should not be reduced pending conclusion of the proceedings of investigation (docket 9889).

Although the hearings in this proceeding were initially scheduled to begin on April 16, 1951, the Commission, on February 14, 1951, upon consideration of questions raised by State regulatory commissions through the National Association of Railroad and Utilities Commissioners with respect to the reasonableness of the procedures used by the Bell system companies to separate plant investment and expenses between State and interstate services, postponed the dates for answer and hearing in order to permit time within which the Commission, jointly with the NARUC, could consider such questions, and within which the Commission could observe trends in revenues and expenses (see discussion of Separations, following).

Separations.—In August 1950, the NARUC urged the Commission to abstain from taking any action looking toward a reduction in interstate message toll telephone rates until a further joint review could be made by the NARUC and FCC of the reasonableness of the procedures used by the Bell system companies to separate telephone plant investment and expenses between State and interstate telephone services. It was pointed out by the States that intrastate toll rates were already much higher than interstate rates for toll service involving equivalent distances; that this disparity presented a serious question as to the reasonableness of the results of the separations procedures; that Bell system applications for further increases in intrastate toll rates were pending in many States; and that interstate toll rate reductions would aggravate the existing disparity materially.

In September 1950, Commission staff members met with representatives of State commissions to consider a specific proposal advanced by the former for modification of the separations procedures applicable to the allocation between State and interstate toll services of interexchange toll line plant investment and related expenses of the associated companies of the Bell system. It was estimated that adoption of this proposal would have the effect, system-wide, of transferring approximately $200,000,000 in book cost of interexchange toll line plant and $20,000,000 in associated expenses annually, from State to interstate operations and would thereby reduce the revenue require-

ments of the associated companies applicable to intrastate operations and increase the requirements applicable to interstate operations. This, it was asserted, would relieve the disparity to the extent of making possible reductions in the amounts of, or preventing, further intrastate toll rate increases; or, in some cases, enabling some downward adjustments in existing State toll rates.

The Commission rejected the proposal in a letter to the NARUC, dated October 18, 1950, in which it concluded that the proposal was arbitrary and unreasonable as a method of cost allocation, and that it conflicted with existing statutory pattern of rate regulation.

In recognition of the position of the States on the matter of separations, the Commission on February 14, 1951, following the institution of its investigation of Bell system rates (previously discussed), advised the NARUC as to its willingness to explore further with States other possible changes in the separations procedures. These further studies, which are still in progress, have not as yet provided any fundamental changes in the procedures which would materially benefit the States from the standpoint of reducing the revenue requirement burden applicable to State toll services.

Toll rate study.—At the close of fiscal 1951, a cooperative committee consisting of staff members of this Commission and State commissions was completing a report on its 2-year study of the problem presented by the disparities in rates for State and interstate message toll telephone services. The report includes a comprehensive collection and analysis of available data relating to the development and technical and economic aspects of toll rates in the United States. It is believed that the report will be of substantial benefit to telephone regulatory commissions in their consideration of toll rate changes and in dealing with the toll rate disparity problem.

As an outgrowth of this joint study, representatives of the Commission and the several States embarked upon a new study to determine the possibility of devising a plan looking toward the establishment and maintenance of uniform toll telephone rates for all toll services in the United States, including the need for appropriate enabling legislation. At the close of the fiscal year, the joint committee was engaged in obtaining data essential to this effort.

State telephone rate cases.—Assistance in State telephone rate cases was rendered to a number of States and municipalities in response to their requests. Owing to budget and staff limitations, the Commission generally had to limit its assistance to the furnishing of advice, consultation and information on subjects of mutual interest, including earnings, depreciation rates, pension accrual rates, and separations procedures.

OTHER REGULATORY MATTERS

Depreciation.—Substantial progress was made during the year in conducting studies and developing information necessary for the Commission to prescribe annual rates of depreciation for telephone companies subject to the Communications Act. On the basis of such studies completed during the year, the Commission, pursuant to the requirements of section 220 (b) of the act, prescribed annual depreciation rates for the following companies of the Bell system: the Chesapeake & Potomac Telephone Co. of West Virginia, Bell Telephone Co. of Pennsylvania, New York Telephone Co., Diamond State Telephone Co., which operates in Delaware, and for each of the operating areas (five States) served by the New England Telephone & Telegraph Co. The Commission also prescribed depreciation rates for the Westerly Automatic Telephone Co., a relatively small subsidiary of New England Telephone & Telegraph Co. In addition, the Commission prescribed revised rates in place of certain of the rates previously prescribed for Southern Bell and Michigan Bell companies. The prescribed rates resulted in annual depreciation charges amounting to $90,402,800 and represented a total reduction of $7,258,200, or 7.5 percent in the annual charges based on the depreciation rates in effect prior to the Commission action.

To date the Commission has prescribed depreciation rates for 12 Bell system companies including the Long Lines Department of AT&T, out of a total of 23 companies within the system, thus effecting a total reduction of $17,310,000, or 7.8 percent in depreciation charges on an annual basis. Studies necessary for prescribing depreciation rates have been completed for five additional Bell companies and one of these companies—the Pacific Telephone & Telegraph Co.—has adopted the new rates on its own initiative. Formal prescription of the Pacific company depreciation rates was deferred due to the desire of certain of the State commissions in the company's territory to make further analyses of the underlying data.

Depreciation expense charges of telephone companies continued to increase in spite of the substantial reductions in depreciation rates. During the 12 months ending April 30, 1951, these expense charges in the case of 23 Bell companies amounted to over $362,500,000, an increase of $33,900,000 or 10.3 percent over the charges for the previous 12 months. This increase is attributed principally to the vast expansion in telephone plant facilities.

A comprehensive study was conducted during the year as to the depreciation reserve requirement of the Long Lines Department of AT&T. This study has not yet been completed. A similar study was completed during the year with respect to the Southern Bell Tele-

phone & Telegraph Co. This study was undertaken several years ago at the request of the Southeastern Association of Railroad and Utilities Commissioners in order to allocate the company's depreciation reserve among the nine States served by it, and so that the regulatory commissions of those States may have information for making determinations of the rate base in their respective areas.

NARUC Committee on Depreciation.—The Commission continued its participation in the activities of this committee, which is composed of staff members of State and Federal regulatory commissions. Its function is to initiate studies and to consider problems that may be submitted to it in connection with the accounting, engineering, and economic aspects of depreciation for public utilities. During the year, the committee completed a report on "Remaining Life Basis of Accounting for Depreciation", and has a report on "A Review of Progress in Depreciation" covering, among other matters, a digest of important court and regulatory commission decisions issued since 1943. The Commission furnished a substantial portion of the data included in these two documents.

NARUC Committee on Accounts and Statistics.—The function of this committee is to participate in the formulation of uniform systems of accounts, annual report forms, preservation of records and related accounting regulations, as well as amendments to, and interpretations of, such regulations in order to foster progress in these phases of regulatory activity and promote uniformity in rules and regulations that may be recommended for adoption by the various State and Federal regulatory agencies. During fiscal 1951, staff members of the FCC participated actively in the work of several subcommittees designated to conduct special studies. An item of direct interest to this Commission, being studied currently by one subcommittee of this committee, is the matter of developing improved regulations with respect to the establishment and maintenance of continuing property records by large telephone companies.

Continuing property records.—Detailed studies are being made of the Bell system continuing property records plans and procedures in connection with the consideration of appropriate revision of the requirements prescribed in part 31 of the Commission's rules. Substantially improved reliability of the rate base and the depreciation base, more accurate mortality studies and resulting depreciation rates, and reduction of administrative costs through improved records procedures, are among the principal objectives of these studies.

Pensions and relief.—For the Bell system, including manufacturing and research activities, pension and other benefit costs amounted to about $175,000,000 during the calendar year 1950. This excludes social security taxes which amounted to approximately $24,000,000. Due to (*a*) the substantial amount of pension costs, (*b*) the frequent

revision of pension accrual rates, and (*c*) the complexity of the actuarial methods and procedures involved in the development of the pension accrual rates, the pension problems have required detailed and continued study and review by the Commission.

Preservation of records.—On August 16, 1950, the Commission adopted a complete revision of its rules for the preservation of records by telephone carriers (part 45). These new rules were designed to assure adequate retention of records needed in regulation of these companies, to improve records-management procedures, and to provide reasonable retention periods for records currently maintained by the several carriers. Recognition was given to such modern record-preservation practices as microfilming, use of tabulating cards, humidified storage, etc.

Restatement of plant accounts on basis of original cost.—Although the restatement of telephone plant accounts on basis of original cost is well advanced with respect to the Bell system companies, there remain a few substantial items among Bell system companies and several items among non-Bell companies where final adjustment of their accounts in this respect has not been effected. Certain of these items are receiving current consideration and an attempt is being made to further the completion of these adjustments as rapidly as is possible. Several current acquisitions of plant (including mergers of smaller companies) at original cost were handled during fiscal 1951.

Annual report Form M (applicable to class A and class B telephone companies).—A complete revision of this report form was drafted during the fiscal year. Final action by the Commission was awaiting the receipt of comments from interested parties.

Annual report Form L (applicable to nontelephone company common carriers operating in the Domestic Public Land Mobile Radio Service).—During the year a brief form of annual report applicable to these small carriers was promulgated by the Commission. This form permits such carriers to file condensed information in lieu of the previous requirements for filing much more detailed information on forms that were designed primarily for the use of wire telephone companies.

Monthly report form for class A telephone companies.—During the year the monthly report form required to be filed by telephone companies having annual operating revenues exceeding $250,000 was simplified in some respects.

Uniform system of accounts for telephone companies.—The uniform systems of accounts for telephone companies were amended during fiscal 1951 as follows:

The Commission revised its rules with respect to the classification of telephone companies so as to provide that only telephone com-

panies having annual operating revenues exceeding $250,000 (formerly $100,000) shall keep the more detailed accounts required for class A telephone companies, permit companies having annual operating revenues exceeding $100,000 (formerly $50,000) but not exceeding $250,000 to keep the less detailed accounts prescribed for class B telephone companies; permit companies having annual operating revenues exceeding $50,000 (formerly $25,000) but not exceeding $100,000 to keep the condensed classifications prescribed for class C telephone companies; and not require further compliance with the uniform accounting rules of the Commission by companies having annual revenues of $50,000 or less.

The Commission's rules were further modified to reduce accounting and reporting requirements with respect to relatively small acquisitions of plant by telephone companies.

Monthly telephone statistics.—To better serve the needs of regulatory commissions, as well as other interested groups, the Commission's published report of monthly operating statistics was revised. The new report uses fewer carriers and presents separate data for important segments of the industry.

3. DOMESTIC TELEGRAPH

GENERAL

The improvement in the financial condition of The Western Union Telegraph Co. that became apparent, starting in March 1950, continued throughout the fiscal year. Revenues and traffic volume continued to rise, and although the downward trend of operating expenses was halted, monthly net income reported during the fiscal year exceeded that reported for each month of the previous fiscal year.

For the calendar year 1950 Western Union reported net income from all communications operations of $7,320,000 as compared with a loss of $4,495,000 in the previous year. The improvement was made even after providing $2,500,000 for income taxes in 1950 for which there was no liability in the previous year. Income taxes for 1950 would have been $2,000,000 higher had the company not had the benefit of net operating loss carry-overs of prior years. For the first 6 months of 1951, $3,863,000 of net income from system operations has been reported, with $2,536,000 provided for payment of income taxes. In December 1950 the company declared a $2 dividend per share, the first dividend payment since 1945, except in 1948 when $1 was paid, and in each of the first two quarters of 1951 dividends were declared at the annual rate of $2 per share.

As the fiscal year drew to a close, Western Union was faced with the necessity of increasing its land line employees' wages, effective July 1, 1951, in an amount estimated to add $11,900,000 to its annual

operating expenses. To offset, in part, this increase in wage costs, the company filed revised tariff schedules for interstate communication services to become effective June 1 and July 1, 1951, which were designed to add $7,431,000 annually to operating revenues. These revised tariffs were suspended by the Commission and a hearing and investigation, on the Commission's own motion, into the charges, classifications, regulations, and practices for and in connection with interstate telegraph service of Western Union was instituted. The company proposed to make similar changes in its rates for intrastate services which would provide $4,303,000 in additional revenues. Additional wage increases have been agreed to by Western Union to become effective September 1, 1951, subject to the approval of the Wage Stabilization Board, which it is estimated would add $3,511,000 to the company's annual expenses.

During the year, the Commission's staff cooperated with the President's Communications Policy Board in connection with the board's study of domestic telegraph problems. The staff furnished various data requested by the board.

SERVICES AND FACILITIES

Speed of service.—The quality of domestic telegraph service rendered by Western Union during fiscal 1951, as measured by speed of service, did not improve appreciably on an over-all basis; i. e., origin to destination, when compared with the preceding fiscal period. Speed of service declined during the June–December period. This may have been due to an increase in volume of messages which occurred during that period. However, a sharp improvement occurred during the last half of fiscal 1951. Western Union is required under the Commission's rules to conduct daily speed of service studies at its 25 largest offices and to report monthly summaries to the Commission. To the extent possible, the Commission makes spot-checks of speed of service at other locations and makes investigations of deterioration in service wherever indicated. The following table compares the average speed of service in minutes reported for fiscal years 1950 and 1951:

	Average speed in minutes	
	1950	1951
Origin to destination:		
Delivered by—		
Telephone	41	41.2
Messenger	46	45.4
Private tie-line	37	37.9
Office relay drag	9.9	8.7

Western Union modernization program.—Western Union's plan for modernizing its facilities and operations, announced in 1945, is well advanced. The program provides for reperforator switching installations at 15 locations, more economical methods of providing intercity telegraph channels, and improvements in pickup and delivery service.

The most important phase of this program, the construction of reperforator switching offices for the relaying of telegrams, was completed during 1950 when Portland, Oreg., was converted to this type of operation. The company plans to install reperforator equipment for the terminal handling of telegrams in New York City, Chicago, and Washington, and it is expected that construction at New York City will be started before 1952. The modernization program to date represents capital expenditures of some $50 million with an estimated $30 million to be spent in future years. Estimated savings in operating expenses resulting from this program to date amount to about $30 million on an annual basis.

The microwave radio relay system constructed by Western Union between New York, Washington, and Pittsburgh and the link between New York and Philadelphia continued to function with only minor interruptions. It reports certain improvements made to the system during the fiscal year which have resulted in increased capacity and greater circuit stability. No further progress has been made toward extending the system to other areas of the country since the last report.

Hearings in docket 9539, regarding the need for interconnection of Western Union and Bell facilities for intercity video transmission, were concluded during the fiscal year. The hearing examiner's initial decision, issued in January 1950, concluded that such interconnection was not necessary or desirable. Oral argument has been held in the matter but the final decision has not been issued.

Western Union is continuing its development of facsimile devices for the handling of telegrams. More than 3,000 small machines, called Desk-Fax, are now in operation on customers' premises in 12 cities for the transmission of messages locally, thus eliminating other means of pickup and delivery. An additional 4,000 are planned for installation soon.

A facsimile machine capable of transmitting pictorial, typed or printed matter at high speed has been developed in the company's laboratory. It would be usable primarily on long-distance circuits. A speed of 1,200 words of typewritten matter or 3,000 words of newsprint can be transmitted to a distant point per minute by this machine.

Construction of wire facilities.—During the year the Commission received eight applications from Western Union covering wire tele-

graph construction and extensions. One such application was carried over from the preceding year, making a total of nine. Six applications were granted and three were pending at the year's end. Those granted covered the leasing by Western Union of 256,074 telegraph channel miles of line at an annual rental of $380,403, and the construction of 117,957 telegraph channel miles of line and associated equipment at a cost of $3,134,690.

Discontinuance, reduction, or impairment of service.—During the year 941 applications for reduction in hours of service or closure of public telegraph offices were filed. In addition, 231 such applications were pending at the beginning of the year. Most of these requests were made by Western Union. Of the total, 984 applications were granted, 25 were withdrawn, 1 denied, 6 were dismissed for lack of jurisdiction, and 156 were pending. Generally, where hours were reduced or offices closed, alternate service was made available. Four applications filed by Western Union for authority to discontinue long-distance telephone toll service were granted.

The Commission on April 9, 1951, issued its final decision and certificate in docket 9235 granting the joint application filed by Western Union, to discontinue its public message toll, private line, and program telephone service; by the American Telephone & Telegraph Co. and certain Bell system companies, for authority to acquire the telephone business and certain telephone property of Western Union located in 30 States; and by the Pacific Telephone & Telegraph Co. and the Bell Telephone Co. of Nevada, for authority to discontinue all message telegraph service rendered by them in California, Oregon, Washington, Idaho, and Nevada.

On February 21, 1951, the Commission adopted a memorandum opinion in which it concluded that public convenience and necessity did not require that conditions providing for the protection of adversely affected employees be attached to certificates or authorizations for the discontinuance, reduction, or impairment of service by communications carriers. Accordingly, the Commission refused to initiate rule-making procedures to provide for the attachment of such conditions to service curtailment authorizations and, on March 28, 1951, terminated jurisdiction which it had reserved to consider the question of employee protection in connection with such applications.

The Commission reviewed its policies regarding applications filed by Western Union for authority under section 214 of the act to discontinue, reduce, or impair telegraph service and adopted the following principal changes in connection therewith: Amended part 63 of the rules relating to extension of lines and discontinuance of service so as to provide that, where experimental expansions in service are made for a temporary period of not more than 6 months, carriers will

not be required to file applications for authority to reduce service to its original status, but will notify the Commission in such cases (docket 9750); adopted conditions, to be attached to future authorizations permitting Western Union to convert company-operated offices to class 9 or class 11 agency-operated offices, which require supervision by the company of such agencies in accordance with certain minimum requirements; and amended part 63 of the rules to make certain deletions and changes in connection with information required in applications for authority to curtail service (docket 9750).

RATES AND TARIFFS

Rate schedules.—At the end of the year, 44 domestic telegraph carriers had tariffs or concurrences on file with the Commission. During the year, they filed 1,229 tariff publications establishing or changing rates, regulations, practices, and classifications of service, including concurrences.

Special permissions.—Thirty-five applications for special permission to make changes in tariffs or file new tariffs to become effective on less than statutory notice, or involving waiver of certain requirements of the Commission's rules, were granted and one such application was denied.

Western Union domestic rates.—By order of May 23, 1951, the Commission, on its own motion, suspended the operation of revised tariff schedules filed by Western Union to become effective June 1 and July 1, 1951, containing certain new and increased rates for interstate message telegraph, money order and miscellaneous services. The order instituted an investigation into the lawfulness of these rates and provided for a hearing thereon (docket 9980). This hearing was in progress at the close of the year.

Reperforator switching equipment charges.—Western Union filed revised tariff schedules, effective May 1, 1951, establishing new and increased installation charges and monthly rates for special installations of reperforator switching center equipment for use with leased teleprinter circuit facilities. The company estimated that the increased rates would produce additional annual revenue in the amount of about $645,000, representing an increase of 63.3 percent in switching equipment charges or about 15.7 percent in total charges. The new and increased rates replaced the former installation charges and monthly rates which were established in 1943 (and last revised in March 1948) for switching center equipment employing the old "plug-and-jack" system. The increased charges, according to the company, were designed primarily to give effect to current labor and material costs in connection with push-button switching installations.

OTHER REGULATORY MATTERS

Relief and pensions.—During the fiscal year, Western Union made a fundamental change in the pension plan applicable to the large majority of its employees, as a result of new contracts negotiated with organizations representing the employees. The principal feature of the pension plan modification was the extension of coverage to the class of employees whose employment with the company started after December 31, 1936.

Reclassification of plant accounts.—Studies by the Commission's staff directed toward analysis of methods and procedures applied, verification of accounting performed, and entries recorded in connection with Western Union's reclassification of its plant and equipment on basis of original cost, were still in progress at the end of the year. These studies are concerned mainly with the necessity of additional adjustments to the original cost determinations or improprieties in plant accounting procedures.

Continuing property records.—Studies necessary for the verification of the form and contents of Western Union's continuing property records and for the evaluation of the effectiveness of continuing property record procedures were continued. As an aid in the maintenance of its continuing property records, the company compiled an 11-volume Master List of Units of Property, which can be used to provide the cost of each of the basic units of plant in service.

Uniform system of accounts.—During fiscal 1951, the operating revenue accounts prescribed in part 35 of the Commission's rules were further revised so as to provide a single account for recording Government message revenue derived from international messages, previously separated between United States and foreign governments.

Preservation of records.—On August 16, 1950, the Commission adopted a complete revision of its rules for the preservation of records by telegraph carriers (part 46). These new rules were designed to improve records-management procedures and to provide reasonable retention periods for records currently maintained by the several carriers. The immediate effect upon Western Union was the release of considerable storage space previously used for records which were no longer required to be retained, or for which microfilm copies were permitted to be substituted.

4. INTERNATIONAL TELEGRAPH AND TELEPHONE

GENERAL

During the calendar year 1950, for the first time in 5 years, the downward trend in the volume of international telegraph traffic handled by

United States cable and radiotelegraph carriers was reversed. Thus, in 1950 these carriers handled a total of 518,523,407 paid words, an increase of 1.02 percent over the 513,175,244 paid words handled in 1949.

The gain apparently resulted, in part, from the general up-trend in business that began in the late spring of 1950, the effects of which were felt in international telegraph traffic beginning with June of that year. Statistics for the first half of 1950 indicate a traffic volume of 241,326,193 paid words, a decrease of 7.1 percent from the traffic volume of 259,888,149 paid words handled in the first half of 1949. Traffic volume for the last half of 1950, however, increased sufficiently to offset this decrease and to bring 1950 totals above those for the year 1949. Thus, in the last half of 1950 the carriers handled 277,097,214 paid words, an increase of 9.4 percent over the last half of 1949 volume of 253,287,095 paid words.

Revenues from message traffic accruing to the international telegraph carriers in 1950 amounted to $35,938,680, an increase of 7.04 percent over 1949 revenues of $33,573,499.

As was the case in 1949, the volume of international radiotelephone calls as well as revenues therefrom showed considerable increases over the figures for the previous year. The chargeable calls in 1950 reached 744,650, an increase of 13.1 percent over 1949. In the same period revenues (including land line charges) were $8,197,736, an increase of 13.9 percent over the previous year.

INTERNATIONAL SERVICE

Telegraph circuits.—Eighty-two foreign countries and United States territorial possessions were served by United States radiotelegraph carriers, either by direct radiotelegraph circuits or via the Tangier, North Africa, relay stations. Of this number, 71 were served via direct circuits and 11 via Tangier. In addition, a number of countries in the Far East, which were not reached by these means, were served by relay stations operated by United States carriers at Manila in the Philippine Islands. Connections with the facilities of foreign carriers made possible communication with most other points in the world. As in previous years, the United States radiotelegraph carriers continued to transmit program material originating with the United Nations and the Department of State to various foreign countries.

Telephone circuits.—Radiotelephone message toll service was in effect with 88 foreign countries and our territorial possessions. Of this number, 53 countries were served directly while the rest were served through connecting carriers. The Bell system companies provided program transmission service to 58 foreign countries and private line service was available to 9 foreign countries.

Applications.—During the fiscal year, licensees in the international fixed public service filed a total of 425 applications for authorizations for additional frequencies, additional transmitters, and additional points of communication, as well as applications for renewal of current licenses and temporary authorizations. Because of difficulties in obtaining clearance for their use, action upon a number of current applications for additional frequencies has been delayed. Otherwise, the Commission acted on approximately the same number of applications as had been filed in the current fiscal year. Licensees in the radiotelegraph service accounted for 362 of these applications while the balance was filed by licensees in the radiotelephone service.

In addition, the Commission received and acted upon some 50 miscellaneous applications by international communications carriers. These included requests for authorizations to hold interlocking directorates in two or more companies, authorizations to decrease or discontinue service, and authorization to extend wire lines.

Frequencies.—The increased crowding of the spectrum has made it extremely difficult to obtain additional frequency assignments for commercial companies operating in the international fixed public service. This was particularly apparent at the close of the year in connection with pending applications for three new radiotelephone and two new radiotelegraph circuits in the Pacific area.

Docket cases.—In the sixteenth annual report reference was made to the applications of Mackay Radio & Telegraph Co. for authority to communicate with Portugal, Surinam, and The Netherlands (docket 8777). This proceeding involved the question of whether, and under what circumstances, the Commission would authorize a second direct radiotelegraph circuit to countries already served directly by one radiotelegraph carrier. On February 21, 1951, the Commission adopted its decision in this matter wherein it stated that in those instances where there is only one direct radiotelegraph circuit to a point, it would authorize a second competing direct radiotelegraph circuit only if the applicant demonstrated that such competition is reasonably feasible. Applying this standard and considering the volume of traffic to the points at issue in that proceeding, the Commission concluded that competition between direct radiotelegraph circuits was reasonably feasible in the case of Portugal and The Netherlands, but that it was not reasonably feasible with respect to Surinam. At the end of the fiscal year, an appeal in this case filed by RCA Communications, Inc., was pending in the United States Court of Appeals for the District of Columbia. This court, on March 23, 1951, denied RCAC's petition for a stay of the Commission's report and order pending decision on the appeal.

The previous annual report also referred to docket 9638 involving applications of Globe Wireless, Ltd., for construction permits to move certain of its transmitters to stations of Press Wireless, Inc. This proceeding was terminated upon a petition by Globe to the effect that it did not wish to pursue its applications.

The sixteenth annual report noted a Commission investigation into the acceptance and delivery regulations and practices of all international and marine carriers (docket 9433). The particular practices at issue were those involving the direct acceptance and delivery by such carriers of international and marine traffic originating in or destined to hinterland points in the United States by telephone, TWX, mail or otherwise (other than by means of domestic telegraph land line) at the request or option and expense of the user. On November 14, 1950, the Commission adopted its decision in this matter, concluding that these practices were proper. However, it was found that in those cases where such acceptance and delivery practices were engaged in without appropriate tariffs being on file with the Commission, such practices were in violation of the Communications Act, and it was ordered that appropriate tariffs be filed.

The International Bank for Reconstruction and Development and the International Monetary Fund, in a complaint filed against certain United States telegraph carriers (docket 9362), presented for determination by the Commission the question of whether these agencies should be accorded the same rates for their outbound official telegraph communications as those accorded to certain other governments or other international organizations for similar communications. Hearings on this matter were concluded in February 1951, and the case is now awaiting the issuance of an initial decision by the hearing examiner.

Hearings in docket 9292 were completed during the latter part of 1950. This proceeding concerns complaints involving the legality of certain agreements between Western Union on the one hand, and Globe Wireless, Ltd., and Tropical Radio Telegraph Co. on the other hand, for the exchange of specified international telegraph traffic. On June 27, 1951, a hearing examiner's initial decision held that the aforementioned agreements were illegal. The parties to the proceeding have been allowed until August 20, 1951 to file exceptions to this decision and to request oral argument.

Equipment and operating techniques.—Modernization of equipment continued with the addition of four new transmitters and the deletion of two existing transmitters at fixed public international radiotelephone stations. In the radiotelegraph service, 10 new transmitters were added and 5 were deleted.

In the radiotelephone service, two of the new transmitters installed near Miami, Fla., were of a new single channel single sideband type. This new equipment which is less complex than the usual multichannel single sideband types, is also less costly and of lower power. Hence, it is particularly well suited to operation over the shorter circuits operated from Miami. Spectrum space occupancy per channel is approximately one-half that required by conventional double sideband transmissions.

In the telegraph service, authority has been granted to transmit a composite emission consisting of frequency shift keying combined with keyed tone modulations and providing up to four channels of communication on a single frequency assignment.

Operations in the international control service formerly utilizing frequencies in the VHF range (principally 152–162-megacycle band) have been, with one exception, discontinued and circuits between transmitting and receiving stations and message centers formerly operated on these frequencies have been transferred to wire lines. This change was made pursuant to the presently effective table of frequency allocations which does not provide for international control operation in the VHF bands. Licensees have indicated interest in establishing control operations on regularly allocated frequencies in the UHF range, but up to the present time only two stations are being operated in that range on an experimental basis.

International merger.—During the past year the Commission maintained on a current basis, certain studies and records which are used in its regulatory activities and which would be of primary importance in the relation to the question of a merger of international telegraph carriers and facilities. The data involved include information with respect to the operations, plant, traffic volumes, revenues and finances of the various international telegraph carriers.

As was stated in the previous annual report, the Commission cooperated with and furnished detailed information to the President's Communication Policy Board with respect to this problem. That board concluded its studies which, among other things, included the question of merger, and on February 16, 1951, submitted its report to the President. With respect to the question of merger, this report entitled, "The Telecommunication—A Program for Progress", stated (p. 16):

> We find no imperative reasons calling for a merger of these companies; we conclude, on the contrary, that the recent improvements encourage a continuation of their present individual status * * *. While we believe that the national interest does not at this time require the repeal of existing prohibitions against merger, we recognize that changing conditions may provide compelling reasons for a merger later on. If so, the anticipation of them by adequate study and legislation will be essential * * *

INTERNATIONAL CONFERENCES

International Administrative Telephone and Telegraph Conference, Paris, 1949.—In the sixteenth annual report, the major provisions of the telegraph regulations as revised at the Paris 1949 conference were set forth. These regulations, with certain qualifying reservations and declarations, were ratified by the United States Senate on August 9, 1950. They were then signed by the President, deposited with the International Telecommunication Union and proclaimed as effective by the President on November 20, 1950. The changes in regulations and traffic classifications, as well as the principles of rate unification provided for in these revised regulations, were reflected in the tariffs filed by United States cable and radiotelegraph carriers effective July 1, 1950.

Other conferences.—During the latter part of 1950, the Commission, after consulting with various interested parties, prepared its views with respect to certain problems which had been assigned for study to the International Telegraph Consultative Committee (CCIT). They were sent to the Department of State which forwarded them to the Secretary General of the ITU as the views of the United States Government. In March 1951, a meeting was held in Geneva of the various study groups of the CCIT to consider the views expressed by the various member governments on the problems assigned to CCIT for study. The United States was represented at this meeting by staff members of the Department of State and the Commission. The various groups adopted recommendations and resolutions on such matters as the technical phases of operation, revision of certain parts of the Telegraph Regulations, the handling of aeronautical traffic and the rates to be charged therefor, etc. These resolutions and recommendations are to be forwarded for further study by member governments and appropriate action at the next plenary session of the CCIT.

RATES AND TARIFFS

Rate schedules.—At the end of the fiscal year, 105 international cable and radiotelegraph carriers had 160 tariffs and 89 concurrences on file with the Commission. During that year these carriers filed 1,938 tariff publications establishing or changing rates, regulations, practices, or classifications of service.

Special tariff permissions.—The Commission received and acted upon 59 applications filed by international cable and radiotelegraph carriers wherein special permission was requested to make changes in existing tariff schedules or to establish new schedules on less than the regular 30-day statutory notice.

Contract filings.—The international and marine telegraph carriers filed approximately 300 new contracts, 600 amendments to existing contracts, and 120 reports of negotiations with other carriers or with

foreign administrations. In addition, and primarily as a result of the changes in the Telegraph Regulations effective July 1, 1950, the various international telegraph carriers filed 2,133 statements showing revisions in the division of charges for telegraph messages exchanged between these companies and their overseas correspondents.

Elimination of special Government rates.—As has been set forth more fully in the previous annual report, the Commission in its Fourth Interim Report in docket 8230, authorized the international telegraph carriers to eliminate special governmental rates under certain specified conditions. By July 1, 1950, such reduced rates had been eliminated for traffic between the United States and 30 foreign and overseas points. Since that time, such reduced rates have also been eliminated with respect to 50 additional foreign points including certain countries in the British Commonwealth.

Distribution of unrouted international traffic.—In the past year the Commission has given active consideration to various problems which have arisen in connection with the interpretation and administration of the formula which sets forth the manner in which Western Union shall distribute unrouted outbound international traffic filed at its offices, among the various international telegraph carriers. The views of the international telegraph carriers with respect to the manner in which they feel this formula should be revised have been solicited. In addition, the carriers have been requested to supply pertinent traffic data which would indicate the manner in which traffic is actually being handled under the present formula. As was noted in the sixteenth annual report, the Commission has pending before it a complaint (docket 9369) wherein it is alleged that Western Union has erroneously interpreted the formula and engaged in traffic practices which are contrary to the provisions thereof. By order dated November 22, 1950, the Commission set this complaint for hearing.

Marine rate case.—During 1950 the Commission received requests from marine radiotelegraph companies for rate relief. At the same time, Western Union, which originates and terminates much of the marine traffic, also advised the Commission that it desired to revise its land-line charges for handling this traffic. This proposed revision also made provision for establishing uniform division of charges with the various marine carriers. On March 14, 1951, the Commission adopted an order instituting an investigation (docket 9915) into the matter of handling marine traffic for coast station and land-line charges as well as the legality of the divisions between Western Union and the marine carriers.

The Commission had pending before it a formal complaint by Tropical Radio Telegraph Co. against Western Union (docket 9822), wherein it was charged that Western Union had failed to comply with the provisions of the formula for the distribution of outbound marine

traffic in its division of tolls for marine traffic. Since this complaint involved issues which were similar to those before the Commission in its general marine investigation, the Commission consolidated this complaint with the proceedings in docket 9915. Hearings in this consolidated proceeding, begun in June 1951, were continuing at the end of the fiscal year.

International rate case.—As was noted in the previous annual report, the Commission has issued four interim reports in docket 8230 and a final report in this proceeding is still pending. During fiscal 1951 the international telegraph carriers enjoyed increased revenues and profits partly because of the increase in traffic resulting from the disturbed world situation and partly because of the changes in traffic classifications resulting from the revised Telegraph Regulations. The Commission is maintaining close watch of these operations. However, because of the aforementioned situation, the Commission has not taken final action in this proceeding.

OTHER REGULATORY MATTERS

Depreciation.—Studies to determine the reasonableness of annual depreciation rates and charges, and the recorded depreciation reserves, and to determine the propriety of the depreciation practices of the international telegraph carriers, were continued. Considerable progress was made on such studies with respect to four major international carriers and, pending completion of these studies, tentative approval was given to the proposals of these carriers to effect changes in their annual depreciation accrual rates, as well as in certain of their depreciation practices.

Continuing property records.—Verification of the form and contents of continuing property records and evaluation of the effectiveness of continuing property records procedures of radiotelegraph and ocean cable carriers were continued. The four carriers that had not completely fulfilled the requirement to establish and maintain continuing property records at the beginning of fiscal 1951 still have not attained this objective, although considerable progress has been made.

Pensions and relief.—The Commission pursued its general studies of the carriers' pension arrangements. Six of the carriers introduced changes in their pension plans during fiscal 1951 and these changes were analyzed, particularly to determine their effect upon operating expenses.

Reclassification of plant.—Except for certain adjustments applicable to four of the carriers and which are now under study, the plant of the international radiotelegraph and ocean-cable carriers has been reclassified in accordance with the respective uniform systems of accounts.

Uniform system of accounts for radiotelegraph carriers; part 35 (uniform system of accounts for wire-telegraph and ocean cable carriers).—Parts 34 and 35 of the Commission's rules were further amended during fiscal 1951 so as to provide a single account in each of the message-revenue groups (Domestic, Transoceanic, and Marine) for recording Government message revenue derived from international messages.

During the year, part 34 (uniform system of accounts for radiotelegraph carriers) of the Commission's rules was further amended to reflect changes in retirement units occasioned by plant developments in recent years.

Preservation of records.—Revised rules for the preservation of records of telephone carriers, part 45, and international telegraph carriers, part 46, were adopted during fiscal 1951. They were designed to recognize modern methods of record keeping, improve procedures for management of records, and provide for adequate retention of records needed in the Commission's regulation of these carriers.

5. STATISTICS

TELEPHONE CARRIERS

Reports were filed on an annual basis by 221 common carriers and 25 controlling companies for the calendar year 1950. Among the reports received from common carriers were 102 from telephone carriers and 95 from carriers engaged in rendering mobile radiotelephone service. Financial and operating data concerning telephone carriers for the year 1950 as compared with 1949 are shown in the following table:

Telephone carriers [1]

Item	1949	1950	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$9,986,086,460	$10,704,134,171	7.19
Depreciation and amortization reserves	$2,796,221,835	$2,980,061,346	6.57
Net investment in plant and equipment	$7,189,864,625	$7,724,072,825	7.43
Local service revenues	$1,801,126,866	$2,058,311,931	14.28
Toll service revenues	$1,126,496,490	$1,245,351,804	10.55
Total operating revenues	$3,057,361,047	$3,445,154,483	12.68
Operating expenses	$2,368,493,780	$2,464,080,999	4.04
Taxes	$366,731,809	$526,043,113	43.44
Net operating income after all taxes	$322,135,485	$455,030,671	41.25
Net income	$252,325,062	$371,592,086	47.27
Dividends declared	$234,294,968	$269,770,556	15.14
Company telephones:			
Business	11,294,574	11,775,231	4.26
Residence	24,658,635	26,269,363	6.53
Average number of calls originating per month:			
Local [2]	5,086,975,778	5,443,998,555	([3])
Toll [2]	179,346,751	176,285,442	([3])
Number of employees at end of October	559,979	565,105	.92
Male	195,524	196,996	.75
Female	364,455	368,109	1.00
Total compensation for the year	$1,754,640,079	$1,798,193,394	2.48

[1] Intercompany duplications, except in minor instances, have been eliminated.
[2] Partly estimated by reporting carriers.
[3] The number of calls shown are not comparable, as many calls were reclassified from "Toll" to "Local" during 1950, due to enlargement of numerous local calling areas.

BUSINESS AND RESIDENCE TELEPHONES BY STATES

There were 43,003,800 telephones in the continental United States of which 30,067,000 are located in residences, and 12,936,800 in business establishments. The number of telephones, arranged by States, are shown on the following table. The figures were compiled on the basis of partly estimated data as of January 1, 1951, furnished by the American Telephone & Telegraph Co.

State	Business	Residence	Total
Alabama	119,100	304,700	423,800
Arizona	59,800	100,600	160,400
Arkansas	80,300	172,900	253,200
California	1,293,200	2,517,900	3,811,100
Colorado	137,100	303,900	441,000
Connecticut	217,700	569,500	787,200
Delaware	35,900	82,200	118,100
District of Columbia	222,600	266,400	489,000
Florida	265,400	381,600	647,000
Georgia	178,000	399,400	577,400
Idaho	39,800	100,700	140,500
Illinois	972,200	2,067,400	3,039,600
Indiana	286,000	866,000	1,152,000
Iowa	167,700	656,700	824,400
Kansas	135,200	459,000	594,200
Kentucky	124,700	336,300	461,000
Louisiana	153,400	363,100	516,500
Maine	57,600	173,400	231,000
Maryland	192,600	469,400	662,000
Massachusetts	464,400	1,122,500	1,586,900
Michigan	528,300	1,508,800	2,037,100
Minnesota	222,000	681,800	903,800
Mississippi	68,100	158,700	226,800
Missouri	333,100	817,500	1,150,600
Montana	44,300	102,300	146,600
Nebraska	96,300	304,500	400,800
Nevada	20,700	28,700	49,400
New Hampshire	37,200	112,400	149,600
New Jersey	474,800	1,170,500	1,645,300
New Mexico	49,800	67,400	117,200
New York	1,992,200	3,498,500	5,490,700
North Carolina	161,400	377,800	539,200
North Dakota	31,400	94,400	125,800
Ohio	661,200	1,952,700	2,613,900
Oklahoma	167,300	405,300	572,600
Oregon	131,900	306,300	438,200
Pennsylvania	848,500	2,303,600	3,152,100
Rhode Island	70,100	171,100	241,200
South Carolina	75,600	174,400	250,000
South Dakota	35,800	118,400	154,200
Tennessee	175,500	458,700	634,200
Texas	603,800	1,275,800	1,879,600
Utah	57,500	141,800	199,300
Vermont	24,300	71,800	96,100
Virginia	213,500	474,500	688,000
Washington	222,600	536,500	759,100
West Virginia	96,400	260,900	357,300
Wisconsin	265,500	726,100	991,600
Wyoming	25,000	52,200	77,200
United States	12,936,800	30,067,000	43,003,800

LAND-LINE TELEGRAPH

Annual reports containing statistical data for the calendar year 1950 were received from 24 wire-telegraph, ocean-cable, and radio-telegraph carriers. Financial and operating data compiled from reports received from the Western Union concerning land-line operations for the calendar year 1950 in comparison with 1949 are contained in the tabulation shown below. The figures pertaining to its

cable operations are included in another table relating to ocean-cable carriers.

The Western Union Telegraph Co.[1]

Item	1949	1950	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$306,316,463	$294,451,126	(3.87)
Depreciation and amortization reserves	$133,978,693	$128,226,700	(4.29)
Net investment in plant and equipment	$172,337,770	$166,224,426	(3.55)
Message revenues	$146,353,375	$151,389,344	3.44
Total operating revenues	$171,393,408	$177,993,880	3.85
Operating expenses, depreciation, and other operating revenue deductions	$173,504,919	$167,279,568	(3.59)
Net operating revenues	($2,111,511)	$10,714,312	
Income taxes		$2,050,000	
Net income	($3,468,249)	$7,352,472	
Dividends declared		$2,458,972	
Revenue messages handled	[2] 182,069,952	[2] 182,994,799	.51
Number of employees at end of October	41,660	40,482	(2.83)
Total compensation for the year	$125,871,207	$116,936,815	(7.10)

[1] Represents data for land line operations. Figures covering cable are included in another table.
[2] Includes domestic transmission of transoceanic and marine messages (about 8,467,000 in 1949 and about 8,462,000 in 1950).

RADIOTELEGRAPH AND OCEAN-CABLE CARRIERS

The accompanying tables contain financial and operating data tabulated from the annual reports filed by radiotelegraph and cable carriers rendering international service. The returns are applicable to the calendar year 1950 as compared with 1949.

Radiotelegraph carriers

Item	1949	1950	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$38,042,579	$38,885,097	2.21
Depreciation and amortization reserves	$18,207,637	$18,845,689	3.50
Net investment in plant and equipment	$19,834,942	$20,039,408	1.03
Message revenues:			
Domestic [1]	$1,542,098	$1,743,566	13.06
Transoceanic	$17,530,051	$19,223,350	9.66
Marine	$1,294,873	$1,271,847	(1.78)
Total operating revenues	$23,440,539	$25,683,717	9.57
Operating expenses, depreciation, and other operating revenue deductions	$22,696,908	$22,962,711	1.17
Net operating revenues	$743,631	$2,721,006	265.91
Income taxes	$500,989	$853,515	70.37
Net income	$430,506	$2,373,280	451.28
Dividends declared	$5,000	$7,500	50.00
Revenue messages handled:			
Domestic [2]	52,784	52,886	.19
Transoceanic	9,588,339	9,938,645	3.65
Marine	920,044	895,347	(2.68)
Number of employees at end of October	5,483	5,264	(3.99)
Total compensation for the year	$18,231,825	$18,208,915	(.13)

[1] Includes revenues from the domestic transmission of transoceanic and marine messages and revenues from domestic classification messages (primarily Canadian and Mexican).
[2] Represents domestic classification messages (primarily Canadian and Mexican).

Ocean cable carriers (including cable operations of The Western Union Telegraph Co.)

Item	1949	1950	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$96,289,405	$97,283,249	1.03
Depreciation and amortization reserves	$64,688,089	$63,910,819	(1.20)
Net investment in plant and equipment	$31,600,716	$33,372,430	5.61
Message revenues:			
Domestic [1]	$344,224	$157,521	(54.24)
Transoceanic	$20,389,931	$20,073,604	(1.55)
Total operating revenues	$23,154,138	$24,649,414	6.46
Operating expenses, depreciation, and other operating revenue deductions	$22,169,301	$21,250,647	(4.14)
Net operating revenues	$984,837	$3,398,767	245.11
Income taxes	$117,888	$708,112	500.67
Net income	$187,916	$2,165,793	1,052.53
Dividends declared	$353,468	$883,670	150.00
Revenue messages handled:			
Domestic [2]	217,691	41,168	(81.09)
Transoceanic	10,172,458	9,856,802	(3.10)
Number of employees at end of October	5,667	5,495	(3.04)
Total compensation for the year	$13,036,719	$12,030,892	(7.72)

[1] Includes revenues from the domestic transmission of transoceanic messages and revenues from domestic classification messages (primarily Canadian).
[2] Represents domestic classification messages (primarily Canadian).

INTERNATIONAL TELEGRAPH TRAFFIC

The reports received from cable and radiotelegraph carriers indicate that 518,523,407 paid words were handled during the calendar year 1950. The outbound traffic amounted to 263,769,025 words during the year, and inbound 254,754,382 words. The following table shows an analysis of the traffic handled between the United States and the principal countries of the world.

International telegraph (radio and cable) traffic, 1950

Country	Number of words	
	Outbound from the United States	Inbound to the United States
EUROPE, AFRICA AND THE NEAR EAST		
Algeria	194,885	123,601
Arabia	812,572	717,943
Austria	1,594,727	1,754,623
Belgian Congo	328,658	287,128
Belgium	5,696,414	4,991,545
British East Africa	238,901	209,720
British West Africa	222,759	262,260
Czechoslovakia	1,071,945	1,551,571
Denmark	1,889,900	1,273,545
Egypt	1,706,590	1,411,503
Ethiopia	211,627	125,424
Finland	481,242	520,938
France	21,276,721	13,242,532
Germany	8,178,185	9,140,448
Greece	2,274,555	2,030,168
Hungary	372,697	340,619
Iceland	286,330	228,450
Iran	955,583	964,466
Iraq	191,609	230,518
Ireland	878,545	1,138,497
Israel	3,119,363	3,300,726
Italy	9,383,346	7,884,526
Lebanon	804,923	793,641
Liberia	624,952	483,833
Luxembourg	125,994	112,401
Morocco—French	362,062	250,667
Morocco—Tangier	684,078	711,996
Netherlands	6,481,231	6,166,073
Norway	2,658,759	1,837,863
Persian Gulf	303,344	308,710
Poland	559,671	442,175
Portugal	1,322,788	952,618
Roumania	155,389	160,784
Spain	3,108,853	2,290,040
Sweden	3,466,261	3,001,991
Switzerland	7,488,197	5,654,025
Syria	302,132	229,120
Transjordania	278,101	101,426
Trieste, Free Territory of	175,622	156,923
Turkey	1,084,336	776,866
Union of South Africa	2,222,858	2,388,860
U. S. S. R.	6,449,812	2,875,859
United Kingdom	47,878,197	45,600,817
Yugoslavia	1,009,097	890,940
All other places	1,432,253	2,710,680
Total	150,346,064	130,629,059
WEST INDIES, CENTRAL, NORTH, AND SOUTH AMERICA:		
Argentina	7,218,013	7,891,759
Bahamas	602,020	728,786
Bermuda	851,722	945,690
Bolivia	777,448	769,976
Brazil	9,805,710	10,710,842
British Guiana	160,850	122,609
British Honduras	101,271	141,102
British West Indies [1]	234,249	167,205

Country	Number of words	
	Outbound from the United States	Inbound to the United States
WEST INDIES, CENTRAL, NORTH AND SOUTH AMERICA—continued		
Canada	6,556,018	7,807,742
Canal Zone	466,833	549,898
Chile	2,152,150	2,302,168
Colombia	4,421,289	4,306,818
Costa Rica	776,158	625,089
Cuba	6,878,907	8,959,965
Dominican Republic	1,252,611	1,224,669
Ecuador	1,245,901	828,355
Guatemala	1,228,613	1,279,713
Haiti	802,905	745,985
Honduras	638,416	559,828
Jamaica	611,595	466,120
Mexico	1,806,081	1,430,707
Netherlands West Indies	1,108,359	1,193,185
Nicaragua	876,985	606,709
Panama	1,195,188	919,452
Paraguay	386,423	215,673
Peru	1,943,859	1,665,251
Puerto Rico	3,453,318	3,081,208
Salvador	790,711	601,555
Surinam	127,381	128,040
Trinidad	508,740	373,689
Uruguay	1,940,774	1,710,343
Venezuela	6,608,106	7,698,960
Virgin Islands	223,923	216,767
All other places	316,740	56,055
Total	68,069,267	71,031,913
ASIA AND OCEANIA		
Afghanistan	172,527	105,431
Australia	3,411,301	3,006,914
Ceylon	579,594	425,526
China (excluding Hongkong)	2,532,469	1,910,132
Formosa	953,707	1,171,854
French Indochina	429,808	474,665
Guam	338,345	414,696
Hawaii	4,565,941	4,130,643
Hongkong	3,960,762	3,643,281
India	5,317,275	4,862,699
Indonesia	2,136,639	2,099,920
Japan	9,097,160	15,258,805
Korea	278,295	928,045
Malay States	1,201,266	1,274,797
New Zealand	863,047	831,757
Okinawa	253,897	618,786
Pakistan	1,675,038	1,686,929
Philippines	5,032,642	6,834,119
Society Islands	132,567	131,201
Thailand (Siam)	1,259,087	1,237,477
All other places	487,630	204,545
Total	44,682,997	51,272,222
Unknown destination or origin	670,697	1,821,188
Grand total	263,769,025	254,754,382

[1] Points not listed separately.

CHAPTER III—SAFETY AND SPECIAL RADIO SERVICES

1. GENERAL

Most of the nonbroadcast radio services are grouped in what is known as the Safety and Special Radio Services. They comprise a broad field of radio utilization by commerce, industry, and Government and represent by far the greatest number of radio station licenses issued by the Commission.

The services fall into four categories:

Safety services.—Aeronautical, Marine, Police, Fire, Forestry-Conservation, Highway Maintenance, Special Emergency, and State Guard.

Land transportation services.—Railroad, Urban Transit, Intercity Bus, Highway Truck, Taxicab, Automobile Emergency, and Citizens.

Industrial services.—Power, Petroleum, Forest Products, Motion Picture, Relay Press, Special Industrial, Low-power Industrial, and Agriculture.

Amateur and disaster services.

These services are continuously expanding, as indicated in the statistical tables at the end of this chapter. This trend necessarily will continue, even though no new uses of radio are authorized, since the licenses are not exclusive but are granted for shared use of frequencies on the basis of the applicant's membership in an eligible group. Thus, the licensing and regulatory problems grow more complex from year to year as more and more radio stations are fitted into the available

spectrum space. Likewise, the function of enforcement and maintenance of a satisfactory level of compliance has become increasingly difficult with the rapid development of these services since World War II to a total approaching 200,000 stations.

2. MARINE RADIO SERVICES

GENERAL

The Marine Radio Services involve the use of radio for the safety, navigation, and general communication needs of shipping interests, both commercial and noncommercial. Of radio's many applications for safety purposes, none is older or more widely known than communication by ships as an aid to the safety of life and property at sea. Through such use, radio has proved itself of inestimable assistance in effecting rescues and averting disasters. The normal radio installation aboard ship provides means also for exchanging operational and public correspondence with coast stations, other ships and, in some cases, with aircraft.

Radio as an aid to navigation has proved its value over the years. Through the use of weather broadcasts, direction finding, loran and radar, ships are assisted in navigating safely, with stranding, collision, and foundering held to a minimum.

Through the use of the radiotelephone, radar, and the radio direction finder, ships on the Great Lakes carrying cargoes primarily of ore, grain, and coal; integrated barge tows on the Mississippi River and tributaries carrying cargoes primarily of petroleum products; and bulk freighters and tankers in the coastal trade carrying petroleum products, coal, grain, and other materials are operated in a more safe and expeditious manner, thereby contributing materially to the national production, security, and economy. Ships in the coastal and international trade also use radiotelegraphy, in particular where communication with foreign stations is carried on.

A ship having a radio installation is classified for convenience as either compulsorily equipped or voluntarily equipped. This distinction is necessitated by the fact that Federal statutes and international agreements require the mandatory installation of radio for safety purposes on board certain classes of ships. Title III, part II, of the Communications Act (for the high seas) and the Ship Act of 1910 (for the Great Lakes) embody the domestic law on this subject, while the International Convention for the Safety of Life at Sea constitutes international law with respect to safety radio requirements on international voyages. The Commission is the sole Federal agency having responsibility for the domestic administration and enforcement of these safety radio laws and treaty radio provisions.

The Commission, pursuant to the Communications Act, also licenses

all compulsory and voluntary radio stations on board vessels of United States registry (including certain U. S. Government ships).

Since a large percentage of the world's ships are engaged on international voyages and since radio is used as international media for communication, the Commission regularly assists the Department of State by participating in international conferences or meetings related to the regulation, control or improvement of the equipment, facilities, frequencies, methods of operation and radio operators for international marine radiocommunication, and for radio aids to international marine navigation.

SAFETY AT SEA

Administration of title III, part II of the Communications Act requiring radio apparatus and operators on board ocean-going vessels, involved, as of June 30, 1951, approximately 1,500 ships of United States registry. When navigated in the open sea, these ships must carry one or more qualified radio operators and maintain safety watches on the radiotelegraph calling and distress frequency. Vessels of countries which are not parties to the International Convention for the Safety of Life at Sea are subject to these same equipment and operator requirements when leaving United States ports.

Commission records disclose that the international radio telegraph distress signal ["SOS"] was used throughout the world 206 times during the year. Studies of distress communications, made pursuant to section 4 (c) of the Commications Act, are used to strengthen the related rules of the Commission for the purpose of insuring maximum use of radio for safety of life and property at sea.

The Commission is authorized by the Communications Act and the Safety of Life at Sea Convention to exempt ships in certain categories from radio requirements if it finds that the route or the conditions of the voyage or other circumstances render such radio requirements unreasonable or unnecessary. Pursuant to this authority, the Commission renewed for 1 year blanket exemptions for passenger vessels of 15 or less gross tons when navigated in coastal waters of the United States not more than 20 nautical miles from the nearest land or not more than 200 nautical miles between two consecutive ports, and also for passenger vessels of less than 100 gross tons when navigated within certain designated coastal areas.

Individual applications for ship radio exemption received during the year numbered 35. Renewal of exemption was granted to several cargo vessels used as tenders and moored most of the time to oil well drilling platforms located within 15 miles of the coast of Louisiana in the Gulf of Mexico. These vessels are voluntarily equipped with two-way radiotelephone installations capable of communicating with

nearby coast stations, with ships similarly equipped, and with United States Coast Guard stations.

SAFETY ON THE GREAT LAKES

Of outstanding significance during the year was formal discussion with Canada of a proposed marine radio treaty between that country and the United States which would be applicable for safety purposes to certain vessels operating on the Great Lakes. This development had been anticipated since the Commission reported to the Seventy-sixth Congress in 1940 its special study of radio requirements for ships navigating the Great Lakes.

The treaty, as proposed, would require several hundred Great Lakes vessels to carry radiotelephone installations and to maintain radio watches for safety purposes. Such radio installations would also have to meet specific minimum standards.

Delegations representing the United States and Canada conferred formally for this purpose at Ottawa from May 7 to May 11, 1951. FCC Commissioner Edward M. Webster was Chairman of the United States delegation. In addition, two members of the Commission's marine radio and legal staff participated as official advisors. Agreement was reached upon the substance of the proposed treaty with the exception of a certain legal technicality which required further study. The conference recessed on May 11, 1951, to await the outcome of that study.

RADIO AIDS TO NAVIGATION

Authorizations were renewed for operation on an experimental basis of shore-based radar (radionavigation land) stations in the cities of Long Beach and San Francisco, Calif., and Baltimore, Md., and new authorizations were granted for like stations at Los Angeles and New York. These stations are used for providing information intended to assist the safe piloting of ships entering, leaving, or mooring within the harbor. Since the Coast Guard has the responsibility for providing and supervising public aids to marine navigation, the establishment of these private aids to navigation is carried out only with the concurrence of that agency. Very high frequency maritime radiotelephone systems are being used experimentally by such radar stations, in some cases to communicate with the pilots aboard ships to furnish navigational information.

Nine experimental radar authorizations (radionavigation land stations) are held by various members of the petroleum industry engaged in off-shore oil drilling activities in the Gulf of Mexico. In each case, these stations are used in the navigation of ships of the licensee in his particular operations.

As of June 30, 1951, there were more than 1,600 United States merchant ships authorized to use radar on a regular basis.

Nine experimental authorizations were renewed to cover shore based radar stations for training merchant marine deck officers in shipboard radar operation on the Great Lakes and on the seaboard. The need for this type of station arises from the fact that shipborne radar is a relatively new device and its use is not sufficiently widespread to provide normal means of training navigators.

INTERNATIONAL FREQUENCY COORDINATION

The efficient functioning of the marine radio services on a systematized and universal basis depends, to a high degree, on international agreements and decisions. For this purpose, international conferences are held periodically to consider frequency allocation and utilization problems. The latest and most far-reaching of these conferences was that of the International Telecommunications Union at Atlantic City, 1947. Some of its revised radio regulations came into force on January 1, 1949, and the remainder, mainly involving the assignment of frequencies between 14 and 150 kilocycles and between 4000 and 27,500 kilocycles, are to become effective on a date or dates to be determined by an ITU Extraordinary Administrative Radio Conference scheduled to convene in Geneva on August 16, 1951.

In treaty region 2 (Western Hemisphere), an assignment plan was evolved and final coordination completed for the 415–535-kilocycle frequency band which affects, mainly, coast stations and compulsorily equipped ship stations which use telegraphy.

It is proposed to implement this plan in the latter part of 1951. Other assignment plans, which involve marine radio services and the fixed public service in Alaska, were prepared for the frequency bands 150–415 kilocycles and 2000–3500 kilocycles; however, further international coordination appears necessary before implementation may be considered.

In the 2000–3500-kilocycle plan, additional ship-shore radio channels would be provided for public telephone service at certain major ports of the continental United States where the present radio channels are greatly overloaded. These proposed additional channels and areas selected for their use are provided, insofar as possible, in accordance with the recommendations of the Radio Technical Commission for Marine Services.

PROPOSED AUTOMATIC RADIOTELEPHONE ALARM SYSTEM

The Commission has actively participated in the preparation of a recommendation concerning the use of an automatic alarm device for guarding the proposed international marine telephone distress frequency 2182 kilocycles.

The relative efficacy of the systems proposed by the United States, United Kingdom, and France for the purpose was studied through comparative practical tests conducted by personnel of the Commission's Laboratory, Marine and Field Engineering Divisions using experimental equipment developed in this country and some equipment received for test from abroad. Tests were made in the New York, Gulf of Mexico, and Great Lakes areas. Considerable interest in the auto alarm problem was evidenced abroad particularly by the extensive coordinated tests made across the English Channel by the United Kingdom and France which led to the development and proposal of a second alarm system by the former administration. The comparative and somewhat competitive tests of similar alarm equipment in the United States and Europe have provided an excellent background for the selection and development of an automatic alarm system for standardization on a worldwide basis.

This matter was considered at the sixth meeting of the International Radio Consultative Committee (CCIR) at Geneva, Switzerland (June 1951), with a resultant recommendation that an auto alarm signal consisting of alternate tones of 2,200 and 1,300 cycles per second, each having a duration of 250 milliseconds, be provisionally adopted internationally for use on the maritime radiotelephone distress frequency subject to a prescribed study program involving laboratory and field tests to be completed within a 1-year period. An engineer of the Commission's Marine Division was a member of the United States delegation at this meeting to aid in the study of the auto alarm matter and the formulation of the CCIR recommendation.

COAST STATIONS

The use of high frequencies by ocean-going ships for long-distance communication with coast stations continues to increase.

During the fiscal year, eight public coast stations using telegraphy were granted authority to discontinue operation. These stations were located at Thomaston, Maine; Norfolk, Va.; Jupiter, Fla.; Beaumont, Tex.; Seattle, Wash.; Kailua, T. H.; Frankfort, Mich.; and Westlake, Ohio. On the seaboard, this trend to curtailment of service arises, in part, from an increase in the number of ship stations being equipped with high frequency radiotelegraph installations in addition to the medium frequency installations required by law and treaty, thereby allowing direct long distance communication with certain coast stations which serve the predominant seaboard ports. On the Great Lakes, the curtailment trend is due to the fact that there are now in operation on those lakes not more than six ship stations licensed by the Commission for telegraphy and these ships also have radiotelephone installations.

A new public coast telegraph station was established at Lake

Charles, La., and public coast stations using telephony were authorized at Pittsburgh, Pa., and at Lake Texhoma, Tex., an inland lake. A limited coast station was authorized in Nueces County, Tex., for communicating with ships desiring passage through the swing gate bridge at that location.

At the close of the fiscal year, a number of applications were pending for authority to establish additional radiotelephone communication channels and stations in the 2–3-megacycle band to meet an increasing need for public ship-shore service in the United States coastal waters. [Pending implementation of the new proposed international frequency allocations, the Commission on July 18, 1951, modified its rules so as to provide for the further use of frequencies presently allocated to this service by designating supplemental "day only" frequencies for use at Boston, New Orleans, Seattle, Miami Beach, Los Angeles, San Diego, San Francisco, Eureka (Calif.), and Tampa. An additional channel was made available at Galveston on a 24-hour basis.]

Numerous applications for VHF (Very High Frequency) coast stations and associated ship stations, both public and nonpublic, were granted during the year. These stations have been operating on an experimental basis and provide a local type of communication for a large number of vessels in harbor and port areas.

The operational results obtained and the interest shown in this new type of radiotelephone facility have formed a basis for regularization of the use of very high frequencies for both public and nonpublic radiotelephone service as reflected in the Commission's recently revised Maritime Service rules.

A unique feature in the operation of these VHF Maritime Mobile Service stations in the regular service is that the VHF ship telephone stations may be operated by a person who does not hold an operator license issued by the Commission provided a specified series of conditions are complied with at all times during such operation. Only modern VHF ship telephone transmitting equipment which has been type-accepted by the Commission, may be licensed for this purpose. The equipment must not be that required on board vessels for compliance with the safety provisions of treaty or statute.

With respect to the operation of nonpublic VHF maritime mobile stations, short range communication plays an important part in piloting and docking ships by providing direct radiotelephone service between the pilot or master of the ship, the dockmaster, and the tugs. In one case, a licensee at New York City emphasized the safety aspect of his particular service in establishing an auxiliary coast station at a location different from his primary station in order to maintain communication should the primary station fail. Thereafter, a severe storm struck New York Harbor, and the auxiliary station operation

resulted in saving valuable property and possibly lives by directing tugboats in the harbor.

The Commission's records indicate that 80 VHF public and non-public coast stations had been established under experimental licenses as of June 30, 1951. With each coast station is associated a number of VHF ship stations that communicate with it.

There were 35 coast stations licensed to use telegraphy in the United States at the end of the fiscal year, including 3 formally classified as "mobile press" stations. The number of coast stations using telephony for regional service, exclusive of those in Alaska, numbered 53. There are five coast stations in the United States employing telephony on high frequencies for long distance public service with ocean going vessels.

VOLUNTARY USE OF RADIOTELEPHONY

Commission records show that there are approximately 25,000 vessels of United States registry equipped with licensed radiotelephone stations for operation on available frequencies in the 2000–3000-kilocycle band. The large increase in the number of ship stations using telephony in this band has aggravated the already serious problem of insufficient frequencies to accommodate all the desired communication at the major seaports. Because of this condition the Commission has modified its rules, as previously stated, to provide for duplicate use of presently allocated ship frequencies in certain additional areas on a "day only" basis.

The Commission, effective July 23, 1951, made over-all revisions to parts 7 and 8 of its maritime rules, which provided for the additional use of the inter-ship telephone frequency 2638 kilocycles on the rivers and inland waters, a use previously not permitted. A study is being made regarding the feasibility of allocating frequencies in the 2000–3500-kilocycle band for assignment to small boats for inter-ship communication on a "geographic area basis". The Commission's revised maritime rules improve communication facilities for the operation of vessels by providing two frequencies in the medium-frequency band and several frequencies in the very high frequency band for ship-shore business and operational purposes.

To further enhance the safety of radiotelephone communication, beginning July 23, 1951, the frequency 2182 kilocycles may be used by ship stations of the United States on a voluntary basis for calling and distress purposes and for safety communication within certain prescribed areas. It is anticipated that this frequency will be recognized eventually for this purpose on an international basis.

A large number of vessels have installed very high frequency equipment for telephone communication with public coast stations along the Atlantic, Gulf, and Pacific coasts and on the shores of the

Great Lakes. The principal users of this service are pleasure boats, tugs, tow boats, and fishing vessels; and on the Great Lakes, bulk freighters carrying iron ore, coal, and grain.

FIXED PUBLIC SERVICE AND MARITIME MOBILE SERVICE IN ALASKA

The Fixed Public Service and the Maritime Mobile Service in Alaska utilize specially assigned frequencies to provide communication between communities in Alaska, with the Alaska Communication System and between coast stations and ships in Alaskan waters. The Alaska Communication System (ACS), under the Department of National Defense, operates the main intra-Alaska communication system and routes Alaska message traffic to all parts of the world. The ACS makes its general point-to-point communication service available as a connecting system to non-Government stations. The Commission maintains liaison with the ACS in coordinating communications facilities in Alaska to serve the public interest.

The number of licensed Fixed Public Service stations (point-to-point) in Alaska decreased during the fiscal year from 524 to a total of 517, while the total number of coast stations in Alaska increased in the same period from 340 to 344.

Several administrative problems have arisen concerning the regulation of non-Government stations in Alaska which call for an early revision of the regulations applicable to these stations. Because of the increasing need for frequencies by other services, notably the aeronautical service, and by Government agencies for stations in Alaska, and because of the effect of forthcoming treaty implementation which will reduce the frequencies available for Fixed Public Service in Alaska, the Commission is confronted with a difficult situation in reducing and changing the fixed service frequency allocation there. In addition, there is undesirable duplication of these radio facilities as between the ACS and the non-Government stations at certain locations. Although the Commission has these matters under advisement, the necessary corrective action is being delayed because the limited Commission staff assigned to resolve these problems must give priority to more pressing work dealing with safety at sea and participation in international treaty work.

INTERFERENCE

Numerous cases of unauthorized radiation from radiotelephone transmitters used aboard small craft have been reported. This has caused harmful interference, in some instances, to the aeronautical service. The possibility of using some convenient and relatively inexpensive but effective means applicable to each existing transmitter for reducing these interfering emissions has been made the subject of investigation.

The matter of interference to reception by Civil Aeronautics Administration stations in Alaska of signals from aircraft stations on the frequency 3105 kilocycles caused by ship, point-to-point, and coast station operations in Alaska has been mitigated to some extent by the issuance of a general notice by the Commission to all involved licensees pointing out the existing problem and requesting precautionary operating measures. Improper technical adjustment of the transmitters was found to be the major cause of this interference.

EQUIPMENT APPROVALS AND PROBLEMS

Additional installations of the nickel-cadmium type of storage battery have been made on board ships required to carry an emergency power supply as part of their compulsory radio installation. This type of storage battery has certain advantages for use on ocean-going vessels; one of the more important features is its ability to remain in good operating condition without attention during sustained periods when a ship is temporarily out of service. Although progress has been made in solving certain regulatory problems involved in the use of such batteries, the development of a practical means for determining its state of charge was still under consideration.

During the year the Commission type-approved for licensing purposes four basic types of ship radar equipment after the required commercial laboratory and shipboard tests. Such type-approval is a regulatory requirement intended to prevent interference prior to operation of the equipment. Two of the types approved are of foreign manufacture. One of these is unusual as compared to commercial equipment manufactured in this country in that separate transmitting and receiving antennas are employed. Also the transmitter, modulator, and receiver "front-end" circuits are associated with the antenna system and rotate with it as one assembly.

Anticipating the possible early effective date of the Safety of Life at Sea Convention, London, 1948, the Commission in a rule-making proceeding proposed more stringent technical requirements for all new types of radiotelegraph auto alarms which would be subject, under the law, to its approval. The related comments of the industry were directed to the important technical question of how best to specify operating tolerances for the dashes and spaces of the alarm signal. Accordingly, the Commission, as a temporary measure, adopted a related rule which embodies the text of the convention regulations (general in character) on this subject. At the same time, the matter of determining the precise text of an appropriate final rule prescribing these operating tolerances was referred in June 1951 to the Radio Technical Commission for Marine Services for study and recommendations.

RULES GOVERNING STATIONS IN MARITIME SERVICES

An extensive revision of the maritime service rules was adopted by the Commission during the fiscal year, to become effective on July 23, 1951.

The revised rules incorporate information relative to procedures to be followed in the licensing of stations and reflect the applicable provisions of more recent international treaties and agreements concerning these services.

The revised rules also regularize the heretofore experimental use of certain very high frequencies in the maritime service. Ship and coast stations, including those which will be authorized to operate on very high frequencies, are classified as "public" or "limited", depending on whether or not the station is open to public correspondence. Also, a new class of nonpublic station known as a Marine Utility station is established, to operate under one station license on either ship or shore as occasion requires. It will be of low power and portable, using radiotelephony, and its scope of operations will be confined to designated geographic areas. This class of station is intended to serve the purely local communication needs of maritime interests, such as harbor pilots who find small portable communication equipment useful in the performance of their duties.

In regularizing former experimental operation, an additional class of fixed station designated Marine Fixed has been established. This type of station is normally located in water areas adjacent to the coast and is authorized to communicate with nearby coast stations using telephony. It is intended primarily to meet the communication needs of the petroleum industry engaged in off-shore, oil-drilling operations.

The revised rules establish new classes of coast stations and several new classes of associated stations. The new classes of coast stations are designated as Public Class I, II, and III; Limited Class I, II, and III, and Marine Utility. The new classes of stations to be associated with them are designated Marine Control, Marine Repeater, Marine Relay, and Marine Receiver Test. Marine Control and Marine Repeater stations will provide for remote control of transmitters, and for relay of received signals on frequencies above 70 megacycles, where this is necessary in lieu of wire lines. The Marine Relay station will be authorized on frequencies above 70 megacycles for exchanging operating signals and for forwarding and relaying ship-to-shore message traffic. The former class of Marine Relay stations, which comprised a coast station using telegraphy under a separate marine relay license to communicate with other marine relay stations in expediting the transmission of telegraph message traffic to ships, has been abolished. However, its functions have been included in the scope of oper-

ations of a coast station licensed for telegraphy. Marine Receiver Test stations will be used at fixed locations on shore for regularly testing the receiving equipment of public coast telephone stations.

The revised rules also establish the Maritime Radiolocation Service on a regular basis and classify the different types of stations, both on ship and ashore, which will provide radionavigation and radiolocation services. The numerous ship radar stations already licensed will be transferred, under the revised rules, from the former "ship" service to the new service. This is in accordance with implementation of the radio regulations adopted at Atlantic City.

To provide for development of equipment or techniques in the marine services, new classes of "developmental" stations have been established which, during the developmental period, will operate experimentally.

Provision is made in the revised rules for type approval or type acceptance of transmitters and other radio equipment to be used for specific marine purposes. Type acceptance will be given for a readily identifiable type of transmitting equipment upon proper showing made in writing by the manufacturer or applicant that the equipment is capable of meeting requirements for station licensing. Type approval, as distinguished from type acceptance, will be given only after suitable tests have been made to determine ability to meet specific requirements for which type approval is requested. With the exception of radar equipment, type approval is applicable only to radio equipment compulsorily installed on ships for safety purposes (such as main transmitters, emergency transmitters, auto alarms, etc.).

The revised rules provide for type approval of radar equipment to be used either on ship or on shore, since such equipment requires special testing techniques to determine its adequacy for licensing purposes.

The revised rules require installation of automatic-alarm-signal-keying devices on ships compulsorily equipped with radiotelegraph installations. Such keying devices will provide, in time of distress, a needed method for automatically and correctly transmitting the alarm signal.

RADIO TECHNICAL COMMISSION FOR MARINE SERVICES

The Commission continued its participation in the activities of the Radio Technical Commission for Marine Services (RTCM). Commissioner Edward M. Webster was reelected its vice chairman for another 2-year term, a Commission engineer continued as Executive Secretary and office space was provided by the Commission for the Secretariat. During the year, the RTCM was reorganized and its membership doubled, with the industry members furnishing an assist-

ant to the Executive Secretary and contributing toward part of the expenses of the Secretariat.

The RTCM studied and made recommendations on radio problems of marine interest and concern. Among these were a study and report on the difficulties which would result from a failure to standardize internationally upon the use of FM (frequency modulation) for VHF marine communication, including an analysis of the advantages of FM over AM (amplitude modulation) for such use; also a study and recommendation to provide an adequate marine radiotelephone service. Technical committees of the RTCM are presently studying medium distance (3 to 50 miles) marine navigational radio systems to determine whether any modifications should be recommended in the existing United States policy on such aids. On November 2, 1950, the RTCM sponsored a demonstration of improved and new electronic navigational aids at the United States Coast Guard Electronic Engineering Station, Wildwood, N. J. A special committee of the RTCM is continuing study on the proposed standardization of selective signaling and ringing devices for the marine radiotelephone services. The RTCM, through the facilities of some of its members, assisted the Commission's engineers in making practical tests of the domestic and foreign radiotelephone auto alarm equipment previously referred to.

3. AERONAUTICAL RADIO SERVICES

The Aeronautical Radio Services provide radio facilities for aircraft operation and safety of life and property in the air. Radio communication has become vital to aviation both from the standpoint of safety of life and property as well as for efficient, expeditious, and economical operation of aircraft.

These services consist of Aircraft radio stations, Aeronautical Land and Aeronautical Fixed stations, Airdrome Control stations, Aeronautical Mobile Utility stations, Aeronautical Advisory stations, Flying School stations, Flight Test stations, Aeronautical Public Service stations, Civil Air Patrol stations, and Navigational Aid stations including radio beacons, ranges, radar devices, direction-finding systems, traffic control operations, approach and instrument landing systems, radio altimeters, and distance measuring devices.

Expansion of aviation radio has been extremely rapid. In 1938 there were less than 1,500 aeronautical stations of all kinds. There were more than 34,000 authorized aircraft and ground stations at the close of fiscal year 1951. This increase is due at least in part to the large growth of voluntary installations of communications equipment aboard private aircraft.

AVIATION ORGANIZATIONS AND CONFERENCES

In order to maintain the aviation radio service at the high level of reliability necessary for safety purposes and to encourage further development, the Commission has increased its participation in the various interagency coordinating and policy groups both on a domestic and international scale. The organizations in which the Commission has been most active are the International Administrative Aeronautical Radio Conference (IAARC) of the International Telecommunications Union, the International Civil Aviation Organization (ICAO), the Air Coordinating Committee (ACC), and the Radio Technical Commission for Aeronautics (RTCA).

The IAARC recommendations and planning form a basis not only for the international allotment of aeronautical frequencies but also for a high-frequency plan for the continental United States. Such a plan to serve the aeronautical operations for this country has been drawn up and will be associated with the United States position for the ITU Extraordinary Administrative Radio Conference planned to start in Geneva on August 16, 1951.

A major and continuing function of the Commission is participation in the work of the Air Coordinating Committee. The ACC recommends proposed United States policy on aviation to the President and acts as a vehicle for coordinating aviation matters between the various departments of the Government and industry. The Commission is active in the ACC through its membership on the Technical Division and the following subcommittees: Aeronautical Communications and Electronic Aids, Airspace—Rules of the Air and Air Traffic Control, Search and Rescue, and Airmen Qualifications.

The Commission is also represented on the Air Traffic Control and Navigation Panel. This was established as a result of the recommendations of the Congressional Aviation Policy Board and the President's Air Policy Commission for the purpose of guiding the program for providing all-weather air navigation and traffic control facilities as well as a national air defense system. Special working group 5 of this panel completed a detailed set of operational requirements and procedures as the blueprint for the integration of air traffic control operations within the United States. The report of this group was approved by the panel and the Technical Division of the ACC as a guide for implementation of the transition system.

The Radio Technical Commission for Aeronautics is a cooperative association of the United States Government-industry aeronautical telecommunication agencies. The RTCA conducts studies of aeronautical telecommunications problems and related matters for the purpose of providing guidance to and coordinating the efforts of all organizations concerned.

The Commission's Aviation Division participates in the Executive Committee and several special technical subcommittees of the RTCA. During the past year these special committees have studied and made recommendations on such problems as:

Special Committee 12—Test procedures and performance requirements for airborne radio transmitting equipment operating within the frequency range 2–30 megacycles and 500 kilocycles.

Special Committee 13—Test procedures for airborne radio equipment operating within the frequency band 30–400 megacycles.

Special Committee 53—Protection ratios for carrier current systems operating in the frequency band 200–415 kilocycles.

Special Committee 56—Implementation of the VHF (118–132 megacycles) utilization plan and review of transition period communications requirements.

Special Committee 57—High altitude grid plan for VOR/DME frequency pairing.

Special Committee 58—Minimum performance requirements for airborne electronic equipment for the transition period common system.

The ICAO is an international organization established to develop standards and recommend practices for international civil aviation throughout the world. During fiscal 1951 the Commission assisted in the preparation for and participated in the ICAO Second Middle East Regional Air Navigation meeting and the fourth session of the Communications Division. In addition, the Commission assisted in preparing for the following ICAO meetings scheduled in fiscal 1952: Third Search and Rescue Division meeting, South American/South Atlantic RAN meeting, and Third European Mediterranean meeting.

Commission participation in the preparation for and in the work of these ICAO meetings affords an opportunity for the guidance of aeronautical planning to insure the most efficient use of the limited radio frequency spectrum and at the same time to provide an adequate communication and navigation service for international aviation. In addition, representation on these groups insures that the Commission will be kept informed of current trends in international aviation telecommunications requirements which, because of the nature of aviation operations, affect and in many instances become a part of the United States domestic requirements.

AIRCRAFT RADIO STATIONS

The largest increase in the aeronautical radio services was that of private aircraft. There were more than 30,000 authorized aircraft radio stations at the close of the fiscal year as compared with approxi-

mately 20,000 in 1950, and of the former, more than 28,000 were private aircraft. To meet the congestion of communications channels which resulted from expansion of civil aviation, additional very high frequencies (VHF) have been placed in service. New communication and traffic control procedures are being adopted and utilized.

There has been a sizable increase in the number of aircraft utilizing radio since aircraft landing at many major airdromes and operating in defense areas are required to be radio equipped.

Related to the general subject of aviation use of radio, but not included in the Aeronautical Radio Services, is a special class of operator authorization for operating radiotelephone stations on private aircraft. This is covered in another section of the current report.

AERONAUTICAL LAND AND AERONAUTICAL FIXED RADIO STATIONS

The more than 1,300 aeronautical land and aeronautical fixed stations provide communications necessary for the safe, expeditious, and economical operation of aircraft. Aeronautical land stations communicate with aircraft whereas aeronautical fixed stations provide point-to-point communications to enable aircraft operators to carry on their business more efficiently.

In the continental United States, aeronautical fixed stations are used primarily as "back-up" circuits for land line facilities; however, in international operations, aeronautical fixed stations provide the primary service. In accordance with Civil Air Regulations, domestic air carriers are required to maintain ground-air-ground communication at terminals and at such other points as may be deemed necessary by the Government to insure satisfactory communications over the entire certified route. Such a system is independent of radio facilities provided by Federal agencies.

The expansion of aircraft operation in the Territory of Alaska has resulted in the formulation of an Alaskan communication plan to provide additional high and very high frequencies. The aeronautical portion of part 14 of the Commission's rules has been incorporated in part 9 together with the other rules affecting aircraft operation in Alaska.

CIVIL AIR PATROL STATIONS

These stations handle the necessary radio communication for civil air patrol activities and emergencies pertaining to the protection of life and property. The Civil Air Patrol, operating on frequencies made available by the United States Air Force, participates in air shows, missing aircraft search missions, training missions and communication systems at encampments, bases, and official meetings. There were nearly 1,500 authorized Civil Air Patrol base stations at

the close of the fiscal year. Approximately 5,000 mobile stations are associated with these base units.

AIRDROME CONTROL STATIONS

This type of station provides communication between an airdrome control tower and aircraft or aeronautical mobile utility stations for the purpose of controlling aircraft within the control area of an airport and both aircraft and vehicular traffic on any portion of the landing area. Such control is mandatory in directing arriving and departing aircraft so as to maintain safe separation of aircraft to avoid collisions and to provide an efficient flow of air traffic into and out of the airport. Fifty-six stations of this type are licensed by the Commission.

AERONAUTICAL MOBILE UTILITY STATIONS

This class of station is installed on board crash, fire, and maintenance vehicles operating on an airdrome to provide communication with the airdrome control tower so that the control tower operator may have direct contact and control over such stations at all times. This service is essential to municipalities and individuals operating airports for safeguarding personnel aboard the vehicles and aircraft utilizing the field. Nearly 100 aeronautical mobile utility stations are authorized.

AERONAUTICAL NAVIGATIONAL AID RADIO STATIONS

These stations involve the transmission of special radio signals to establish traffic lanes of the air so that aircraft may determine position with reference to the navigation facility. The navigational aid stations include radio beacons, radio direction-finders, radio ranges, localizers, glide path, marker beacons, ground control approach, instrument landing, radar and distance measuring stations. This service is normally operated by the CAA; however, as a result of the inauguration of off-airways route operation by the air carriers, it has been necessary for the air carriers to establish and operate additional navigation facilities. At the close of fiscal 1951 there were more than 150 aeronautical navigation type facilities authorized by the Commission.

FLYING SCHOOL RADIO STATIONS

A flying school station is a station on the ground or on board an aircraft used for communications pertaining to flight instructions to students or pilots while actually operating aircraft and for the promotion of safety of life and property. At the close of the fiscal year, 18 flying school stations held licenses.

FLIGHT TEST RADIO STATIONS

A flight test radio station is installed on ground or aircraft for the transmission of communications in connection with the test of aircraft or major components of aircraft. The development of aircraft and associated equipment has steadily increased. For the flight testing of such aircraft and associated equipment, communication with the ground station is essential in order that the aircraft manufacturer may acquire information necessary for the designing and production of aircraft and components which will be safe and efficient. Nearly 100 flight test stations were in operation.

AERONAUTICAL PUBLIC SERVICE RADIO STATIONS

An aeronautical public service radio station provides private communication between individuals aboard aircraft in flight and persons on the ground. The aeronautical public service station operates in connection with the Nation-wide, land-line telephone system through the coastal harbor radio telephone and coastal telephone stations. This service has continued to increase inasmuch as the operators of large aircraft used for business purposes consider communications between individuals aboard their aircraft in flight and the ground to be essential. Nearly 550 of these stations held licenses.

AERONAUTICAL ADVISORY STATIONS

This is a new class of station, first authorized during 1951 to meet an increasing demand for advisory air-ground communication at the smaller airdromes, many of them in remote locations not served by regular aeronautical control or communication facilities.

This type of station provides advisory communications between an airport operator and private aircraft to enable airmen to ascertain the condition of the runways, type of fuel available, wind conditions, weather and other information necessary for aircraft operations. Aeronautical advisory stations are not used for the control of aircraft at a landing area and authorizations for these stations are issued only to the owner or operator of a landing area not served by an airdrome control station. Thirty-three such stations have been authorized.

4. PUBLIC SAFETY RADIO SERVICES

The Public Safety Radio Services encompass radio communication used for State and local police, fire, forestry-conservation, and highway maintenance organizations, and for certain State military organizations. Included, also, is the Special Emergency Radio Service used for the alleviation of an emergency endangering life or property.

Just as the Marine Radio Services afford safety to ships at sea and the Aeronautical Radio Services care for the safety needs of aircraft,

the Public Safety Radio Services provide important communication facilities required by the different non-Federal governmental jurisdictions for the public safety needs of the over-all population of the country.

Although public safety use of radio on land is taken as a matter of course and it receives little, if any, publicity, State and local police departments have found that, with radio, one police officer can do the work that formerly required at least three or four men. Highway departments have also found that by using radio they can keep roads in condition and make repairs faster with fewer pieces of road equipment and less personnel. Accordingly, in this time of manpower and material shortages, the Public Safety Radio Services have continued a steady growth as evidenced by the authorization of some 1,500 new stations during the year, bringing the over-all total of public safety radio systems to more than 9,100 with an estimated total of nearly 90,000 transmitters.

During the year a new service was added to the public-safety group—the State Guard Radio Service. Regulations governing this service are provided in the new subpart K of part 10 which became effective when adopted by the Commission on October 30, 1950. Under the new regulations, authorizations for stations in the State Guard Radio Service may be issued to the official State guard, or comparable organization of a State, Territory, possession, or of the District of Columbia, where such an organization has been created by law and is subject only to the governor or comparable official of the State or Territory in which it is to be licensed as distinguished from National Guard organizations subject to Federal control.

PUBLIC SAFETY ASSOCIATIONS AND CONFERENCES

In order to acquaint public-safety licensees more fully with the Commission's rules and their interpretations, and in order to become acquainted with the problems of the licensees, the Commission has increased its attendance at national meetings held by the associations of licensees in the various public-safety services. Notably, these are the yearly meetings of the Associated Police Communication Officers, Inc.; the International Municipal Signal Association, Inc.; the Forestry Conservation Communications Association, and the American Association of State Highway Officials.

Members of the Commission's staff have attended these meetings to deliver addresses on the subjects of Commission rules, interpretations, and current trends in the services. They have also participated in the associated technical sessions at which problems cropping up in the day-to-day operations are discussed and analyzed. Thus, the Commission is kept informed of what changes may be required in order to keep its rules current to meet the varying needs of the licensees.

Staff members of the Commission responsible for administering the Public Safety Radio Services have participated, to the extent that work relates to such matters, in the work of several committees that are engaged in the preparation of reports and recommendations outlining the United States position on policy matters to be presented by the Department of State at the next international conference—the Extraordinary Administrative Radio Conference, to be held at Geneva, starting August 16, 1951. This work has been divided into three stages. The first stage consisted of discussions between the IRAC and FCC representatives to resolve conflicts between the Federal and non-Federal frequency assignments and to prepare a unified United States assignment plan. Secondly, a second series of conferences will be held in order to resolve conflicts between the assignment plan evolved in step 1 and those of other countries in the American region. The unified plan covering the American region will then be presented for consideration at the Geneva conference. This, of course, is a continuing project and work thereon will be continued during the next fiscal year.

The Commission has also participated extensively in discussions with other governmental agencies, with the Interdepartment Radio Advisory Committee, and with industry with respect to the needs for civilian defense radio communication facilities. As a result of these meetings, the Commission is now in the process of preparing rule amendments which are intended to clarify the extent to which the individual public safety radio services will participate in the civilian defense program of the country.

POLICE RADIO SERVICE

Police radio station authorizations are issued to States, Territories, cities, and towns. Governmental institutions charged with the responsibility for providing their own police protection are also eligible. There are some 6,200 police radio authorizations.

During the year the Commission was able to regularize high-powered operation on the part of State police radio systems. Preliminary work on this project was started during 1949 when experimental authorizations were issued to four separate States. As a result of the experience gained from this experimental operation, the Commission found it in the public interest to permit State police systems using frequencies between 42–44 megacycles to operate high-powered stations. It is expected this will result in a more efficient as well as economical radio system, particularly for those States covering large areas and having a low density of population.

The Commission was also successful in its efforts to provide for the needs of the Territorial Highway Patrol in Alaska for point-to-point

voice communication between the various territorial police radio stations. An amendment to part 10 authorized the use of the frequency 7480 kilocycles for such police communication in Alaska.

The police in the Midwest had established the value of intersystem communication in previous years. Based on this experience, several extensive networks have been inaugurated on the west coast to provide intersystem communication among all the police agencies in a given area. In view of the mountainous terrain encountered and since the police operate principally in the VHF part of the frequency spectrum, which is in general limited to line of sight transmission, most of the intersystem networks on the Pacific coast involve the use of unattended fixed relay stations located on mountain tops. These stations are triggered off by signals received via radio from a police department in one valley and automatically retransmit these signals on another frequency to other police departments on the other side of the mountain.

FIRE RADIO SERVICE

Eligibility in the Fire Radio Service is extended to governmental agencies and organizations which are responsible for providing local fire protection. Volunteer fire departments are included among those organizations eligible in this service. At the end of the year there were some 430 fire radio stations authorized—a growth of approximately 50 percent during the year. However, it is to be noted that this expansion is occurring primarily in the urban areas and in the suburban areas adjacent thereto. In the rural areas the volunteer fire departments are not generally able to install independent radio systems due to the limited funds available. It is customary, therefore, in the rural areas for the fire department to take service from the nearest police radio station.

FORESTRY-CONSERVATION RADIO SERVICE

Stations in the Forestry-Conservation Radio Service are authorized to transmit communications relating to the prevention, detection, and suppression of forest fires and other official forestry conservation activities. Eligibility is generally restricted to States, Territories, possessions, and other governmental subdivisions, and to persons or organizations charged with specific forestry conservation activities.

The value in combatting and preventing the spread of forest fires has been clearly demonstrated in the many fires that occurred during the past year. Additionally, radio has proved its value in connection with the conservation of wildlife and in the enforcement of fish and game laws in many States. As a result, the service has shown a steady growth during the year from a total of approximately 1,300

stations at the end of fiscal year 1950 to approximately 1,700 stations at the end of the current year.

HIGHWAY MAINTENANCE RADIO SERVICE

The Highway Maintenance Radio Service was first established on July 1, 1949. Despite this very brief history, the service has grown to more than 400 stations. This service provides the radio communication needs in connection with the maintenance, supervision, and operation of public highways. Eligibility is extended to States, Territories, possessions, and governmental subdivisions including counties, cities, towns, etc. Although there are relatively few State-wide highway maintenance systems in operation at present, these systems have indicated the savings that radio can achieve in the operation and maintenance of our public highways. It is anticipated, therefore, that this service will enjoy an uninterrupted and steady growth.

SPECIAL EMERGENCY RADIO SERVICE

The Special Emergency Radio Service is the only one of the public safety group which is not generally reserved for governmental subdivisions. It is included in that group, however, because communications are restricted to transmissions directly relating to public safety and the protection of life and property.

Eligibility is extended to private individuals who are concerned in one way or another with public safety, such as ambulance service, beach patrols responsible for life-saving activities, school bus operators having routes in rural areas, doctors and veterinarians, and organizations established for relief purposes in emergencies. Persons having establishments in remote locations and lacking other communication facilities are eligible. Communications common carriers are also permitted to use special emergency radio stations to bridge gaps in wire line circuits in order to speed the restoration of normal communications which have been disrupted.

There were more than 300 authorizations in this service at the close of the year.

STATE GUARD RADIO SERVICE

State Guard Radio Service, available only to a bona fide State military organization under State direction, is used primarily for the transmission of emergency communications directly relating to public safety and the protection of life and property. Such stations may also be used to transmit nonemergency communications necessary for training and maintaining an efficient organization. In view of the limited number of frequencies available, the Commission was able to provide only one frequency for this service, but provision is made for such stations to operate on certain frequencies in the band 2505–3500

kilocycles where a frequency can be made available upon a shared basis through appropriate arrangements with governmental agencies. The State of Texas was the first licensee in this service, and it now holds licenses covering 1 mobile, 47 base, and 3 fixed stations. As of June 30, there were 50 State Guard authorizations.

5. LAND TRANSPORTATION RADIO SERVICES

The Land Transportation Radio Services include the Railroad, Taxicab, Intercity Bus, Urban Transit, Highway Truck, and Automobile Emergency Radio Services. Communications are limited to those relating directly to the protection of life or important property and to messages essential to the maintenance, supervision, and efficient operation of land transportation systems.

Although the rate of expansion in radio facilities authorized for the transportation services during the past year has not been as rapid as during the period immediately following July 1, 1949 (when part 16 of the Commission's rules became effective), the fact that the services are now established on a regular basis rather than experimental continues to provide for the sound and orderly expansion of new and existing radiocommunication systems engineered and planned on a long-range basis. The year closed with nearly 5,000 authorizations covering 78,000 transmitters.

RAILROAD RADIO SERVICE

The Railroad Radio Service provides for the radiocommunication needs of the Nation's passenger and freight railroads providing a common carrier service. As of 1951, the railroads had in excess of 600 radio authorizations covering nearly 400 land stations and 5,300 mobile units. Approximately 50 percent of the class 1 railroads now have radio facilities.

The history of railroad radiocommunication dates from 1915, when the first experimentation commenced. Both space radio and carrier current or inductive systems are presently in use. It is generally recognized, however, that the carrier system cannot be used satisfactorily in all cases as a substitute for space radio.

Generally, railroad communications may be broken down into two general types: (1) Communication on and with trains en route, and (2) communication within yard and terminal areas. To provide for the communication needs of the railroads, the Commission has allocated 41 frequencies in the 152–162-megacycle band for the Railroad Radio Service in the city of Chicago where 23 trunk-line railroads with a total of 32 routes are operated. Of these 41 frequencies, 39 are available for use outside of Chicago, some being shared with the

Public Safety Radio Services in areas where there will be no interference to railroad radio operations.

The use of radio by the railroads has progressed on a conservative, but sound and carefully planned, basis. The growth of this service has been steady, and it is anticipated that it will continue. Of significance in this respect is the change in emphasis in railroad communications which is now centered on main-line operations while in the past it was on the yard and terminal type of operation.

Additional frequencies in the microwave region are also available to the railroads on a developmental basis. The availability of frequencies in this region of the radio spectrum has created a whole new concept of point-to-point local and long distance communication. The successful operation of a limited number of microwave systems presently operated by the railroads to supplement their point-to-point communication needs gives promise that an increased number of requests for authority to construct such systems can be expected. Determining factors in the expansion of activity in the microwave type of installation presently appears to be the availability of suitable and reasonably priced equipment, and the development of new techniques and types of terminal equipment leading to increased channel or circuit utilization.

TAXICAB RADIO SERVICE

The Taxicab Radio Service provides a communication service for persons furnishing to the public, for hire, a nonscheduled passenger land transportation service which is not operated over a regular route or between established terminals. The principal use of this service is in connection with dispatching of taxicabs.

The Taxicab Radio Service has operated on a regular basis since 1949, and since that time has grown at a phenomenal rate. There are now nearly 3,200 separate systems operating in this service with more than 63,000 mobile units. The Taxicab Radio Service has a total of eight frequencies in the 152–162-megacycle band, and these are heavily loaded in some areas. Improved equipment which has been readily available has contributed to the growth of this service. Such equipment has permitted satisfactory adjacent channel operation in congested areas, which in turn leads to better utilization of spectrum space. In addition, the year saw the first large scale developmental operation on frequencies in the 450–460-megacycle band where results appear to be satisfactory and may encourage further growth of the service by providing additional spectrum space in congested areas.

INTERCITY BUS RADIO SERVICE

The Intercity Bus Radio Service provides for the radiocommunication needs of companies which are regularly engaged in passenger

transportation over public highways between cities as distinguished from the Urban Transit Service which is limited to operations within urban or suburban communities. Use of radio by bus transportation companies assists operators in providing safe, efficient, and more dependable service. Communication facilities are often required to warn drivers of dangerous or unusual road conditions which may be encountered, and as a means of expediting the dispatching of additional buses, ambulances, repair trucks, and wreckers.

The growth of the Intercity Bus Radio Service has been relatively slow but steady since it was inaugurated in 1949. There are 31 such authorizations. The communication requirements of this service necessitate installations which are capable of providing coverage over an extensive service area, and such systems require careful planning. Installations of this type may be quite costly and operators are proceeding cautiously in the use of the service.

URBAN TRANSIT RADIO SERVICE

The Urban Transit Radio Service provides a communication service for companies operating city and urban bus lines whose operations are primarily within urban and suburban communities. The basic purpose and chief use of this service is to furnish communication between supervisory cars and repair trucks during power and equipment failures, collisions, and to assist in rerouting transit lines during traffic tie-ups, fires, and other such emergencies. The majority of the more than 100 authorizations in this service have been issued to transit systems in the larger cities.

HIGHWAY TRUCK RADIO SERVICE

The Highway Truck Radio Service provides a communication service for persons regularly engaged in the operation of trucks on a route basis outside of metropolitan areas. This service is not available for truck routes within a single metropolitan area.

The Highway Truck Radio Service was established because wire line facilities are not generally available at all hours and locations to truckers on many intercity routes. Although highway radio systems are generally expensive to install because of the extensive number of installations required, the service now has nearly 300 authorizations.

AUTOMOBILE EMERGENCY RADIO SERVICE

The Automobile Emergency Radio Service provides for the radiocommunication needs of persons or organizations providing emergency road service. Masses of automobiles on crowded highways require prompt towing and repair service if highways are to be kept clear. This service has proven effective in the dispatching of emer-

gency road service trucks and towcars to stalled or disabled vehicles, which contributes toward public safety on the highways, particularly in urban areas. The number of authorizations was approaching 100.

Lack of spectrum space has hindered the development of this service in the past. With the availability of equipment capable of operating on frequencies in the 450–460-megacycle band, it is anticipated that congestion may be materially decreased on the single 30–40-megacycle frequency with a resultant improvement of service in crowded areas.

6. INDUSTRIAL RADIO SERVICES

The Industrial Radio Services include the Power, Petroleum, Forest Products, Motion Picture, Relay Press, Special Industrial, and Low-Power Industrial Radio Services. The growth of these services has been very rapid in the past year. They have nearly 10,000 authorizations to use 70,000 transmitters.

As an aid to efficient administration of these services, the industries are recognized individually for purposes of allocating frequencies and determining eligibility. Regional industry advisory groups are functioning in several of these services and have appreciably reduced the Commission's administrative load by supplying applicants with information as to which frequencies in a given area may be the most desirable from the standpoint of interference.

On February 17, 1949, the Commission temporarily allocated the band 1750–1800 kilocycles to the radiolocation service for use within 150 miles of the Gulf of Mexico for the location of petroleum deposits. In the light of the current national emergency, and due to the increased interest shown by parties interested in the use of radiolocation in the off-shore exploration for petroleum, the Commission held a hearing on June 4, 1951, to determine whether a radiolocation service should be provided in the 1750–1800-kilocycle band, which is presently allocated to the Disaster Communications Service. A decision in this matter is pending.

POWER RADIO SERVICE

The Power Radio Service provides for the radiocommunication needs of persons who are engaged in generating, transmitting, collecting, purifying, storing, or distributing, by means of wire or pipeline, electrical energy, artificial or natural gas, water or steam for use by the public.

This service is used by public utilities generally in connection with the restoration of service which may have been interrupted by fire, flood, storm, accident, or disaster. The principal volume is messages concerning routine maintenance activities not necessarily of an emergency nature. Communications are required to coordinate pipelaying, wire-stringing, cable-pulling, and other construction projects.

Messages are also required between load dispatchers and generating stations, gas storage areas, pumping stations, and other supply sources.

The use of radio by public utilities continued to increase at a rapid rate during the past year. There are more than 5,000 such authorizations. In addition to the new mobile and fixed system installations, many utilities have shown an increasing interest in the development of the microwave portion of the spectrum and multichannel radio links which permit central operation of electrical control circuits for entire power plants and systems.

PETROLEUM RADIO SERVICE

This service provides for the radiocommunication needs of persons who are engaged in locating, producing, collecting, refining, or transporting by means of pipelines, petroleum or petroleum products including natural gas.

The Petroleum Radio Service is used, for example, by persons engaged in the geophysical exploration beneath the earth's land and water surfaces for oil. Other uses include drilling for, producing, collecting, or refining and piping those products.

Petroleum is usally located in remote areas where the construction of telephone lines is impractical. Fire, explosion, well blowouts, accidents and equipment failures require prompt and efficient communications if serious disasters are to be prevented or halted. Radio is also used to maintain communication between field headquarters and drilling sites to provide close supervision of drilling operations.

The use of radio by the petroleum industry, particularly in the production and pipeline phases, has been increasing at a phenomenal rate. There were more than 2,400 authorizations at the year's close. Many new point-to-point microwave radio circuits are being installed parallel to pipelines, one such system extending from Houston to Chicago. These microwave systems usually are capable of handling several voice, telemetering, and control circuits simultaneously, and many are quite complex and expensive, being integrated with mobile radio systems along pipelines.

FOREST PRODUCTS RADIO SERVICE

The Forest Products Radio Service provides for the communication needs of persons engaged in tree logging, tree farming, or related woods operations. There is no provision for any other uses of radio in this service other than those involved in actual woods operation. The more than 450 authorizations in this service provide private business with radiocommunication facilities similar to those used by Federal and State governments for fire detection, prevention, and suppres-

sion. They may also be used to promote safer, more efficient, and more economical logging operations.

Lumbering in recent years has in many areas become a vast tree farming operation, whereby trees are planted in denuded areas, protected during growth and then cut and replaced with seedlings. Patrol and protection of these areas require adequate communication facilities although actual logging operations may not occur over long intervals. As in the past, the greatest usage of this service is in the Pacific Northwest.

MOTION PICTURE RADIO SERVICE

The Motion Picture Radio Service is intended to serve the radiocommunication needs of the motion-picture industry and is available for persons engaged in the production or filming of motion pictures. The number of authorizations fluctuates around a score.

This service may be used by picture companies on location to connect parties with the nearest wire lines for purposes of safety of life and property, to expedite shipment of supplies and to promote more efficient operation on location. The low-power radio transmitting equipment generally used to coordinate action taking place on outdoor sets serves a useful function during filming, often eliminating time consuming retakes.

RELAY PRESS RADIO SERVICE

The Relay Press Radio Service is intended to provide for the radiocommunication needs of newspapers and established press associations. The principal use of this service is in the dispatching of reporters and photographers. The greatest use of this service is by the large metropolitan dailies. There are 35 authorizations.

SPECIAL INDUSTRIAL RADIO SERVICE

The Special Industrial Radio Service, which has nearly 1,500 authorizations, is limited to persons engaged in an industrial activity primarily devoted to producton, construction, fabrication, manufacturing, or similar processes as distinguished from activities of a service or distribution nature. An applicant is further required to show that his activities involve construction projects of a public character, and are confined to a remote or sparsely settled region or to the yard area of a single plant.

In view of the current national defense program, the scope of plant area communication systems has been extended to permit the operation of mobile transmitters outside of the physical limits of such installations on matters involving plant security in those cases where use of the Low-Power Industrial Radio Service does not meet the operational

requirements of the industry which would otherwise be eligible for that service.

Establishing the Special Industrial Radio Service was not easily accomplished. Chief among the problems faced was the question of how far the Commission could go, in view of the limited amount of spectrum space, toward permitting businesses, whatever their character, to operate private radio systems. The demand for facilities, especially in urban areas, has been so great that there are not enough frequencies to provide for a mobile dispatching service for retail stores and service or distribution organizations.

LOW-POWER INDUSTRIAL RADIO SERVICE

The Low-Power Industrial Radio Service affords a communication service for industrial and commercial activities which have need for short-distance mobile radiocommunication to permit more efficient and safe conduct of their operations. It provides for the operation of any number of portable transmitter units which are restricted to a very low power in order to reduce the interference range between units and thereby permit large numbers of transmitters to operate on a few frequencies. As in the past, most of the 150 authorizations in this service are held by contractors and maintenance and service companies.

MISCELLANEOUS

In addition to these regular services, there is a very limited radio operation in California where, since 1926, nine point-to-point telegraph stations have transmitted agricultural market information for regional use.

7. AMATEUR RADIO SERVICE

The Amateur Radio Service is one of the oldest radio services recognized and established by the Commission, and continues to be one of the largest and most active of the services administered. Amateurs now hold collectively about 180,000 station and operator licenses.

At the end of the fiscal year there were approximately 90,500 amateur station licenses and 88,700 amateur operator licenses outstanding. The number of amateur stations remains slightly higher than the number of amateur operators as a result of many operators being licensees of more than one amateur station, either as trustee-licensees of stations used by amateur radio clubs or by military units, or as owners of personal stations at more than one address. The number of these additional stations, however, is balanced somewhat by a corresponding number of amateur operators who do not have amateur station licenses, due principally to their being in the Armed Forces

or otherwise unable to locate an amateur station at some permanent address.

There is no age limit in the Amateur Radio Service, station and operator licenses being held by persons in their early teens as well as by persons in their seventies and eighties. Any citizen of the United States who passes the prescribed examination and is otherwise qualified may obtain an amateur operator and station license. Women as well as men are welcomed to the ranks of the amateur radio hobbyist and find it an interesting avocation; in fact, their special interest in amateur radio is evidenced by the formation of a national and international organization known as the Young Ladies Radio League which holds meetings and general get-togethers over the air.

The amateurs, or "hams" as they prefer to be known, are internationally recognized and licensed in many countries, although possibly three-fifths of the amateur stations in the world are located in the United States and its possessions and Territories. Their ranks comprise persons in almost every walk of life, from those who obtain a livelihood from employment in the radio industry to housewives, school children, and others whose livelihood is obtained in completely unrelated lines of endeavor. They are all united, however, by a common interest in experimentation and self-improvement in radio techniques; an interest which is without pecuniary considerations and involves only personal aims. Through the exercise of their skills in designing, developing, constructing, and experimenting with radio equipment, and developing communication techniques, as well as by providing scientific observation services and emergency communication service in times of disaster or local emergency, and the handling of personal messages between members of the Armed Forces and their families at home, the amateurs have demonstrated that the privileges granted them have been well justified.

In addition, the Amateur Radio Service has a high degree of national value. It constitutes a reserve of self-trained radio technicians and operators upon which the country can draw in times of war and other national need, and its special networks, the equipment of its stations, and other amateur activities have proved extremely valuable in the national defense program. In the planning for the defense of the civilian population in case of armed attack, the Federal Civil Defense Administration is encouraging the integration of amateur radio stations, operators and networks into the local civil defense organizations to provide civil defense communication.

To assist in the planning of civil defense communication and the utilization of amateurs for that purpose, the Commission on January 17, 1951, in cooperation with the Federal Civil Defense Administration and with the concurrence of the Armed Forces, announced that certain portions of the regularly allocated amateur frequency

bands are to remain available for use of amateur radio stations and operators to provide communication for civil defense activities after any suspension of normal amateur activity which may be found to be necessary because of war or other national emergency, and that regulations to govern the use of those frequency bands in the civil defense program would be the subject of later action by the Commission. At the close of the fiscal year, this matter was under active study by the Commission, with the possibility that proposed rules to govern the operation of amateur stations and operators for civil defense purposes would be made public during the latter part of 1951.

The value of the Amateur Radio Service in times of emergency was again amply demonstrated during the year. One of the most outstanding examples of public service by the amateurs occurred during January and February 1951, when severe ice storms blanketed a large portion of Texas for a period of over 170 hours, completely disrupting communication and power wire lines in that area. Communications handled by the amateurs in the area, using emergency power in many cases and on an entirely voluntary basis, related to the dispatching of trains and other utilities, the relaying of orders for emergency food supplies, the reporting of hourly weather observations, the bridging of gaps in commercial telegraph facilities for handling emergency and death messages, and the relaying of personal messages regarding the health and safety of individuals. Cases of similar service in the Pacific Northwest, in California, in Mississippi and Tennessee, in Florida and Alabama, and in the New England States, when floods, hurricanes, and other natural disasters struck, were reported to the Commission.

Another example of the value of amateur response to distress was a report that an amateur station at Nome Creek, Alaska, saved the life of a woman at a remote hamlet. The amateur's call was picked up by the Commission's monitoring station at Anchorage, which alerted an Air Force Rescue Squadron which, in turn, dispatched an Army doctor by air who administered a blood transfusion and transferred the woman by plane to a hospital in Fairbanks.

During the year the Commission amended its amateur rules in a number of important aspects to bring them into conformity with current needs. Foremost among those actions was the finalization of rule changes first proposed in April 1949, to foster the further development of amateur radio by defining the basic purpose for which amateur stations are licensed and revising the operator license structure. After due deliberation of the written comments filed and arguments presented, the Commission on January 29, 1951 finalized the rules, effective March 1 thereafter. Among other things, the rules now provide for two new classes of amateur operator licenses, available July 1,

1951; one for the beginner in radio who wishes a "learner's permit" so that he may qualify by actual experience for a higher class of amateur license, the other for the technically minded individual who wishes to experiment with radio without the necessity for qualifying in the Morse Code to the extent required for operation on the lower amateur frequencies. These new amateur operator licenses, called the "Novice" and "Technician" classes, respectively, require an ability to transmit and receive the International Morse Code at a speed of only 5 words per minute, as compared with the minimum of 13 words per minute required for other classes of amateur operator licenses.

In addition, a new higher class of amateur operator license, called the Amateur Extra Class, was also established, to become available January 1, 1952. This license, which is designed to recognize superior amateur qualifications, including the ability to transmit and receive in the International Morse Code at the rate of 20 words per minute, will authorize the same amateur operating privileges as the former class A amateur license (renamed the Advanced class) which will not be available, other than by renewal of existing licenses, after December 31, 1952. The other existing classes of amateur operator privileges, previously known as class B and class C, were also renamed as General and Conditional classes, but were otherwise continued without change.

Other amendments to the amateur rules include the addition of frequencies 3800 to 3850 kilocycles in the amateur "80-meter" band for use by amateur radiotelephone stations; permanent provision in the rules for the use of narrow band frequency or phase modulated radiotelephony in the bands 3800 to 3850 kilocycles, 14,200 to 14,250 kilocycles, 28.5 to 29.7 megacycles, and 50 to 54 megacycles; and a revision of rules with respect to the renewal of amateur operator licenses to require that the showing as to operating activity be made in terms of operating time rather than in terms of the number of other stations with which radio communication is established.

In consideration of the service of numerous amateurs in the Armed Forces during the present period of national emergency, and the resulting inability of those amateurs to qualify for the renewal of their amateur operator privileges by operation of their amateur stations, the Commission waived the requirements of a showing of operating time with respect to all amateur operator licenses which expire during the period January 1 to December 31, 1951, inclusive, where it is shown that the individual amateur was unable to meet the requirements because he was on active duty in the Armed Forces of the United States. The extension of the period of this waiver will, of course, depend upon the status of the national emergency at the end of the calendar year 1951.

Interference to the reception of television broadcast continues to be an item of major concern to amateurs throughout the United States, particularly to those whose stations are located within a short distance from TV receivers as compared to the distances of those receivers from the TV stations which they are attempting to receive. This problem is especially acute when the owners of TV receivers are using them to receive weak signal programs beyond the normal service areas of the TV stations concerned and beyond the normal range for which TV receivers are designed. The situation is additionally aggravated by the receiving characteristics of many TV receivers which, because of their extreme sensitivity, are particularly susceptible to signals appearing on frequencies to which they are not even tuned.

The challenge to reduce radiation of harmonic and other spurious emissions which may cause interference on the frequencies to which TV receivers are tuned has been successfully met by many amateurs; the problem of eliminating the interference caused by the inability of a receiver to differentiate between signals on entirely different frequencies is also being solved in many cases by the use of wave-traps and "band-pass filters". However, the Commission is aware of the problems presented and is studying the matter with a view to clarifying individual responsibilities in such cases.

In response to a request from the Department of the Army, and with the concurrence of the largest national organization of amateurs, the Commission on April 25, 1951, issued a public notice requesting the voluntary cooperation of the amateurs in the avoidance of harmful interference to military radio operation in the 3700- to 3900-kilocycle portion of the amateur "80-meter" band during large scale military maneuvers to be staged in North and South Carolina from August 6 to September 7, 1951. In that notice, the amateurs were asked to refrain from all operations during the specified period and in the specified frequency band in an area roughly composed of the States immediately surrounding North and South Carolina; and to similarly limit their operations during night hours in all States east of the Mississippi River.

Despite an enviable record of self-policing on the part of amateur licensees in general, as usual, it was necessary for the Commission to issue a number of citations in cases of frequency deviation or other minor infractions of its rules. It also ordered the suspension of the licenses of 10 amateurs involved in more serious violations of its rules and ordered a hearing in the case of one applicant whose past record indicated a complete disregard of the regulations of the Commission when operating amateur stations previously licensed to him.

Increased activity was noted during the year in the preparation by amateurs for emergency operations of all kinds, particularly in the provision of emergency power supplies for their home stations and in

the installation of mobile units in their automobiles, in preparation for the communication problems incident to a widespread disaster resulting from natural causes, accident, or armed attack. This included a healthy expansion of the use of the VHF and UHF amateur bands, with scheduled drills and tests on a continuing or regular basis in many areas. As a result of this increased activity, new records for distance of communication on the VHF were being established frequently, giving further impetus to more experimentation on those bands.

8. CITIZENS RADIO SERVICE

The Citizens Radio Service provides a radiocommunication service for the individual citizen. Licensing procedures are relatively simple and any citizen of the United States who is 18 years of age or older is eligible.

This service may be used for radiocommunication, radio signalling, control of objects or devices by radio, and for any other purpose not specifically prohibited by the Commission's rules. Stations licensed in this service are not permitted to charge for messages, carry broadcast material, to transmit directly to the public or to engage in communications that are contrary to law.

Although this service has been established since January 1949, the wide usage predicted for it has not yet materialized; consequently it has grown rather slowly and there are somewhat less than 600 authorizations. The chief reason for this has been the absence of readily available low-cost radiotelephone equipment designed specifically for operation in the citizens radio band, 460–470 megacycles. Equipment intended for operation in this service for control of objects or devices including garage door openers has recently appeared on the market. The demand for such equipment will increase as the availability increases and cost decreases.

A proposal to amend the rules governing this service to provide for the operation of control devices on the frequency 27.255 megacycles is presently under consideration.

9. DISASTER COMMUNICATIONS SERVICE

The Disaster Communications Service is a new service, established by the Commission on March 21, 1951. However, the planning for that service extended over a period of several years as the result of early recognition by the Commission of the need for a liaison service for handling of emergency communications in times of disaster to be composed of amateurs and other non-Government and Government groups operating fixed, land, and mobile stations. The frequencies available to this service, 1750 to 1800 kilocycles, were set aside for disaster communications by the Commission on February 17, 1949,

pursuant to a proposal in that regard made in its Report of Proposed Allocation Below 25,000 Kilocycles, dated May 21, 1945.

Any person eligible to hold a station license under the provisions of the Communications Act, is eligible for station license in the Disaster Communications Service, provided it is shown that the station will constitute an element of a bona fide disaster communications network organized or to be organized and operated in accordance with a locally or regionally coordinated disaster communications plan. Stations of the United States Government may also operate in this service if authorized to do so by their controlling agencies.

Stations in the Disaster Communications Service may provide essential communication incident to or in connection with disasters or other incidents which involve loss of communication facilities normally available or which require the temporary establishment of communication facilities beyond those normally available. Thus, they may be used, when needed, in connection with such incidents as floods, earthquakes, hurricanes, explosions, aircraft or train wrecks, and armed attack, when the health or safety of a community or larger area, or of a group in an isolated area, is threatened or involved.

As a consequence of the present state of national emergency emphasis on preparations for civil defense, it is natural that the Disaster Communications Service should be looked upon as one of the possibilities of providing means for the handling of civil defense communications. This was anticipated by the Commission in providing that, while the organization and operation of disaster communications plans shall be under the leadership and direction of competent local authority in the areas served by such stations, duly designated civil defense officials of such areas will also be considered competent local authority.

At the end of the fiscal year, licenses in the Disaster Communications Service had been issued to two municipalities—Santa Cruz, Calif., and Phoenix, Ariz.—both primarily for civil-defense purposes. These licenses authorize the operation of two station units at fixed (control center) locations, 29 portable station units capable of being moved from place to place and being used at undetermined locations, and 32 mobile station units mounted in automobiles, trucks, or other mobile vehicles. Several applications for licenses in this service were pending at the end of the year, and are expected to be granted as soon as the necessary showings of eligibility and purpose of the proposed stations are completed.

10. ENFORCEMENT

The centralization during the past year of enforcement and compliance activities in the Safety and Special Radio Services was a new

organizational concept which, it was hoped, would produce better results through concentration of records, standardization of methods and procedures and specialization of personnel. The necessity for some drastic action became evident with the rapidly increasing number of violation citations, complaints of interference, and other irregularities amounting to nearly 20,000 annually. These were to be expected, of course, with the vastly increased use of radio for commercial and safety purposes in recent years, and the extension of eligibility to large segments of the general public who were new to radio and hence unappreciative of the technical difficulties of large-scale radiocommunication and the need for strict compliance with the necessarily complex regulations in order that all licensees might obtain the full benefits of this form of communication.

The new arrangement has proved very satisfactory. After a period of organization and experience in classifying the general categories of enforcement and compliance problems, steps were taken to standardize letters, forms, procedures, and methods which have enabled the Enforcement Unit, with less than half the personnel heretofore available for the purpose, to keep abreast of the current influx and reduce to a very large extent the backlog of violation matters which had existed at the inception of the unit. Over-all compliance is still far from satisfactory, however, and the staff has devoted considerable study to possible new concepts of enforcement methods that may offer promise of better end results.

Despite efforts to create "assembly-line machinery" to speed the handling of routine cases, many practical factors such as public interest, degree of offense, honest mistakes, new situations not contemplated by rules, etc., make it necessary to exercise original judgment and discretion in a high percentage of the cases. Thus, one of the most time-consuming aspects of enforcement activity is that of conducting an exchange of correspondence in regard to citations for irregularities due to misunderstanding or misinterpretation of rules. Although these situations generally require individual treatment, standardized letters and information releases have been and are being developed for certain recurring types.

In addition to the large volume of citations and complaints disposed of by routine administrative methods, certain enforcement matters involve formal proceedings such as imposition of monetary forfeitures, license suspension, and revocation proceedings or reference to the Department of Justice for prosecution. The Commission is empowered to mitigate or remit certain forfeitures incurred by vessels, or their masters, by reason of the navigation of the vessel in the open sea contrary to radio requirements of the Communications Act. During the past year a total of $9,220 was collected in the settlement of such cases.

Studies were made during the past year of possible amendments of the Communications Act which would serve to lessen the enforcement task and facilitate enforcement procedure. A proposed amendment to section 319 of the act was submitted to Congress which would permit waiver of the requirement for construction permit in the majority of stations in the Safety and Special Radio Services. No practical purpose is served by the construction permit in many instances and the proposed amendment, if enacted into law, should remove an important source of technical violations. A study was completed looking toward possible amendment of the penalty provisions of the act to enable the assessment of small civil penalties to be collected or mitigated by the Commission. Such legislation is similar to that administered by the Coast Guard and other Government agencies and is considered essential to deal effectively with the type of minor irregularities so prevalent in the Safety and Special Radio Services.

11. STATISTICS

Number of Stations in Safety and Special Radio Services

Stations in the Safety and Special Radio Services (exclusive of experimental, which are treated in a separate chapter) exceeded 177,000 at the close of the fiscal year. This represents a net increase of more than 23,000 during the year. The number of authorized stations in the various services are shown in the following table:

Class of station	June 30, 1950	June 30, 1951	Increase or (decrease)
Aeronautical Services:			
Carrier aircraft	1,572	2,173	601
Private aircraft	17,856	28,113	10,257
Public service aircraft	690	546	(144)
Aeronautical land and fixed	1,409	1,310	(99)
Civil air patrol [1]	1,886	1,483	(403)
Airdrome control	53	56	3
Aeronautical navigational	134	155	21
Flight test	83	86	3
Flying school	16	18	2
Aeronautical utility mobile	95	88	(7)
Aeronautical advisory	0	33	33
Total	23,791	34,061	10,267
Marine Services:			
Ship	22,601	26,681	4,080
Ship radar	1,125	1,625	500
Coastal and marine relay	130	116	(14)
Alaskan coastal	340	344	4
Alaskan fixed public	524	517	(7)
Other	201	261	60
Total	24,921	29,544	4,623
Public Safety Services:			
Police	5,618	6,198	580
Fire	276	432	156
Forestry-Conservation	1,307	1,728	421
Highway maintenance	238	408	170
Special emergency	168	313	145
State guard	0	50	50
Total	7,607	9,129	1,522

Class of station	June 30, 1950	June 30, 1951	Increase or (decrease)
Land Transportation Services:			
Railroad	450	604	154
Urban transit	100	111	11
Intercity bus	30	31	1
Taxicab	2,750	3,152	402
Highway truck	107	270	163
Automobile emergency	58	85	27
Citizens	335	560	225
Total	3,830	4,813	983
Industrial Services:			
Power	3,601	5,016	1,415
Petroleum	1,380	2,416	1,036
Forest products	246	453	207
Special industrial	724	1,451	727
Low-power industrial	93	150	57
Relay press	26	35	9
Motion picture	20	21	1
Agriculture [2]	9	9	0
Total	6,099	9,551	3,452
Amateur and Disaster Services:			
Amateur	87,967	90,585	2,618
Disaster communications	0	2	2
Total	87,967	90,587	2,620
Grand total	154,218	177,685	23,467

[1] The apparent decrease in the number of Civil Air Patrol stations was the result of a change in licensing procedure. For administrative convenience, there was inaugurated a "system license" plan in which all of the land station transmitters at the same location and the associated mobile units authorized to a particular CAP Wing were combined into a single station authorization. There has been considerable activity in this service and under the former licensing procedure would have shown a sizable increase in the number of stations authorized, since more than 200 new systems were added during the fiscal year 1951.

[2] This service was grouped with the Common Carrier statistics in the sixteenth annual report.

NOTE.—A station is defined as a separate license or construction permit authorization. For example, 65 mobile units operating on 1 license are counted as 1 station.

Applications Received in Safety and Special Radio Services

More than 107,000 applications for stations in the Safety and Special Radio Services were received during 1951. This represents an increase of more than 13,000 applications compared with the previous year. The number of applications received in each service is shown in the following table:

Class of station	Received 1950	Received 1951	Increase or (decrease)
Aeronautical Services:			
Aircraft	14,201	19,662	5,401
Ground	2,413	2,830	417
Total	16,614	22,432	5,818
Marine Services:			
Ship	16,905	18,757	1,852
Ship radar	680	1,196	516
Coastal and marine relay	126	177	51
Alaskan coastal	264	503	239
Alaskan fixed public	351	647	296
Other	340	307	(33)
Total	18,666	21,587	2,921
Public Safety Services:			
Police	8,119	6,104	(2,015)
Fire	488	801	313
Forestry-Conservation	2,201	1,337	(864)
Highway maintenance	327	555	228
Special emergency	298	447	149
State guard	0	90	90
Total	11,433	9,334	(2,099)
Land Transportation Services:			
Railroad	579	550	(29)
Urban transit	104	78	(26)
Intercity bus	13	11	(2)
Taxicab	4,323	3,602	(721)
Highway truck	189	416	227
Automobile emergency	116	125	9
Citizens	596	192	(404)
Total	5,920	4,974	(946)
Industrial Services:			
Power	5,228	4,467	(761)
Petroleum	2,452	2,661	209
Forest products	364	656	292
Special industrial	1,418	2,378	960
Low-power industrial	169	160	(9)
Relay press	48	37	(11)
Motion picture	41	29	(12)
Agriculture	0	14	14
Total	9,720	10,402	682
Amateur and Disaster Services:			
Amateur	31,034	38,469	7,435
Disaster Communications	0	11	11
Total	31,034	38,480	7,446
Grand total	93,387	107,209	13,822

NOTE.—An unusually large number of applications for renewal of license was received in the Public Safety, Industrial, and Land Transportation Radio Services during 1950. Consequently, in some services, there was a decrease in the number of applications received during 1951 since renewal periods have been staggered in an effort to equalize the load.

Number of Transmitters in Safety and Special Radio Services

More than 392,000 transmitters are authorized to operate in the Safety and Special Radio Services. These figures were compiled on the basis of records as of January 1, 1951, unless otherwise stated.

Of this total over 111,000 were land or fixed stations and more than 280,000 were portable or mobile units.

The breakdown follows:

Class of station	Land or fixed station transmitters	Mobile station transmitters	Total transmitters
Aeronautical Services:			
Aircraft		25,293	25,293
Ground	3,181	7,282	10,463
Total	3,181	32,575	35,756
Marine Services:			
Ship		25,545	25,545
Ship radar		1,384	1,384
Coastal and marine relay [1]	101		101
Alaskan coastal [1]	382		382
Alaskan fixed public [1]	612		612
Other [1]	178	1,156	1,334
Total	1,273	28,085	29,358
Public Safety Services: [2]			
Police	4,266	59,991	64,257
Fire	383	7,945	8,328
Forestry-Conservation	1,365	10,041	11,406
Highway maintenance	311	1,513	1,824
Special emergency	224	943	1,167
State guard	30		30
Total	6,579	80,433	87,012
Land Transportation Services:			
Railroad	379	5,280	5,659
Urban transit	54	1,453	1,507
Intercity bus	26	387	413
Taxicab	3,067	63,479	66,546
Highway truck	119	1,878	1,997
Automobile emergency	76	989	1,065
Citizens [3]		1,500	1,500
Total	3,721	74,966	78,687
Industrial Services: [4]			
Power	3,524	39,538	43,062
Petroleum	1,861	10,429	12,290
Forest products	269	2,639	2,908
Special industrial	769	9,363	10,132
Low-power industrial		1,692	1,692
Relay press	16	369	385
Motion picture	10	142	152
Agriculture	9		9
Total	6,458	64,172	70,630
Amateur and Disaster Services:			
Amateur	90,599		90,599
Disaster communications [5]	2	61	63
Total	90,601	61	90,662
Grand total	111,813	280,292	392,105

[1] As of Nov. 30, 1950.
[2] As of Mar. 9, 1951.
[3] Estimated.
[4] As of Apr. 20, 1951.
[5] As of June 30, 1951.

NOTE.—Due to the change in licensing procedure for Civil Air Patrol Stations, accurate records, which show the number of portable and mobile units, are not currently available. It is estimated that there are 7,000 such transmitters authorized.

CHAPTER IV—RADIO BROADCAST SERVICES

1. RULE CHANGES

Probably the most significant rule change affecting broadcast application processing was the adoption of part 17, Rules Concerning the Construction, Marking and Lighting of Antenna Structures, which is discussed elsewhere in this report.

Other rule changes pertaining to broadcasting included the following:

1. Authorization was given to the engineer in charge of the headquarters' district offices of the Comission's Field Engineering and Monitoring Division to act upon AM and FM licensees' requests for temporary operation with operators of lesser grade than normally required.

2. Arrangement was made to have the expiration of licenses of commercial broadcast stations occur in groups on a geographical basis (instead of a frequency basis as heretofore). AM and FM stations in each of 18 geographical areas will have their licenses expire at the same specified time and the time of expiration of these groups is spaced at 2-month intervals through their 3-year license period. Similarly, the expiration dates of the 1-year licenses of TV stations are divided into six geographical groups for the same purpose. This procedure permits the licensees of several kinds of broadcast stations in the same area to make the necessary equipment tests and prepare the reports on all stations at one time.

3. The Commission's rule requiring that the main studio of a broadcast station be located in the city the station is licensed to serve,

and that a majority of its programs must originate there, was relaxed to permit the establishment of the main studio at the transmitter site. It was also relaxed to permit licensing of a station to serve more than one city, if a substantial number of live programs would originate in each place, and if a satisfactory showing could be made regarding compliance with the standards (particularly with respect to coverage) and regarding the unreasonableness of considering the station as serving a single city.

4. The Commission issued a report on the establishment of a uniform policy to be followed in licensing radio broadcast stations in connection with violations by an applicant of laws of the United States other than the Communications Act of 1934, as amended. The purpose of the report was to set forth the basic principles which will guide the Commission in the exercise of its licensing functions where the applications raise questions with respect to violations of law other than the Communications Act. In that report the Commission stated:

> The Commission must be satisfied that an applicant has the requisite qualifications to assure that public interest will be served by a grant of his application. This determination cannot be made on the basis of isolated facts but should include a careful, critical analysis of all pertinent conduct of the applicant. We believe that if an applicant is or has been involved in unlawful practices, an analysis of the substance of these practices must be made to determine their relevance and weight as regards the ability of the applicant to use the requested radio authorization in the public interest. We do not believe that the outcome of this determination should be prejudged by the adoption of any general rule forbidding any grant in all cases where unlawful conduct of any kind or degree can be shown. Nor do we believe that any rule could adequately prescribe what type of conduct may be considered of such a nature that in all cases it would be contrary to the public interest to grant a license.

2. TELEVISION (TV) BROADCAST SERVICE

INCREASE IN TV APPLICATIONS

The Commission continued its "freeze" policy concerning the construction of new television stations and, consequently, there was no increase in the number of commercial TV broadcast stations on the air during the fiscal year. The 107 stations that were in operation continued to bring national and local video programs to 63 cities and metropolitan areas with a population of approximately 87,000,000 people in 43 States. Of these stations on the air, 81 held licenses while 26 operated on a commercial basis under special temporary authorizations.

Notwithstanding the Commission's request to interested parties not to file applications for new television stations until after a final determination had been reached on the issues in the pending television rule-making proceeding, discussed hereinafter, there was a steady increase in the number of applications for new TV broadcast outlets

and at the end of the year 415 such applications were pending. It appears that in many areas, due to the limited number of available channels, comparative hearings will be necessary to determine which of the applicants are best qualified to construct and operate the requested facilities.

Television-receiver production continued at a rapid pace despite material restrictions and the limited areas of normal reception. Continued progress was made in receiver design with emphasis on larger direct-view picture tubes. It is estimated that there were over 12,500,000 receivers in the hands of the public at the close of the fiscal year.

COLOR TELEVISION

In its Notice of Further Proposed Rule Making, issued on July 11, 1949, the Commission stated that it would consider color-television systems which could operate in a 6-megacycle channel. Three such systems were proposed to the Commission; i. e., the field sequential system, the dot sequential system, and the line sequential system. Hearings were held on these proposed systems between September 26, 1949, and May 26, 1950, during which period the Commission heard the testimony of 53 witnesses during 62 days of hearing covering 9,717 pages of transcript, and received in evidence 265 exhibits. Demonstrations of the proposed color systems were viewed by the Commission on eight separate occasions.

The Commission's detailed findings and conclusions with respect to the color-television issues were set forth in the First Report of the Commission, issued on September 1, 1950. On October 11, 1950, the Commission issued its Second Report of the Commission, and at the same time issued an order amending its television engineering standards to provide for color standards based on the field sequential system. This order and the proceedings incident to its promulgation and adoption were thereafter the subject of litigation in the Federal courts. On May 28, 1951, the Supreme Court of the United States affirmed the judgment of the lower court sustaining the order of the Commission.

Color broadcasts based on the field sequential system began on a commercial basis on June 25, 1951. The initial programs were carried over a limited network and for a limited period during the day.

TELEVISION PROCEEDINGS

The Commission's extensive rule-making proceedings to amend its television rules, regulations, engineering standards, and frequency assignments were instituted on July 11, 1949. The Commission had discovered, as stations began operating under the present table of TV frequency assignments, that too little mileage separation had been

provided between stations, and that the interference resulting from tropospheric propagation caused a serious degradation of service.

The television situation was further complicated by the fact that the 12 channels in the VHF band comprising the present table of assignments were so limited in number that many communities were of necessity either without any assignments whatever or with insufficient channels to provide adequate service. The Commission, therefore, was faced with the additional task of investigating the feasibility of employing channels in the UHF portion of the spectrum to supplement the present table in order to insure a Nation-wide competitive system.

Since the allocation problems of the UHF (Ultra High Frequency) and VHF (Very High Frequency) bands are interrelated, it was necessary to consider them simultaneously to insure a fair and equitable assignment of TV channels throughout the country. The purpose of the television rule-making proceedings has been to lay the groundwork for an efficient Nation-wide television service In addition, the Commission gave consideration to such developments as color television, the reservation of channels for noncommercial educational purposes, stratovision and polycasting. Pending the outcome of these proceedings, the Commission on September 30, 1948, stopped granting new TV stations.

In September 1949, the Commission commenced extensive public hearings in these proceedings (dockets 8736 et al.) starting with the color-television issue already mentioned, which extended into 1950.

On October 16, 1950, the Commission began hearing testimony on the general issues. These included the feasibility of utilizing the UHF portion of the spectrum for commercial TV broadcasting, classification of stations, mileage separations between stations, oscillator radiation, image interference, intermodulation, stratovision, polycasting, and the reservation of television channels for noncommercial educational stations. This phase of the hearings continued to January 31, 1951, at which time the Commission recessed in order to study the voluminous record.

On the basis of this record, the Commission on March 22, 1951, issued a Third Notice of Further Proposed Rule Making looking toward the promulgation of television engineering standards based on the latest technical information; the adoption of a Nation-wide television assignment plan utilizing both the VHF and UHF portions of the frequency spectrum; a partial lifting of the freeze under certain conditions, and the reservation in specific communities of television channels for noncommercial educational use. The proposed table provides for 1,965 assignments in 1,256 cities. Of these assignments, 209 assignments would be reserved for noncommercial educational stations. Approximately 700 written comments and 400 oppositions

to comments were filed with the Commission in connection with these proposals.

The Commission received three petitions challenging the legality of its proposals to adopt an assignment plan under which television channels would be assigned to various communities in the United States in accordance with a principle of priorities and engineering standards of allocation. In a memorandum opinion and order, released June 15, 1951, the Commission designated these petitions for oral argument insofar as issues relating to the authority of the Commission to issue a table of assignments and tc reserve channels for noncommercial educational stations were raised. This argument was held June 28, 1951.

Upon consideration of the comments and oppositions filed in connection with the Third Notice of Further Proposed Rule-Making, and in view of its action in designating for oral argument the petitions which challenged its authority to adopt a table of assignments and to reserve channels for a noncommercial educational service, the Commission, in a third report, released June 21, 1951, concluded that it was not appropriate, at that time, to partially lift the television "freeze".

EXPERIMENTAL TV SERVICE

At the end of the fiscal year there were 18 licenses, 4 construction permits, and 5 special temporary authorizations for experimental television stations to carry on research and experimentation for advancement of the television broadcasting art.

Some of these experimental stations were used by equipment manufacturers for the development of different types of transmitting apparatus. A considerable amount of research was conducted in the UHF (470–890 megacycles) for the purpose of determining the propagation characteristics and other properties to be expected on these frequencies. Studies were also made of the propagation characteristics of the different frequencies over various types of terrain, the design and development of transmitters, receivers and converters, and the feasibility of satellite operations.

In the field of color television, experimental broadcasting was conducted on both the VHF and UHF bands. Much of the experimenting was directed toward the field testing of color equipment developed in the laboratory. Limited public participation was solicited for the purposes of conducting subjective tests relative to the characteristics of the different systems.

Two authorizations were issued by the Commission for testing proposed systems of subscription television. The first system, described by its proponents as "Phonevision", was the subject of a technical and economic test between January 1, 1951, and March 31, 1951. In brief,

"Phonevision" may be described as the transmission of a jittered television picture which may be received in scrambled form by any television receiver. When the owner of a television set wishes the jittered picture unscrambled and his set is equipped for "Phonevision", he asks the telephone operator to allow the key signal to reach his set. As soon as the request is received at the telephone exchange, the key signal is sent along the telephone wire through a filter and into the set. The picture then becomes clear and may be viewed on the receiver.

Prior to these "Phonevision" tests, 300 television set owners in the Lakeside area of Chicago had their sets adjusted so they could receive scheduled programs at a cost of $1 per program by calling the telephone operator as described. The results of these tests had not been submitted to the Commission at the close of fiscal 1951.

In addition to the "Phonevision" tests the Commission granted authority to a New York television station to test the technical operations of a system of subscription television described by its proponents as the "Skiatron Subscriber-Vision System". This system also involves the transmission over the air of a scrambled television picture which may be received in scrambled form by any television receiver. An unscrambling device or decoder which may be built into the set automatically clears up the incoming picture when a special key or card is inserted into the receiver.

TELEVISION BROADCAST AUXILIARY SERVICES

During the year, rules were adopted establishing on a regular basis three classes of television auxiliary stations: Television Pickup Stations, Television STL (Studio-Transmitter Link) Stations, and Television Inter-City Relay Stations. These stations operate in the microwave region of the radio spectrum and are used in connection with the regular facilities of a television broadcast station.

Television pickup stations are operated by TV broadcast station licensees or permittees and are used for the purpose of relaying television program material such as sporting contests, parades, and other special events from their points of origination to the broadcast stations. Television broadcasters rely heavily on this service as a readily available means which permits considerable flexibility in the programming of special events.

As their name implies, television STL stations are employed to provide a radio circuit between the studio and transmitter of TV broadcast stations. Ordinary wire lines are usually incapable of carrying TV signals, and special coaxial circuits are expensive to install and to operate.

Television intercity relay stations are licensed to television broad-

casters to provide privately owned television relay circuits between cities where adequate common carrier facilities are not available.

OTHER TELEVISION DEVELOPMENTS

Television network facilities, operated principally by communications common carriers, both coaxial cable (wire) and microwave relay (radio), were greatly expanded. At the end of the year, a total of 47 cities and metropolitan areas, representing 80 stations, were interconnected while 16 cities with 27 TV stations were noninterconnected. It was anticipated that within the calendar year the east and west coasts would be connected. (See also reference to coaxial cable and microwave relay in the chapter on common carriers.)

3. STANDARD (AM) BROADCAST SERVICE

CLEAR CHANNELS

No action was taken during the year on the so-called Clear Channel Hearing (docket 6741) and Daytime Skywave Hearing (docket 8333), because of the pendency of the new North American Regional Broadcasting Agreement (NARBA), which is discussed later.

These hearings, the records on which have been closed for several years, are directed primarily to the question of how to make best use of the clear channels of the standard broadcast band assigned by an international agreement for use by the United States. The clear channels are necessary for standard broadcast service to rural areas since channels which are primarily allocated for service to population centers (the so-called regional and local channels) must be shared by a multiplicity of stations and are, therefore, cluttered with interference—particularly at night when propagation conditions make interference problems more acute—to such an extent that each station provides satisfactory service only over relatively short distances where its signals are strong enough to override the interference. Rural areas beyond these distances thus receive no service from such stations and must rely on the 10- to 50-kilowatt clear channel stations. On the other hand, the number of regional and local channels is insufficient to satisfy the present demand for stations to provide local service to cities and towns.

At present, Commission rules limit the power used on clear channels to 50 kilowatts. On 25 of the clear channels which are assigned for use by class I–A stations the night-time operation of a second station is prohibited. Whether the over-all utilization of the clear channels would be improved by permitting higher power, by permitting more stations on each channel, or by some combination of these is the basic issue in the clear channel proceeding.

It should be noted that under the current NARBA agreement the United States acquires new priority for class I stations on clear channels as follows:

Frequency (kilocycles)	Station	Previous classification	Classification under new NARBA
1030	WBZ—Boston, Mass	I-B	I-A
1540	KXEL—Waterloo, Iowa	II	I-B
1560	KPMC—Riverside, Calif	II	I-B
1560	WQXR—New York, N. Y	II	I-B

NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT

The difficult process of arriving at an international agreement regarding assignments in the standard broadcast band and rules for the sharing of channels moved a long step closer to realization during the year with the signing on November 15, 1950, of the Third North American Regional Broadcasting Agreement in Washington. It was signed by all the countries of the North American region excepting Mexico and Haiti. The signed document was submitted by the President to the Senate in February, and was referred to the Committee on Foreign Relations for the necessary action looking toward ratification.

Following the expiration of the preceeding regional agreement on March 29, 1949, most of the countries of the North American region continued their operations as if it were still in force, recognizing that uncoordinated assignments would lead to serious interference problems and would eventually create a complex situation very difficult, if not impossible, to untangle. Cuba, however, believing that certain provisions of the old agreement had been unduly restrictive and contrary to her interests, had made a number of assignments during 1949 which were not consistent with the expired agreement, some of which caused extensive interference to certain United States stations. It was chiefly the difficult problem of adjusting the increased number of Cuban stations into the regular broadcast station assignment pattern that led to the breaking off of negotiations for a new agreement in December of 1919 at Montreal as well as the bilateral discussions with the Cubans in March of 1950 at Havana. In breaking off, it had been agreed to resume the conference in the summer of 1950, and the Third North American Regional Broadcasting Conference, accordingly, resumed its sessions on September 6, 1950, with delegations from all North American countries, except Haiti, participating. These countries are Bahamas, Canada, Cuba, Dominican Republic, Jamaica, Mexico, and the United States.

The final document of the Montreal session, which outlined the

form of the treaty and contained substantial agreement on administrative procedures, was used as a basis for composing the new agreement. Modifications and refinements in this document were made in some instances to accommodate the ideas of the Mexican delegation which had not participated in the Montreal session, and general agreement on this part was obtained without undue difficulty.

The problem of station assignments, particularly for the higher powered stations in Cuba and Mexico, was still the most difficult and time-consuming aspect of the negotiations, and led to the withdrawal of the Mexican delegation from the conference on October 18, 1950. In withdrawing, the Mexican delegates made the announcement that they had not been able to receive satisfaction on a sufficient number of their requirements to continue in the negotiations, but that they would expect to reach bilateral agreements with other governments "founded on an equitable and just basis". They recommended that the remaining conferees give serious consideration to reducing the channel separation from 10 to 9 kilocycles, thus creating some 11 new channels in the broadcast band, since this seemed to offer the best and perhaps the only solution to the Mexican requirements.

The Commission is gratified to note that since that time Mexico has continued to give de facto recognition to the expired agreement, which is taken as evidence of her continuing intention of keeping the way open for an "equitable and just" agreement on broadcasting. The difficulties with Cuban assignments were finally resolved on a basis which involved considerable changes by both Cuba and the United States.

The message from the President transmitting the text of the agreement to the Senate enclosed a report by the Secretary of State on its effects. This report points out, among other things, that an agreement is necessary as a basis for reasonable assurance that, in the reception of radio program service, the public will not be plagued unduly with interference from foreign stations and that the orderly and more efficient development of domestic broadcast service will be favored by a fair measure of international stability on the broadcast band.

To quote from the report:

> Taking into account the diverse interests of the countries concerned, the new NARBA is considered to be, despite certain drawbacks, the most satisfactory agreement that could be negotiated at this time. There are some features of the agreement which, from the viewpoint of the United States, are not wholly desirable and in some respects the agreement is not as favorable to the United States as was the original NARBA agreement of 1937. Nevertheless, it must be realized that, for reasons indicated hereinbefore and in the enclosed memorandum, there is no practical possibility of restoring the situation as it existed under the provisions of the previous agreement. Under the new NARBA the position of broadcasting in the United States would, in the view of the Depart-

ment of State, the Federal Communications Commission, and a number of non-Government broadcasting interests, be far more favorable than would be the case in the absence of such an agreement. Within the framework of the new NARBA the people of the United States can continue to receive, in general, the same level of broadcasting service received by them heretofore and there is considerable room within that framework for improvement of broadcasting service within the United States by domestic action. On the basis of past experience and a practical view of international political factors involved, it is clear that the primary question with respect to the new NARBA is whether the public interest of the United States in the field of broadcasting would be served better by the ratification and entry into force of the agreement than by no agreement at all, since there is no real prospect for negotiation of a more favorable agreement. Notwithstanding the opposition of some elements of the broadcasting industry, it is considered that the best interests of the United States would be served by ratification and entry into force of the agreement.

The more important provisions of the agreement as signed are discussed in the following paragraphs:

Station notifications and classifications and general standards of protection from interference.—The new NARBA provides in general for continued recognition of past notifications of United States stations and for international acceptance by the parties thereto of the station and channel classifications, engineering standards of station protection, and other related engineering factors. This is basic from the viewpoint of the United States if many of its approximately 2,200 standard (AM) broadcasting stations are to continue to operate within the band of 107 channels available for such broadcasting and continue to receive the international protection necessary for a stabilized broadcasting system capable of genuinely serving the people of this country. For example, under the new NARBA the channels available for standard broadcasting are classified as "clear", "regional", and "local" channels as under past agreement; stations are classified in classes I, II, III, and IV; and power and other specific engineering requirements are set out to govern the use of the several types of channels and the operation of the different classes of stations. The importance of provisions such as these should be fully appreciated for our whole broadcasting system is predicated upon the use of such classifications and standards internationally as well as domestically. And, as indicated earlier, such station and channel classifications, and engineering standards, as well as the continued acceptance and protection of our existing station assignments, are effective from an international viewpoint only to the extent that they are provided for by agreement. One of the technical standards contained in past agreement and in the new agreement, but with respect to which Cuba has taken reservation in the new agreement, is the so-called 650-mile rule. It is referred to subsequently in connection with provisions of the agreement concerning clear channels.

Duration of agreement; investigation and elimination of objectionable interference; arbitration, etc.—The new NARBA contains a number of provisions of a general legal and administrative nature which are most important from the viewpoint of the United States. For example, provision is made that the new NARBA will remain in effect even beyond its normal term of 5 years in the event that a subsequent NARBA is not available to replace it. Thus, in the absence of denunciation of the agreement, the type of uncertainty and dislocation which has existed during the past year or two because of the absence of an agreement will be circumvented for the future. The new NARBA also contains agreement by the parties to cooperate in the investigation and elimination of objectionable interference. Moreover, it contains clear-cut provisions for com-

pulsory arbitration of disputes in the event that such disputes are not settled otherwise, and for the holding of administrative conferences permitting frequent consideration of engineering matters during the period between plenipotentiary conferences.

Class I–A stations.—Under the original NARBA the United States secured priority in the use of 25 clear channels for class I–A stations. As a result of domestic assignments this number was reduced to 24 during the period of past agreement. Class I–A stations are intended to serve wide areas at considerable distances from the transmitter location. The protection to which these stations were entitled under the original NARBA was basically (*a*) a requirement that the signal at the border of the United States from any foreign station on the channel not exceed a specified maximum strength and (*b*) that no foreign station operate on the channel at night within 650 miles of the United States border. As previously indicated, Canada and Mexico each received six such assignments and Cuba received one, which it subsequently relinquished upon acquiring a number of other important privileges in the interim agreement. Under the interim agreement of 1946 Cuba was authorized to establish stations on 4 of the 24 clear channels upon which the United States had class I–A priority. No requirement was specified for the protection of these Cuban stations from interference caused by stations in the United States.

Since the expiration of the original NARBA and the interim agreement, Cuba, asserting a right as a sovereign country to use of all channels in the absence of any agreement to the contrary, has assigned one or more stations to each of approximately 14 of these channels. And, in the absence of any NARBA, Cuba has considered itself to be without special obligation to protect the United States stations on these channels. Under the new NARBA, the number of clear channel class I–A priorities recognized for the United States has been restored to 25 and the number of such priorities recognized for Canada has been increased from 6 to 7. One such priority is also recognized for the Bahamas. Cuba will utilize only 6 of the 25 channels so assigned to the United States, withdrawing stations from approximately 8 of them. Moreover, Cuba has agreed to accord a high degree of protection to the United States stations on those channels. Jamaica would use 2 of the 25 channels, but would fully protect the border of the United States. On these eight channels, i. e., the six to be used by Cuba and the two to be used by Jamaica, the United States would provide a limited protection to the Cuban and Jamaican stations specified in the agreement but would otherwise retain full freedom in the use of those channels.

Accordingly, under the new NARBA the United States would retain its class I–A priority on 25 clear channels. This is the same number as under past agreement. On 19 of these channels all other countries signatory to the agreement would protect the United States stations to the border of the United States. For example, in the case of Cuba this would mean protecting the United States to the tip of Florida even though we may not at present have a useful signal at that point. The border protection specified in such cases is exactly the same as that which was provided in past agreement. From our recent experience without an agreement it is quite clear that in the absence of the new NARBA continued recognition by all parties to the agreement of the priorities and protection just indicated cannot be expected. On six of these channels the United States station would receive a degree of protection which, though somewhat less than full I–A protection, is greater than that accorded any other type of station and would still permit them to render service over extensive areas hundreds of miles from the station. On these channels, also, a considerably lesser degree of protection could be expected in the absence of the new NARBA. In view of the provision of the NARBA requiring full "border" protection to United States stations on 19

clear channels, and in view of the fact that under the agreement the United States would have no obligation whatever to protect any station that might in the future be assigned on any of its I–A channels, failure of Cuba to accept the so-called 650-mile rule does not in reality appear to present a particularly serious difficulty, although it would have been preferable to have Cuban acceptance of that rule and every effort was made by the United States delegation to secure such acceptance.

It is to be noted that in no case is a class I–A station in the United States required to change its operation.

One of the important factors in evaluating the effect of the new NARBA is the effect that the provisions with respect to class I–A priorities would have upon service to rural areas in the United States. As a result of the reduction in the actual use by Cuba of clear channels upon which the United States has class I–A priority, there would, as a practical matter, be a significant improvement in service to rural areas from class I–A stations. Moreover—and this of utmost importance—in the absence of the new NARBA interference to such rural service from stations in other countries would in all probability become even worse than at present. The improvement in rural service that would result from the new NARBA is of utmost importance because of the great dependence in rural areas upon I–A channels for broadcasting service.

The new NARBA also contains most important provisions concerning class I–A channels which are favorable to the United States and which were not found in earlier agreement. For example, flexibility in the use of class I–A channels, that is, freedom to add additional stations to those channels, change existing assignments, increase power, etc., without in any way jeopardizing internationally the class I–A status and protection of its 25 channels, and without the obligation to protect any foreign stations on the channels with the exception of the 6 Cuban and 2 Jamaican stations which have been referred to at an earlier point and which would be entitled to protection as class II stations. The clear recognition of this right of flexibility was not contained in past agreement and is a matter of greatest importance in order to make possible the most effective domestic improvement in broadcasting service.

Class I–B stations.—This class of station, like class I–A stations, is intended to serve wide areas through skywave service. Although a station of this class does not receive protection from foreign interference at the border of the country, it does receive a high degree of protection in areas in which its service is useful. Under the new NARBA, Cuba would be permitted to cause some derogation of the usual protection standards for United States class I–B stations by 14 stations on 11 channels. Under past agreement this was permitted by six stations on five channels. However, in none of these instances recognized in the new NARBA does it appear that as a practical matter the United States station would suffer sufficiently to prevent satisfactory accomplishment of its operation. Moreover, under the new NARBA three additional class I–B priorities are recognized for the United States, and in no case would it be necessary for the United States station to change its operation.

Class II stations.—A class II station also operates on a clear channel but its operation is subordinate to the class I operation on the channel. Under past agreement class II stations were not entitled to any protection from class I stations. Under the new agreement those class II stations which now exist would receive a degree of protection from changes in existing class I assignments and from future class I assignments. It is under this new provision that the Cuban and Jamaican class II stations on eight clear channels upon which the United States has class I–A priority would receive some protection. However, it is important to note that under this provision at least 25 class II

stations in the United States would also be entitled to protection from class I stations for the first time. In addition, to accommodate certain frequency changes in Cuba which are part of a general reallocation in that country, three United States class II stations would be required under the new NARBA to change frequency, with consequent changes being required in their antennas and equipment.

Class III stations.—There are approximately 900 class III stations in the United States. In general, they are intended to serve not only the cities in which they are located but also a substantial area surrounding their locations. With few exceptions, the standards governing class III stations and protection remain the same under the new NARBA as under past agreements. In 10 cases Cuban stations on regional channels would be permitted to operate with powers in excess of that normally permitted on such channels. In three of these cases the Cuban stations are classified as class III stations. In seven of these cases the Cuban stations are classified as class I–C or I–D stations which are discussed in the immediately following paragraph. However, in all 10 of these cases the class III protection is accorded the United States stations on the channels involved. In one of these cases a United States station would be required to modify its antenna system to reduce radiation toward Cuba. However, Cuba would also be required to modify its use of the same frequency in order to reduce radiation toward stations in the United States to an equal degree.

Special protection of certain Cuban stations.—On 11 channels Cuba would be entitled to a relatively high degree of protection from future assignments in other countries. These Cuban stations would be classified as classes I–C and I–D stations. It is to be noted in this connection that under the new agreement Cuba does not receive any class I–A assignments and would receive only one class I–B assignment. It is also to be noted, as indicated above, that the special protection to which Cuban I–C and I–D stations would be entitled in no way affects existing stations. It only has reference to future assignments.

4. FREQUENCY MODULATION (FM) BROADCAST SERVICE

Seventeen applications for new stations were filed during the year, an increase of one over the number received the previous year. Thirteen of these applications were from operators of AM stations, seven of which operate daytime-only AM stations. Seven of the applications were for stations to be located in cities with populations under 5,000.

A few of the applications for modification of FM facilities were for higher powered installations; the majority were for lower powered installations. Many of the latter were submitted when it was found that the FM operations were not profitable, while others found that interim operation with less than the authorized facilities provided satisfactory coverage and the expense of the additional installation was not warranted. Some of those who have been withholding authorized construction while awaiting decisions on pending applications in the TV or AM broadcast services or an improvement in the FM situation were granted licenses for their present interim FM installations if they were found to meet requirements of the rules and standards.

At the present time only three FM stations using 50-kilowatt transmitters are in operation. Of approximately 70 grants made by the Commission for use of 50-kilowatt transmitters, only 12 remain outstanding—the others have been deleted or modified to specify smaller installations. Three stations which had 50-kilowatt installations ceased operation after it was found that FM was not proving to be as successful as expected. The equipment operated by one of these stations was purchased by the University of Illinois, and is now being installed at that institution for use in the noncommercial educational FM broadcast band.

A number of FM broadcast station licensees have complained that FM receivers are in short supply in their areas and, consequently, a build-up of their FM audiences cannot be achieved. It has been claimed that the set makers will not supply a pent-up demand for FM receivers. Groups representing the broadcasters and the manufacturers met in June 1951 in an attempt to cooperatively solve their problems. Figures presented by the two groups apparently were at variance, with the broadcasters showing shortages whereas the manufacturers countered with a survey showing large distributor and factory inventories. Both groups agreed that the problem should be attacked on a market-by-market basis as shortages develop. The broadcasters are to report shortages of FM set stocks in their areas to manufacturers. A joint committee will explore the feasibility of cooperative effort in publicizing and promoting the advantages of FM listening.

The failure of FM to expand and develop in accordance with original expectations has presented numerous problems to the Commission and to industry. Licensees of FM stations, in an attempt to supplement broadcast revenues, have resorted to functional music operations, including storecasting, transitcasting, and specialized services to factories and restaurants. In the spring of 1951 the Commission determined that functional music operations were in violation of the Communications Act and the Commission's rules and regulations. There was pending before the Commission a petition filed on behalf of 13 FM stations engaged in functional music requesting the Commission to reconsider that decision.

5. NONCOMMERCIAL EDUCATIONAL FM BROADCAST SERVICE

This service is continually expanding, although in a rather slow fashion. Applications for 18 new stations were received during the year. At the year's close there were 95 authorized stations, 82 of which held regular licenses.

Thirty-nine stations in this service use transmitters with power ratings of 10 watts or less. The majority of new applications are

for these lower power stations. A number of stations starting with this power have modified their installations to use more powerful equipment.

The rules for noncommercial educational FM broadcast stations were amended to allow the operation of stations in this service having transmitters with power output ratings of 10 watts or less by holders of the new Radiotelephone Third Class Operator Permit or the Radiotelegraph Third Class Operator Permit (formerly Restricted Radiotelegraph Operator Permit).

As a further aid to stations using transmitters with output ratings of 10 watts or less, the Commission amended its rules to permit remote control operation of such stations. Of the 39 stations authorized to use low power transmitters, only 3 have so far availed themselves of remote control operation. The covering rules merely require control circuits between the operating position and the transmitter to provide positive on and off control (faults on line must remove transmitter from the air), aural monitoring of the transmissions at the operating position, and equipment of the station to be on premises under control and supervision of the licensee and not accessible to others. The operator stationed at the remote control position must hold a license of the proper grade for operation of the transmitter.

In contrast to a considerable number of deletions of regular FM broadcast stations operating in the commercial portion of the FM band, no noncommercial educational FM broadcast station having once started programming on the air has ever been deleted. However, six authorizations for educational stations have been deleted before construction—several were allowed to expire without explanation and were considered forfeited, while in the other cases it appears that, due to changes in plans on the part of the educational institution, construction would have had to be postponed indefinitely and the permittees accordingly submitted their authorizations for deletion.

6. FACSIMILE BROADCAST SERVICE

FM broadcast stations may engage in facsimile broadcasting. Little interest, however, seems to be shown by FM licensees in providing such a service.

Facsimile may be transmitted on a simplex or multiplex basis. Simplex facsimile transmissions may only be broadcast at times when aural FM programs are not being transmitted. Multiplex facsimile transmissions may be broadcast at the same time the aural programs are being transmitted.

During the year the Commission amended its rules regarding multiplex facsimile transmissions to remove the limitation on the hours of such operation (formerly a maximum of 3 hours between 7 a. m. and midnight with no limit for the hours between midnight and 7 a. m.)

and to require no reduction in quality of the simultaneously transmitted aural programs below 15,000 cycles (formerly 10,000 cycles) as required by the standards concerning FM broadcast stations. The standards were amended to permit either amplitude or frequency modulation of the subcarrier when multiplexing in place of amplitude modulation as formerly required.

7. INTERNATIONAL BROADCAST SERVICE

There was no change during the year in the number of international broadcast stations. Forty such stations, licensed by the Commission, continued to function under the auspices of the Department of State in beaming the "Voice of America" programs in many languages to various parts of the world.

8. AUXILIARY BROADCAST SERVICES

As in the case of experimental and auxiliary stations associated with television, the Commission authorizes three classes of supplemental aural broadcast stations—remote pick-up, studio-transmitter link, and developmental. A brief description of these adjuncts follows:

REMOTE PICK-UP BROADCAST SERVICE

Remote pick-up broadcast stations, operated by broadcast station licensees, permit "on-the-spot" coverage of happenings outside of the studio. Use of portable or mobile radio transmitters of low power provide temporary aural program circuits from scenes of sport meets, parades, conventions or other public gatherings, religious services and other special events. Many of the pick-up transmitters are self-powered and highly mobile and can provide emergency communication facilities during the disruption of normal circuits resulting from floods, storms or other disasters. There are more than 1,000 such stations.

This service has grown steadily during the past year and broadcasters are using it more and more to provide a variety of programs which could not be made available through the use of less flexible wire line circuits.

BROADCAST STL SERVICE

Broadcast STL (Studio-Transmitter Link) stations, operated by broadcast station licensees, are utilized to provide a program circuit between the studio and transmitter. Employment of radio for this purpose permits locating broadcast transmitters at favorable locations which may be inaccessible to ordinary wire lines. These stations operate in the 925 to 952-megacycle portion of the spectrum and are required to employ directional antennas for spectrum economy.

During the past year, the rules were amended to extend this service

to AM broadcast stations and to permit both AM and FM broadcast stations to use STL facilities from secondary studios as well as the main studios. Thus, broadcast stations are enabled to establish studios in small adjacent communities which are unable to support a broadcast station of their own and where existing telephone circuits are not suitable for and are usually unavailable for broadcast use.

DEVELOPMENTAL BROADCAST SERVICE

Developmental broadcast stations are licensed experimentally to conduct research and development looking toward the advancement of the broadcast art. They are used extensively by manufacturers for the development and testing of radio transmitters and antennas designed for use in the broadcast or auxiliary broadcast services. Stations in this service are also operated for the purpose of making propagation studies or to obtain data on other engineering problems related to broadcasting.

Among the more interesting projects conducted during the past year was the operation of a very low powered transmitter installed in the studio of a television broadcast station for the purpose of developing and testing an extremely compact, light-weight, inconspicuous "hearing aid" type earphone receiver, which can be worn by performers and production personnel participating in TV programs and used to receive cues and orders or prompting. Another project saw the development of a highly portable television pickup camera in which the cumbersome and heavy cables normally employed with such devices were completely eliminated through the use of low powered radio transmitters.

9. STATISTICS

BROADCAST AUTHORIZATIONS

There were 4,592 broadcast authorizations outstanding as of June 30, 1951. These were broken down by broadcast services as follows:

Class of broadcast station	June 30 1950	June 30 1951	Increase or (decrease)
Standard (AM)	2,303	2,385	82
Frequency modulation (FM)[1]	732	659	(73)
Television (TV)	109	109	
Television experimental and auxiliary	206	213	7
Noncommercial educational (FM)	82	95	13
International	40	40	
Remote pickup	1,003	1,043	40
Studio transmitter	29	42	13
Developmental	6	6	
Total	4,510	4,592	82

[1] Commercial facsimile broadcasting is now authorized over FM facilities.

GROWTH OF BROADCASTING

The growth of AM, FM, and TV broadcast services since 1943 is shown in the following table of authorized and licensed stations at the close of each fiscal year.

	AM		FM		TV		Total	
	Authorized	Licensed	Authorized	Licensed	Authorized	Licensed	Authorized	Licensed
1943	912	911	48	37	6	6	966	954
1944	924	912	52	45	9	6	985	963
1945	955	931	53	46	25	6	1,033	983
1946	1,215	961	456	48	30	6	1,701	1,015
1947	1,795	1,298	918	48	66	6	2,779	1,352
1948	2,034	1,653	1,020	142	109	7	3,163	1,842
1949	2,179	1,963	865	377	117	13	3,161	2,353
1950	2,303	2,118	732	493	109	47	3,144	2,658
1951	2,385	2,248	659	534	109	81	3,153	2,863

BROADCAST APPLICATIONS

	Pending June 30, 1950	Received	Disposed	Pending June 30, 1951
AM				
New stations	277	216	223	270
Change in facilities	255	223	243	235
Renewals	238	933	903	268
License	73	393	392	74
Transfers	67	401	391	77
Miscellaneous	74	726	724	76
Total AM	984	2,892	2,876	1,000
FM[1]				
New stations	20	35	43	12
Change in facilities	34	133	129	38
Renewals	36	317	283	70
License	41	139	142	38
Transfers	10	75	73	12
Miscellaneous	20	355	359	16
Total FM	161	1,054	1,029	186
TV				
New stations	351	72	8	415
Change in facilities	17	31	18	30
Renewals	9	44	49	4
License	11	41	37	15
Transfers	3	17	13	7
Miscellaneous	6	69	72	3
Total TV	397	274	197	474
All other				
New stations	57	344	368	33
Change in facilities	8	129	127	10
Renewals	245	460	606	99
License	80	348	381	47
Transfers	31	121	113	39
Miscellaneous	12	80	90	2
Total all other	433	1,482	1,685	230
Grand total	1,975	5,702	5,787	1,890

[1] Includes noncommercial educational.

BROADCAST STATION DELETIONS

Month	AM	FM	TV	Total
1950				
July	10	7	0	17
August	3	10	0	13
September	5	4	0	9
October	4	8	0	12
November	7	3	0	10
December	9	5	0	14
1951				
January	1	15	0	16
February	6	8	0	14
March	10	14	0	24
April	1	6	0	7
May	4	8	0	12
June	10	3	0	13
Total	70	91	0	161

RECEIVING SETS

The Commission does not license or otherwise regulate broadcast receivers. At the close of the fiscal year industry estimated that there were more than 102,000,000 such sets in use, as compared with 163,000,000 reported by the United Nations for 128 countries. In June the United States Census Bureau estimated that out of 42,520,000 occupied dwellings in the United States, 40,093,000 had receiving sets.

BROADCAST INDUSTRY FINANCIAL DATA

GENERAL

In the calendar year 1950, the grand total revenues of the broadcasting industry (AM, FM, and TV) passed the half-billion mark for the first time. Total revenues, which comprise revenues derived from the sale of time, talent, and program material to advertisers, were reported at $550.4 million. The 1950 AM and FM revenues amounting to $444.5 million were the highest on record. Aggregate TV revenues in 1950, of $105.9 million, were more than triple the $34.4 million for 1949.

Broadcasting industry profits of $59.0 million in 1950 were more than double those of the previous year. Industry profits realized from AM–FM broadcasting operations were $68.2 million, or approximately 30 percent above 1949 while the industry's over-all loss from TV broadcasting operations was reduced from $25.3 million in 1949 to $9.2 million in 1950. All profit figures are before payment of Federal income tax.

The following tables show the comparative calendar year 1949–1950 financial data for the AM, FM, and TV broadcast industries:

ALL NETWORKS AND STATIONS

Item	1949	1950	Increase or (decrease)
			Percent
Total broadcast revenues	$449,500,000	$550,400,000	22.4
AM and FM	415,200,000	444,500,000	7.1
TV	34,300,000	105,900,000	208.7
Total broadcast expenses	422,200,000	491,400,000	16.4
AM and FM	362,600,000	376,300,000	3.8
TV	59,600,000	115,100,000	93.1
Broadcast income (before Federal income tax)	27,300,000	59,000,000	116.1
AM and FM	52,600,000	68,200,000	29.7
TV	[1](25,300,000)	[1](9,200,000)	

NATION-WIDE NETWORKS ONLY

[Including owned and operated stations]

Item	1949	1950
Revenues:		
AM	$105,300,000	$106,000,000
TV	19,300,000	55,500,000
Total	124,600,000	161,500,000
Expenses:		
AM	86,800,000	87,300,000
TV	31,400,000	65,500,000
Total	118,200,000	152,800,000
Income (before Federal income tax):		
AM	18,500,000	18,700,000
TV	[1] (12,100,000)	[1] (10,000,000
Total	6,400,000	8,700,000

[1] Deficit.

NOTE.—The 4 Nation-wide AM networks (ABC, CBS, MBS, and NBC) owned and operated a tota of 18 stations in 1949 and 1950.

The 4 TV networks (ABC, CBS, Dumont, and NBC) owned and operated a total of 14 stations in 1949 and 1950.

Some networks indicated that expense allocations between AM and TV operations were not complete to the extent that certain indirect operating expenses of TV are included under AM operations.

AM BROADCAST REVENUES, INCOME AND INVESTMENT

[Revenues and income before Federal income tax]

Item	4 Nation-wide networks and their 18 stations		3 regional networks and their 8 stations		All other stations [1]		Industry total	
	1949	1950	1949	1950	1949	1950	1949	1950
Revenues from network time sales	$86,683,599	$83,955,101	$1,959,184	$2,099,285	$46,255,542	$45,475,830	$134,898,325	$131,530,216
Revenues from sale of time to national and regional advertisers and sponsors	17,292,386	17,597,734	1,269,055	1,382,475	89,753,066	99,843,671	108,314,507	118,823,880
Revenues from sale of time to local advertisers and sponsors	5,621,396	6,121,701	1,481,059	1,559,909	175,041,846	195,529,224	182,144,301	203,210,834
Total revenues from time sales	109,597,381	107,674,536	4,709,298	5,041,669	311,050,454	340,848,725	425,357,133	453,564,930
Commissions paid to representatives, etc.	23,012,591	22,393,667	910,163	1,020,272	26,384,929	29,061,836	50,307,683	52,475,775
Incidental broadcast revenues:								
Revenues from sale of talent, etc.	10,566,163	13,072,375	134,540	268,106	11,297,566	11,862,240	21,998,269	25,202,721
Furnishing material or service	3,675,093	4,038,953	946	2,418	5,783,849	5,851,649	9,459,888	9,893,020
Other incidental revenues	4,461,515	3,644,959	219,027	149,381	2,596,484	3,078,609	7,277,026	6,872,949
Total broadcast revenues	105,287,561	106,037,156	4,153,648	4,441,302	304,343,424	322,579,387	413,784,633	443,057,845
Total broadcast expenses	86,788,853	87,374,551	4,747,280	4,119,565	265,985,585	280,820,467	357,521,718	372,314,583
Total broadcast income	18,498,708	18,662,605	(593,632)	321,737	38,357,839	51,758,920	56,262,915	70,743,262
Investment in tangible broadcast property:								
Original cost	25,499,895	28,431,206	4,930,738	1,662,737	[2] 200,156,402	[2] 212,303,407	230,587,035	242,397,350
Depreciation to date	14,986,235	16,061,913	1,696,588	1,200,943	63,829,920	75,721,314	80,512,743	92,984,170
Depreciated cost	10,513,660	12,369,293	3,234,150	461,794	136,326,482	136,582,093	150,074,292	149,413,180

[1] Includes 1993 stations in 1949 and 2117 stations in 1950.
[2] Data available from 1997 stations in 1949 and 2108 stations in 1950.

TV BROADCAST REVENUES, INCOME AND INVESTMENT [1950]

Item	4 networks and their 14 owned and operated stations	93 other stations	Industry total
Revenues from network time sales	$27,312,824	$7,897,652	$35,210,476
Revenues from sale of time to national and regional advertisers and sponsors	8,207,754	16,826,579	25,034,333
Revenues from sale of time to local advertisers and sponsors	6,857,926	23,526,985	30,384,911
Total revenues from time sales	42,378,504	48,251,216	90,629,720
Commissions paid to representatives, etc	7,415,806	6,892,987	14,308,793
Incidental broadcast revenues:			
Revenues from sale of talent, etc	10,860,665	4,300,804	15,161,499
Furnishing material or service	7,223,049	3,062,665	7,223,049
Other incidental revenues	2,429,603	1,717,225	7,200,493
Total broadcast revenues	55,476,045	50,438,923	105,914,968
Total broadcast expenses	65,506,575	49,622,386	115,128,961
Total broadcast income or loss	(10,030,530)	816,537	(9,213,993)
Investment in tangible broadcast property:			
Original cost	25,504,165	44,756,253	70,260,418
Depreciation to date	7,547,824	12,454,185	20,002,009
Depreciated cost	17,956,341	32,302,068	50,258,409

FM BROADCAST REVENUES, INCOME AND INVESTMENT

Item	1949		1950	
	Number of stations	Amount	Number of stations	Amount
FM Broadcast Revenues				
FM stations operated by:				
AM licensees:				
Reporting no FM revenues [1]	452		420	
Reporting FM revenues	167	$1,200,000	163	$1,400,000
Non-AM licensees	104	1,400,000	86	1,400,000
Total FM stations	723	2,600,000	669	2,800,000
FM Broadcast Expenses				
FM stations operated by:				
Non-AM licensees	104	5,000,000	86	4,000,000
Industry total		(1)		(1)
Total FM Broadcast Income (Before Federal Income Tax)				
FM stations operated by:				
Non-AM licensees	104	(3,600,000)	86	(2,600,000)
Industry total		(1)		(1)

( ) Denotes loss.

[1] In view of the difficulty in a joint AM-FM operation in allocating FM operation expense separately from AM station operation expense, licensees of such stations were not required to report FM station expense separately. As a result, FM industry totals for expense and income are not available. AM-FM licensees, however, were requested to report separately the revenues, if any, attributable to FM station operation if such data were readily available. In only a few instances did AM-FM licensees state they were unable to segregate the FM revenues.

CHAPTER V—MISCELLANEOUS RADIO SERVICES

1. GENERAL

Not grouped with the Safety and Special Radio Services or with the Radio Broadcast Services, but having an important bearing on the over-all electrical communications picture, is the use of radio for experimentation and development, the operation of noncommunications equipment for industrial, scientific, and medical purposes; the growing utilization of low power devices which radiate frequency energy, and general rules applicable to antennas for all types of radio stations.

This chapter deals with those specific subjects.

2. INDUSTRIAL, SCIENTIFIC, AND MEDICAL SERVICE

A serious limiting factor in the use of radio transmitting and receiving equipment is the prevalence of electrical interference tending to prevent the satisfactory reception of transmitted signals. This interference may be in the form of atmospheric background noise, or it may appear as a result of spurious and harmonic emissions from various types of electrical and radio frequency operated equipment. The Commission has long recognized that certain equipment using radio frequency, but not designed for communication purposes, contributes a substantial portion of the interference to authorized radio services, and the operation of equipment of this type has often resulted in the disruption of the service of communication systems. Such interruptions to radio reception are not confined to the broadcast services, but also seriously hamper services concerned with the safety of life and property.

To minimize the actual or potential interference from particular kinds of noncommunication equipment using radio-frequency energy, the Commission adopted, effective June 30, 1947, part 18 of its rules

which relates to the Industrial, Scientific, and Medical Service. Part 18 is designed to govern the operation of medical diathermy, industrial heating, and miscellaneous equipment.

Medical diathermy equipment includes any apparatus (other than low power intermittent surgical diathermy equipment) which generates radio frequency energy for therapeutic purposes. Industrial heating equipment includes apparatus using radio frequency energy for the purpose of heating operations in manufacturing or production processes. Miscellaneous equipment includes apparatus, other than diathermy or industrial heating equipment, in which the action of the energy emitted is directly upon the workload and does not involve the use of associated radio receiving apparatus.

Part 18 specifies the frequency bands which have been allocated for the operation of such equipment and also defines the extent to which harmonic and spurious radiations on frequencies outside the allocated bands must be suppressed. Subsequent to the adoption of part 18 of the rules, five additional frequency bands above 40 megacycles have been made available for this service, but have not as yet been included in part 18.

The Commission has dealt with interference problems arising from the operation of equipment included in part 18, first, on a request-for-cooperation basis, and later, in those cases where cooperation was not satisfactorily accomplished, by the use of enforcement provisions available to the Commission. In the administration of part 18, the Commission has been guided by a desire to provide interference-free communications and yet permit the necessary use of medical diathermy, industrial heating, and miscellaneous equipment. Advice and suggestions regarding the possibility of modifying older types of equipment to effect compliance with the rules has been given by the Commission. The Commission's efforts to bring about amicable solutions of interference problems created by the use of equipment included in part 18, have, in general, been well received.

The expanding use of television facilities, and the further congestion of the frequency spectrum by other services, has resulted in an increase in the number of interference cases reported. Thus far, the procedure set up for processing complaints of interference to radio reception has been satisfactory. However, the rapid growth of the broadcasting, communication and safety services can lead to an increase in the number of difficult situations which may be resolved only by the use of stronger measures available under the act.

In addition to its regulatory duties, the Commission has held conferences with representatives of industries engaged in the manufacture and sale of equipment regulated by part 18. These conferences have been helpful to both industry and the Commission in the solu-

tion of problems relative to equipment included in that part of the rules. Type approval certificates have been issued covering 70 diathermy machines and 8 types of miscellaneous equipment tested in accordance with the procedure set forth in the rules, and found to be in compliance.

Through rule-making procedure, the Commission has issued orders successively postponing the effective date of the rules concerning welding devices employing radio frequency energy pending further study. An industry committee has been cooperating with the Commission to eliminate interference caused by the operation of such welders. Further study of this problem, both by industry and the Commission, is continuing in an effort to arrive at suitable technical standards whereby the welding industry can be brought under the rules and, at the same time, minimize interference caused to other services.

3. EXPERIMENTAL RADIO SERVICES

In compliance with the Communications Act requirement that the Commission "study new uses for radio, provide for the experimental use of frequencies, and generally encourage the larger and more effective use of radio in the public interest", the Commission has provided for experimental radio stations. Part 5, Rules and Regulations Governing Experimental Radio Services, became effective October 1, 1939, and has been modified from time to time as the demands of the experimental service have required. These rules were designed to promote all types of experimentation in and relating to the radio art.

The present rules provide for three categories of experimental stations, namely, class 1, class 2, and class 3. Class 1 stations are for the use of persons engaged in fundamental or general research, experimentation and development of the radio art; or for the development, testing and calibration of radio equipment. Class 2 stations are authorized for the development of a new radio service or the expansion of an established service. Class 3 authorizations are available to individuals interested in conducting experimental programs on their own behalf for a limited period of time.

The Commission's rules provide for two subclasses of class 1 experimental stations in addition to the above general categories. These subclasses are contract developmental and export developmental stations. The former classification includes experimental stations licensed for the purpose of developing equipment or techniques to be used by stations operated by the United States Government. The latter classification is for a similar purpose where the equipment is to be used by stations under the jurisdiction of a foreign government.

The majority of class 1 stations are operated by equipment manu-

facturers and research and development organizations. These stations are engaged in experimentations directed toward the improvement of existing radio equipment as well as the development of new equipment, new techniques in the electronic art, and fundamental studies involving radio propagation. Several licensees are engaged in developing narrow band equipment suitable for adjacent channel operation which would effect a more efficient use of the radio spectrum. Other development work includes new and improved radio aids to navigation, radiolocation equipment, and microwave communication equipment. Continued experimental work is being done in ionospheric investigations and propagation studies of the various frequency bands throughout the spectrum, particularly in the upper range of the spectrum where the presently available information is meager.

The frequency allocation rules (part 2) provide for the experimental use of various bands of frequencies above 25 megacycles subject to the condition that interference is not caused to the service or stations to which these frequencies are regularly assigned. Specific frequencies below 25 megacycles, which are listed in part 5 of the rules, are allocated for use by class 1 experimental stations.

Numerous class 1 authorizations have been issued to manufacturers and sales engineers for field intensity or coverage surveys in areas where it is proposed to establish radio communication systems. The results of these surveys provide useful information for choosing the operating frequencies, power, emission, and antenna location for optimum performance.

Applications for class 2 experimental stations usually involve proposals for the establishment of new services which are not provided for in the rules or are directed toward the development of some phase of an established service. Since the establishment of the new Land Transportation and Industrial Services on a regular basis the number of class 2 stations has decreased.

Because of the limited scope of experimentation permitted by class 3 authorizations, the Commission receives few requests for such authorizations. Most types of experimentation permitted under a class 3 authorization may also be conducted under a class 1 authorization or, for qualified persons, under the Rules Governing the Amateur Radio Service.

Part 5 of the rules is being completely revised, and it is expected that the necessary rule-making procedure looking to final adoption will be completed in the near future.

Statistics for the experimental radio services follow:

NUMBER OF EXPERIMENTAL RADIO STATIONS

Class of station	June 30, 1950	June 30, 1951	Increase or (decrease)
Class 1	416	348	(68)
Class 2	50	56	6
Total	466	404	(62)

EXPERIMENTAL TRANSMITTERS

Classification	Nonmobile	Mobile	Total
Class 1	203	1,154	1,357
Class 2	17	151	168
Total	220	1,305	1,525

EXPERIMENTAL APPLICATIONS

Class of station	Received 1950	Received 1951	Increase or (decrease)
Class 1	799	839	40
Class 2	100	51	(49)
Total	899	890	(9)

4. RESTRICTED RADIATION DEVICES

The necessity for establishing a minimum field strength figure, below which it would not require the use of radio-frequency emissions to be licensed, has been recognized by the Commission and, as a result of studies undertaken in 1938, rules relating to certain low power devices were adopted. These rules, presently codified as part 15, Rules Governing Restricted Radiation Devices, do not place a limitation upon the permissible power, but do place a limitation on the distance at which such equipment can be used, the distance being an inverse function of the frequency employed, and specify a maximum permissible field intensity at that distance.

Considerable use has been made of equipment designed to operate within the provisions of part 15, particularly in the frequency band allocated for use by the Standard Broadcast Service. Typical of these uses are "college campus" broadcast stations, which employ carrier current techniques for the distribution of programs essentially broadcast in nature; industrial signalling and communications systems using carrier current techniques; space radiating devices such as phono-oscillators, garage-door openers, remote-control devices for model airplanes or other objects; etc.

Since the operation of radio transmitting devices under part 15 does not involve licensing for either equipment or operators, this mode of operation has been adopted by many persons. As a result, the Commission has received considerable correspondence regarding restricted radiation devices purportedly operating in compliance with part 15.

It has been found, however, that much of the equipment intended to operate under these rules has proved incapable of compliance with the maximum permissible field strength limitation. Campus broadcasting, and other carrier current systems, have grown to such proportions that a study of the problems created is being made. A notice of proposed rule making has been published and comments invited regarding the various types of restricted radiation devices and systems now in use. However, further study will be necessary before a satisfactory solution to the problem of restricted radiation devices can be found.

5. NEW ANTENNA RULES

On May 23, 1950, the Commission proposed rules concerning the construction, marking, and lighting of antenna towers and their supporting structures. The rules, as part 17, were made final on December 13, 1950, effective February 15, 1951. Their purpose is to prescribe certain procedures and standards with respect to the Commission's consideration of proposed antenna structures which will serve as a guide to persons intending to apply for radio station authorizations.

Part 17 is a result of a need for definite procedures governing a study of each antenna proposal and consultation with all aviation interests concerned for the purpose of determining the extent of aeronautical hazard created by a proposed antenna structure. To this end the criteria contained in part 17 were developed in conjunction with the Air Coordinating Committee (ACC), the Civil Aeronautics Administration (CAA), the Department of Defense, other Government agencies, and the radio industry.

The new rules were promulgated pursuant to section 303 (q) of the Communications Act which grants the Commission authority to require the painting and/or illumination of radio towers if and when in its judgment such towers constitute, or there is a reasonable possibility that they may constitute, a menace to air navigation. Prior to the adoption of part 17, the question of the degree of hazard created by a proposed antenna tower was referred to the Civil Aeronautics Administration for that agency's recommendations in accordance with section 1.377 of the Commission's rules. All applications proposing the construction of antennas over 150 feet, or located within 3 miles of an airport, were being so referred at the rate of about 175 per month. The CAA's recommendations were predicated on its Technical Standard Order N18, Criteria for Determining Obstructions to Air Navigation, and its predecessor standards.

With the adoption of part 17, the function of making recommendations concerning the possible aeronautical hazards of antennas passed from the CAA to the Airspace Subcommittee (ASP) of the Air Coordinating Committee (ACC). The ACC was created in 1946 by

Executive Order No. 9781 to provide for the development and coordination of aviation policies. The Airspace Subcommittee (ASP) of the ACC coordinates proposals by Government agencies, private individuals, and industry which may involve conflict in the navigable airspace; the ASP assumes the responsibility previously delegated to the CAA for determining whether a proposed tower will be a menace to air navigation.

Part 17 is composed of three subdivisions. Subpart A contains general information, including statements of basis and purpose, definitions of the technical terms involved, a specification of how and when an application should be made, and a description of the Commission's procedure in the consideration of an application. Subpart B contains the criteria set forth for determining whether or not a proposed radio tower will require special aeronautical study by the Airspace Subcommittee. If a proposed radio tower meets the specifications of these criteria, it is deemed not to involve a hazard to aviation. Subpart C specifies tower painting and lighting requirements.

In view of the technical phases of part 17, and the fact that antenna proposals involve various types of radio services, the Commission decided that the antenna surveys be coordinated in a single branch in the Office of Chief Engineer. Statistics of antenna applications processed by the Antenna Survey Branch (ASB) for the fiscal year subsequent to February 15, 1951, the effective date of part 17, follow:

Antenna applications

Services	Received	Cleared by ASB	Not cleared by ASB—referred to ASP for study	Pending June 30, 1951
Broadcasting:				
AM	234	172	53	9
FM	26	18	3	5
TV	22	18	3	1
Experimental	5	5	0	0
Common carrier	89	81	4	4
Special services	2,846	1,986	56	804
Total	3,222	2,290	119	823

CHAPTER VI—RADIO OPERATORS

1. COMMERCIAL RADIO OPERATORS

The Commission is concerned not only with radio station licensing but also with the licensing of the stations' operators. Over 600,000 commercial radio operators (as distinguished from amateur radio operators, treated elsewhere in this report) now hold licenses. There are nine basic classes of commercial operator licenses graduated to meet the operating requirements of the various classes of radio stations. Included among the commercial operators licensed are those whose use of radio is complementary to their occupation as well as those who operate radio stations as a vocation.

Basically, all radio stations licensed by the Commission are required by law to have licensed radio operators and the Commission has the duty in accordance with the Communications Act to issue operator licenses. In this connection, the Commission prescribes the kinds and classes of radio operators and the qualifications they must possess as a basis for licensing. Examinations for the various operator licenses are given regularly at the Commission's field offices and at regular intervals at examination points located throughout the United States.

Commercial radio operator licenses normally have 5-year terms and an operator wishing to maintain his licensed status must take steps at the end of the term to obtain either a renewal or a new operator license. Renewal licenses normally are given without examination if the operator has been working under his license for a reasonable portion of the license term. The accelerated drafting of operators into the Armed Forces which occurred during the past year and the temporary employment of operators in rearmament work prevented many operators from obtaining the requisite service for renewal and the Commission in the public interest temporarily waived the normal renewal service requirements.

The present national emergency and rearmament program have created a special demand for electronic technicians. This demand has

been supplied partly from the licensed operator personnel of radio stations and this in turn has created a shortage of radio operators holding licenses of the higher classes. Furthermore, the amount of ocean-going shipping was increased to meet the requirements of the emergency and an increased number of experienced radiotelegraph operators were needed to man the ships. As an emergency measure to add to the supply of experienced marine operators, a special class of radio operator license was created in April 1951 which is valid only for ship radio stations. The license is issued to certain former operators upon their passing an appropriate Morse Code test.

The shortage of operators holding radiotelephone first-class operator licenses has had a serious impact upon broadcast stations located in the small market areas. To afford temporary relief, the Commission established a policy of granting temporary permission for periods up to 30 days to utilize lower class operators for the normal operation of stations under the supervision of one or more fully qualified full-time operators. This relaxation is granted only where it is shown that the station concerned has made reasonable efforts to employ first-class operators and has been unable to do so. The Commission by amending its rules delegated authority to administer this policy with respect to AM and FM broadcast stations to its 23 district field engineering offices. Licensees applying for temporary relief from the normal operator requirements accordingly should apply to these offices rather than to the Commission's Washington offices. At the end of the fiscal year, authorizations to employ lower grade operators were being granted at the rate of approximately 28 per week.

The Commission has authority under the law to issue radio operator licenses only to United States citizens. This limitation, coupled with the basic statutory requirement that radio stations in the United States have operators licensed by the Commission, generally prevents foreigners from operating radio stations of this country. This situation is most evident in the case of mobile stations such as those on board aircraft travelling between Canada and the United States. From the difficulties arising in this connection, it appeared desirable to effect some arrangement whereby citizens of these two countries could operate each other's stations, and this led to negotiations with Canada in which the Commission participated. As a result, representatives of the two Governments on February 8, 1951, at Ottawa, signed a convention which would provide a solution to some of the operator problems presented. At the end of the year, the convention had not been ratified by either Canada or the United States and was not yet in effect. That there is considerable interest in the provisions of the convention is indicated by the numerous inquiries received from aircraft pilots.

The Commission on January 29, 1951, in line with the International

Radio Regulations, issued a proposal to amend section 13.61 of its rules so as to further define the operating authority of holders of the Restricted Radiotelephone Operator Permit and the Aircraft Radiotelephone Operator Authorization. Under the proposed amendment, operators obtaining these authorizations would not be eligible to operate ship or aircraft radiotelephone stations having a power capability greater than 50 watts. The matter had not been finally decided at the end of the year.

During the past year, work was completed on material for a supplementary examination for licensed radio operators who wish to perform or supervise tests and adjustments of ship radar installations during the installation, servicing, or maintenance of such equipment. The examination consists of 50 questions on specialized theory and practice applicable to the proper installation, servicing, and maintenance of ship radar in general use for marine navigational purposes. Upon passing the examination, known as element 8, the eligible applicant is entitled to have a radar endorsement placed upon his radio operator license.

The Commission publishes a booklet to show the scope of the examinations for the various classes of commercial radio operator licenses and endorsements. This publication, entitled "Study Guide and Reference Material for Commercial Radio Operator Examinations", is printed and made available to interested persons by the Government Printing Office. Because of substantial changes made during the preceding year in the examinations, the Commission made extensive revisions of the publication.

2. STATISTICS

AUTHORIZATIONS

Commercial operator licenses of all classes reached a total of approximately 612,000 at the close of the year, which was a net increase of more than 74,000 over the previous year. Comparative figures follow:

Class of license	June 30, 1950	June 30, 1951	Increase or (decrease)
Radiotelegraph:			
First class	4,795	4,432	(363)
Second class	8,250	7,667	(583)
Third class [1]	1,162	1,155	(7)
Temporary limited:			
Radiotelegraph			
Second class		141	141
Radiotelephone:			
First class	38,049	39,000	951
Second class	17,535	18,400	865
Third class		4,400	4,400
Restricted radiotelephone permit	346,990	398,960	51,970
Aircraft radiotelephone authorization	120,550	137,988	17,438
Total	537,431	612,143	74,712

[1] Includes restricted radiotelegraph operator permits.

APPLICATIONS

During the year more than 150,000 applications for commercial operator licenses were received. This represents an increase of approximately 50,000 over the figure for last year.

CHAPTER VII—FIELD ENGINEERING AND MONITORING

1. GENERAL

The Field Engineering and Monitoring Division constitutes the Commission's primary inspection, examination, enforcement, and engineering fact-finding unit. Its field staff inspects radio stations of all types and serves notices for discovered discrepancies, conducts radio-operator examinations and issues operator licenses to those found qualified, monitors the radio spectrum to assure that stations operate on their assigned frequencies with prescribed power, locates and closes unauthorized transmitters, investigates complaints of interference to various radio services, obtains and correlates technical data for Commission use, furnishes fixes and directional information to aircraft which are lost and provides bearings and fixes on ships in distress.

2. FIELD OFFICES

The Commission's 9 regional engineering offices supervise 23 district offices, 6 suboffices, 3 ship offices, and 18 monitoring stations, which are listed in the appendix. The engineering work performed by these field offices and monitoring stations is coordinated and directed by the Washington office.

3. MONITORING STATIONS

The Commission operates 18 monitoring stations of which 11 are primary stations and 7 are secondary stations. Sixteen are located in the United States, one in Hawaii, and one in Alaska. The secondary station at North Scituate, R. I., was closed in January 1951 for budgetary economy reasons. A request has been made to Congress that four new monitoring stations be added during the next fiscal year, with corresponding increase in the present monitoring station staffs.

This unique monitoring and direction-finding network is the only one of its kind in the United States. It renders services to the public and Government in numerous ways and to the Commission in special categories. Functioning as it does on a round-the-clock basis and being linked together and with Washington headquarters by radio and teletypewriter circuits, it constitutes a prompt and accurate identifying, localizing, and frequency-measuring adjunct to the Commission's law enforcement and emergency aid programs.

4. INSPECTIONS

BROADCAST STATION INSPECTIONS

The Commission's engineers regularly inspect the equipment of all stations in the AM, FM, and TV broadcast services. These inspections are to determine whether the stations abide by the rules and regulations under which their operation has been authorized and whether they render an adequate technical broadcast service to the listening and viewing public. All of the stations' technical operations are carefully reviewed, including their maintenance of directional radiation patterns, their authorized power, the frequency and stability of emissions, the program modulation including quality of music or voice, the proper lighting of the antenna towers for the enhancement of safety to airborne passengers and the maintenance of logs and records showing that other requirements of the Communications Act are being observed.

Following is a tabulation of the number of broadcast stations of the three classes inspected in 1950 and 1951.

Broadcast stations inspected	1950	1951
AM	1,476	1,242
FM	306	204
TV	104	44
Total	1,886	1,490

Discrepancies noted in broadcast station operation during 1950 totaled 1,108 as compared with 885 during 1951. Percentage-wise, 59 percent of the station inspections made in 1950 resulted in citations while 59.4 percent resulted in this action in 1951.

SHIP STATION INSPECTIONS

Since 1910, the United States has continued in the forefront in the enactment of safety legislation and in the enforcement of international laws for the safety of lives and property at sea. The Commission's engineers, as did those of its predecessor agencies, assist ship owners and operators in maintaining ship radio apparatus in a condition of

instant readiness for emergency demands. Ship inspection figures for 1950 and 1951 follow:

Number of ship inspections	1950	1951
United States ships	6,982	7,897
Foreign ships	3,032	2,939
Total	10,014	10,836

During inspections of ship radio stations, the formal action to obtain correction of defects and irregularities is here shown:

Number of deficiency notices served	1950	1951
United States ships	6,960	4,393
Foreign ships	1,943	1,431
Total	8,903	5,824

The ever-present danger of complacency in the maintenance of radio equipment by owners and licensees points out the need of continued and regular inspections of ship radio stations to maintain their readiness and efficiency when disaster strikes in the age-old battle of men against the sea.

The number of discrepancies which were corrected immediately by the licensee or his representative during the inspection, and therefore did not necessitate the serving of formal deficiency notices, is indicated below:

Violations cleared during inspections	1950	1951
United States ships	2,783	3,355
Foreign ships	513	540
Total	3,296	3,895

INSPECTION OF OTHER RADIO STATIONS

Inspections made of stations in services other than broadcast and ship totaled 13,507 in 1951 and 12,755 in 1950. Discrepancies of a technical nature totaling 3,742 were revealed in 1951, while 3,699 were discovered in 1950. The use of radio in more and more services to the public, in the dispatching of vehicles of various types in the safety services, in providing communication to isolated communities, in watching by radio the rise and fall of river levels to prepare the populace for floods, and in underground prospecting and in other apparently unlimited and widely divergent fields continues to present added field responsibilities and obligations. Records are maintained in each Commission district office of the new stations, and as they are authorized these stations are scheduled for inspection upon the next

trip to that vicinity. Due to the number of new stations added annually, it has been impossible lately to accomplish yearly inspections of all stations with the available inspectional force and, as a result, inspections are made of stations at least once during their license period.

In order to facilitate compliance with the Commission's rules and regulations, the inspecting engineer calls technical discrepancies to the attention of the station at the time the discrepancy is discovered and clears those which are corrected while the inspection is in progress. These discrepancies, consequently, are not recorded as formally cited and the incident is recorded as a minor discrepancy which was "cleared during inspection".

In continuing its efforts to hasten the correction of operational discrepancies, and particularly in those cases where the station's operation does not directly involve safety of life and property, "sample inspections" are made of groups of stations. Inspections also occur during Nation-wide drives synchronized with the release of appropriate public notices, as was recently accomplished in connection with private aircraft. This method has proven quite effective in bringing to the attention of groups of radio-station operators the need for their obtainment of required operator and station licenses in cases where these documents had not been secured previously, also, to bring to their realization the need for standard operating procedures and "circuit discipline" of a "party line" nature. This tends to free the itinerant aircraft frequencies of unnecessary conversation which can disrupt the channels with consequent loss of their usefulness in an emergency.

The Commission's field engineers are responsible for the inspection of the hundreds of thousands of stations in the various categories. These include mobile stations as well as the fixed stations which service them. Mobile stations are in the majority. They encompass radio equipment on police, fire department, ambulances, tow trucks, taxicabs, and other vehicles which serve the public. Inspection is made of these stations as frequently as limited inspectional personnel can be spared from other duties.

5. OPERATOR EXAMINATIONS

Commercial operator licenses totaling 139,732 were issued in the field during 1951 as compared to 101,226 issued during 1950. This is an increase of 38 percent. The licensing of stations in new or expanding radio services calls for an ever-increasing number of licensed operators for their operation. Some stations—such as TV and radiotelegraph stations on ocean going ships—require operators holding the highest grades of radiotelephone and radiotelegraph licenses which are obtained only after the applicant has passed a thorough technical

examination given by an examining engineer. Licenses valid for the operation of other types of radio stations require examinations which are designed to determine the applicant's knowledge of and familiarity with the service in which he seeks authority to operate.

Examinations are given regularly at field engineering offices of the Commission, at the Washington examination office and at various points in the United States, its Territories and possessions. In addition, examinations given at points outside the district offices are held annually, semiannually, or quarterly as the needs of the locality indicate. The places and times of these examinations are made known by publication, semiannually, of an official examination schedule which may be obtained by writing to any of the district engineering offices listed in the appendix hereto.

6. INVESTIGATIONS

Investigative activity increased somewhat in 1951 over that in 1950. This was brought about by a number of factors, among which are the steady increase in the number of new adaptations of radio and to the mounting purchases of television receivers. During 1951 a total of 9,652 investigative complaints of all types were handled by Commission investigative engineers as compared with 8,613 in 1950.

Investigations may be divided into two general groups: (*a*) Those pertaining to licensed stations and (*b*) those made in connection with unlicensed, unidentified, or unknown stations or sources of radio interference. Although the number of cases involving unlicensed stations is a relatively small proportion of the total number of investigations conducted, such investigations constitute an extremely important activity due to the fact that unlicensed operation must be suppressed as quickly as possible, particularly if serious interference is involved. Cases of deliberate violations of the Communications Act must be prepared for prosecution of the persons responsible. In this category are investigations to apprehend persons who commit other violations such as the use of profane and indecent language, or who use radio surreptitiously for illegal purposes such as that occasionally attempted at race tracks to "beat the bookies".

The Commission's investigative engineers recently uncovered several unauthorized TV broadcasting stations which were installed for the purpose of providing "bootleg" television programs to communities which, due to their geographical location, were unable to receive programs from authorized stations. The Commission's ability to speedily discover these and other illegal operators who attempt to break the laws acts as a deterrent to more widespread illegal radio operation.

During the year, 11 cases of illegal operation were referred to the

Department of Justice for prosecution. Convictions were obtained in four cases, while the others had not yet reached court. Prosecution and conviction of all operators of illegal stations found are not sought by the Commission in cases where the violation was manifestly not premeditated, particularly when committed by minors. During 1951, a total of 101 unauthorized stations were discovered and closed as compared to 149 in 1950.

A total of 5,625 investigative cases relating to licensed stations were handled during 1951, an increase of 417 over 1950. These investigations were made in connection with complaints relating to authorized stations of all classes. Interference to TV reception accounted for the largest number but interference to AM and FM broadcasting and, of lesser magnitude, interference to and by the various stations or services, likewise received appreciable effort.

Less numerous, but of considerable importance to safety of life and property, were cases involving interference to aviation and other communications services caused by equipment frequently located more than a thousand miles from the place at which the interference was experienced. The equipment responsible for such interference was frequently found to be radio frequency "industrial heaters" used in certain manufacturing processes. Such interference sources are first localized by the Commission's long-range direction-finding network, then tracked down by means of mobile direction-finding units.

Many interesting phenomena are discovered due, to some extent, to the large number of stations which are being installed, particularly in the urban communities. Rectification of radio signals, due to imperfect metallic contacts in homes and mixing of radio signals in a radio receiver from two or more radio stations in the complainant's vicinity, is a frequent cause of interference. Other sources are various domestic electric appliances, passing airplanes, trains, streetcars and buses, electric-welding equipment, diathermy, and, in some cases, radio receivers which radiate radio signals into the neighborhood while they are receiving. The latter has been found to be particularly true of some TV receivers now in use.

7. MONITORING FUNCTIONS

Commission monitoring is analogous to the work of traffic policemen in maintaining order on the Nation's highways. Most countries of the world have found it necessary to maintain monitoring stations. In fact, it is an obligation under international treaties and radio conventions to do so. The United States has been a pioneer in this regard and strives to maintain its leadership of operating, in the

Federal Communications Commission, the best monitoring system of this type in the world.

INTERFERENCE COMPLAINTS

When a signal which cannot be identified by the complainant is causing interference to other radio operations, quick corrective action is essential. Vital messages can be jammed by accident or negligence as well as by design. It is natural that the Commission, through its monitoring service charged with keeping order in the air lanes, is looked to both for identifying the station causing interference and for eliminating the trouble.

A typical example of this type of interference elimination occurred when an engineer in Washington, D. C., noted a particularly strong unidentified signal estimated to be a potential, if not actual, source of interference to an aircraft frequency. Consequently, an "alert" was placed via the Federal Communications Commission's teletype in order that coordinated long-range bearings could be obtained. Later during the same evening an Air Force base in Texas filed a formal complaint through the nearest monitoring station on the same interfering signal already under observation. In addition to the complaint from Texas, another was received from an Air Force base in Montana. In a short time bearings were obtained, plotted, and a "fix" evaluated indicating the offending signal to come from the vicinity of an Air Force base in California. The responsible authorities were notified and shortly thereafter the interfering signal left the air. All of this was accomplished in the relatively short time of 37 minutes from the time the initial complaint was received until the time that the interfering signal was removed.

Another instance involved interference to a channel used by the Transcontinental and Western Airways at New York. Bearings were obtained, a fix determined, and the source located, all in 15 minutes.

But sometimes neither the identification nor the removal of the trouble is so simple. In more complicated cases, a final step must be taken by calling mobile units into operation to trace the source of the offending transmission. One case in point during the year was when the Coast Guard advised the Commission's monitoring service that an unidentified signal was at times blocking out transmissions on an aircraft channel. After long-range bearings were taken, a mobile unit was dispatched from the New York area to run down the offender. It was found to be an excessively radiating industrial heater used for gluing wood panels. This operation took approximately 3 days. Since the owner of the machine did not offer cooperation leading toward eliminating the interference, it was necessary for the Commmission to secure an injunction to remedy the situation.

In some cases, long-range bearings for identification are not required, but extensive monitoring observations, including frequency and band-width measurements, observations of modulation percentage, etc., must be made of a station to determine the facts. The Commission's monitoring personnel is called upon to make observations and recommendations. The latter are then brought to the attention of other bureaus of the Commission, or other agencies or governments if necessary, to effect a solution to the interference problem.

A total of 2,479 major monitoring cases were handled during the fiscal year, which was 596 more than in 1950. This reflects the increase of interference complaints proportionate to the number of operating stations. The trend is expected to continue as more and more stations are authorized in the various services.

EMERGENCY SERVICE

The Commission's monitoring stations continued to be called upon to furnish emergency long-range direction finder fixes on lost or otherwise disabled air and sea craft. During the past year 168 requests were received in this category as compared with 116 in 1950. More can be anticipated next year, due to the increased amount of military training flights.

Several cases of emergency monitoring assistance given during fiscal 1951 were of interest. Among these were instances of aid furnished lost B–29's en route from Honolulu to the mainland; aid furnished the giant Navy aircraft *Mars* which lost the use of two engines over the Pacific; aid given a military transport, en route to Halifax with failing engines, which radioed at the end of the journey, "Have landing in sight thank God"; aid furnished a giant B–50 lost in the Middle West; aid furnished a PAA clipper ship flying the Pacific; aid furnished a lost yacht named the *Francis C* which, after receiving its position, transmitted "Continuing voyage express appreciation for assistance rendered"; and assistance given planes seeking to fix the position of many of the hurricanes last fall in the Caribbean.

MONITORING SURVEYS

During the year many monitoring surveys were made, both for the Commission's use and at the request of other agencies. These surveys for the most part are exacting and time consuming but are necessary for the efficient use of the radio spectrum. Data from such surveys are also used at international conferences.

MONITORING ENFORCEMENT

In policing the spectrum, thousands of improper operations have been detected and brought to the attention of the offenders. During

fiscal 1951, as a result of monitoring activities, 8,846 violation notices were served on radio stations and operators both domestic and foreign. This is slightly lower than the 9,817 served during the previous fiscal year and undoubtedly represents an improvement in the maintenance of frequency stability and in operating practices due to close surveillance.

8. TECHNICAL OPERATIONS

As a result of rapid expansion of radio communication into higher frequencies and new fields of radio activity, there continues to be corresponding need for new and improved equipment for use in exercising technical surveillance over the operations of radio stations, locating unlicensed stations and sources of interference to authorized services, and for obtaining propagation data and other information for use in connection with allocation of frequencies, especially in frequency ranges above 50 megacycles. To meet these equipment needs a number of items of equipment were purchased and modifications were made in existing equipment to provide improved and more diversified operation.

During the fiscal year 68 new engineering projects were assigned to the field offices and monitoring stations as a result of requests from the various offices in the Commission and from other Government agencies or originated by the Field Engineering and Monitoring Division. In addition, 93 projects were carried over from the previous year. The total of 161 active engineering projects which involved engineering studies, measurements and investigations was about 25 percent greater than for the previous year and 33 percent greater than for 1949. The field engineers spent more than 8,000 man-days during fiscal 1951 on these subjects, about the same total time as for the two previous years.

Examples of engineering project assignments were:

The directional patterns of 236 different AM broadcast stations were checked to determine whether the stations were operating their antenna systems in accordance with the specifications set forth in their licenses. Field intensity measurements and surveys were made of the emissions of eight AM broadcast stations in connection with interference to other services from these stations involving harmonic radiation, cross modulation, and other spurious radiations.

The long range AM broadcast field intensity recording program was continued at six stations and a new program of VHF and UHF field intensity recording in cooperation with the Central Radio Propagation Laboratory was initiated at nine monitoring stations and one district office. At the close of the year, 20 AM broadcast and 22 VHF and UHF television and FM broadcast recorders were in continuous operation. Information obtained from these 42 recorders is used in

connection with allocation studies and in determination of range of coverage to be expected from the various classes of stations. Special mobile field intensity recordings were also made at five offices, using test cars to obtain information and data which could not be obtained at fixed locations.

Considerable progress was made during the year in replacing the old mobile investigative units with new investigative cars. When the year ended, 15 of the new cars had been completely modified and equipped and work was progressing on 7 additional cars. The Field Engineering and Monitoring Division operates a total of 39 fully equipped investigative cars.

Installations of low frequency direction finders (250 to 1500 kilocycles) were made at seven of the monitoring stations to extend the coverage with fixed direction finders below that previously available. In addition, considerable progress was made in development of new long range direction finders which may be remotely controlled and operated from the monitoring building. Two different methods of performing this feat have been devised and operational tests are now in progress to determine the relative accuracy and usability of the two arrangements. Such direction finders will greatly increase the efficiency of the Commission's direction finding network, leading to faster fixes and more economical utilization of manpower.

Other field activities involved construction of special equipment for monitoring and engineering measurements and for other purposes which cannot be fulfilled by commercially available equipment. Also, a number of tests were made to determine the suitability of various items of equipment for use at the field offices and stations.

CHAPTER VIII—TECHNICAL AND LABORATORY ACTIVITIES

1. GENERAL

Research and technical studies are basic to Commission allocation of frequencies and the establishment of rules governing the operation of all types of radio services. Such highly involved and complicated matters can be handled only by specialized engineers. Those engaged in this phase of the Commission's work are grouped into two divisions—Technical Research and Laboratory. Both divisions function under the Office of the Chief Engineer. Particular projects require the cooperation of the Commission's field engineers and monitoring system.

2. TECHNICAL RESEARCH DIVISION

The Technical Research Division serves as an operational research group for the purpose of resolving problems relating to wave propagation, technical standards, and various allied subjects. In this connection it organizes research projects for the collection of technical data by the Field Engineering and Monitoring Division, the Laboratory Division, and other organizations including certain groups in the radio industry. It also participates in the technical studies incident to international conferences and treaties, and represents the Commission in the coordination of radio research, standardization, and instrumentation with Government and industrial organizations.

During fiscal 1951, the Technical Research Division continued its current long-term projects at about the same level as during the previous year while it increased activities in the VHF and UHF part of the spectrum. More emphasis was also exerted on those projects dealing with technical standards. The duties of the Ad Hoc Committee on television continued through most of the year and resulted in the release of the widely accepted Ad Hoc reports. The division continued to carry on special studies and to collect and analyze basic data concerning radio wave propagation as well as other communica-

tion problems, and to make the resulting scientific information available to the Commission for guidance in the promulgation of new rules and the determination of technical limitations and practical engineering standards.

Allocation of radio frequencies to the various radio services is premised upon a knowledge of many highly technical and complicated things. These include ionosphere and troposphere propagation, terrain effects, useful intensities of signal as related to various sources of interference, geographical and frequency separations necessary to alleviate interference in accordance with various requirements, equipment capabilities and limitations, new developments and their possibilities, and other fundamental considerations.

The Commission must have a detailed knowledge of the propagation characteristics of radio signals throughout the spectrum in order to make the most economic and practical allocation of facilities. The propagation characteristics of the band of frequencies allocated to a particular service has to be consistent with the operating requirements. The further allocation of stations within a service—i. e., the determination of cochannel and adjacent channel distance separations, service ranges, and power limitations—can only be founded on a knowledge of propagation. This knowledge is best obtained from deductions arrived at by experienced engineers through the study and analysis of long-term field intensity measurements involving the use of carefully calibrated recording equipment. It is the primary function of the Technical Research Division to obtain and evaluate such data.

VHF AND UHF PROPAGATION STUDIES

Television and FM—Ad Hoc Committee.—Several members of the division participated actively in the Ad Hoc Committee for the evaluation of the radio propagation factors concerning the TV and FM broadcast services in the frequency range between 50 and 250 megacycles. This committee was formed in October 1948 and functioned through July 1951 in connection with the Commission's hearings on TV and FM allocations. The committee was headed by the Chief of the Technical Research Division and consisted of propagation experts from industry and Government. A considerable amount of time was spent by several of the members of this division on the subcommittee responsible for preparing volume II of the Ad Hoc Committee Report, which was introduced into the record of the television allocation hearing of October 1950.

TV standards.—The division participated actively in the drafting of engineering standards for TV broadcast stations, as proposed by the Commission on September 21, 1950, and March 22, 1951.

Measurements.—During the early part of the year plans were drawn

for the recording of field intensities of new TV and FM stations by the Commission's monitoring stations. During the last quarter of the fiscal year the plans were finalized and the work of installing recorders and collecting field data got under way.

In collecting information on radio propagation and atmospheric noise, the division has maintained close liaison with the Central Radio Propagation Laboratory of the National Bureau of Standards, exchanging data and collaborating in the preparation of propagation curves and charts. Recently the CRPL has endeavored to expand its recording program and, because of its inability to increase these activities to the extent desired, expressed its desire to assist in the expansion of the Commission's recording program in order to provide the military services with much-needed technical information at the earliest possible date. In order to supply the required propagation data, plans were worked out for the inauguration of a project of VHF and UHF propagation measurements in which the Commission will obtain information useful in the allocation problems associated with TV, FM, and other radio services utilizing these frequencies, and, at the same time, vital information will be obtained concerning the application of these frequencies to defense problems.

The division continued to analyze data accumulated at various monitoring stations and prepared numerous technical reports on the subject. These included information concerning UHF propagation as applied to broadcasting purposes resulting from measurements made on frequencies between 529 and 535 megacycles, as transmitted by the National Broadcasting Company from station KC2XAK in Bridgeport, Conn. This was the first station in the United States to transmit TV programs regularly on UHF.

A paper on VHF propagation was prepared in cooperation with industry engineers and presented before the joint meetings of the Institute of Radio Engineers and International Radio Scientific Union, held in Washington in April 1951.

Other studies.—In preparation for the television allocation hearing, numerous studies were made of the effect upon TV broadcast service areas of the different parameters, such as transmitting antenna height, acceptance ratio (ratio of desired to undesired signals required to give satisfactory service), multiple interference, etc. These studies were made for both the VHF and UHF ranges of frequencies under propagation conditions typical of different parts of the country.

Extensive studies were made of available data to evaluate the variation of field intensity for the UHF band. These studies included both long-distance tropospheric propagation and line-of-sight propagation over irregular terrain. These studies enabled intelligent estimates to be made of the service available in the UHF band.

152–162-Megacycle study.—During the year the Common Carrier Bureau was confronted with applications for facilities in the Public Land Mobile Service in excess of those which could be accommodated by the available frequency pairs. For example, a large number of applications came from the New York area. This involved an allocation problem which ranged from New Brunswick, N. J., to Hempstead on Long Island and north to West Chester, Conn. Since the applicable rules did not contain definitive engineering standards for the allocation of frequencies, it was necessary to investigate the propagation characteristics of the 152–162-megacycle band and the performance of the equipment used by this service in order to arrive at engineering standards dealing with service and cochannel interference. Much use was made of the material developed by the TV Ad Hoc Committee, which was interpolated to give the expected transmission conditions in this frequency range. A technical report was prepared summarizing all of the pertinent factors and making recommendations. Technical assistance was rendered to the engineers of the Common Carrier Bureau in the preparation of the technical exhibits for the application hearings. Assistance was rendered in hearings on similar problems in Chicago, Los Angeles, and Dallas.

Color television.—Since the Technical Research Division had been actively involved in the color television hearings, considerable time and effort were also expended in analyzing the voluminous hearing record and exhibits. The salient technical points involved were brought out in the Commission's color television report.

TECHNICAL STUDIES AND STANDARDS

General.—Each year produces its crop of new radio developments and with each comes a fresh series of technical problems. When a new service or a new phase of an old service is inaugurated there is immediate need for new rules including definitions of terms, technical requirements, and operational limitations. With the rapid expansion which is taking place in the many existing radio services and, due to the development of new services, the need for technical studies grows steadily. By the same token the Commission's problems of interference prevention are continually becoming more extensive and more acute. This is not hard to understand when it is realized that approximately 18 million new broadcast receivers were manufactured in this country during the past year.

Restricted radiation devices.—The study of restricted radiation devices undertaken during the previous year was carried forward during fiscal 1951. The most acute problem was that of interference from power line carrier current systems to navigational aids. The Government-industry committees continued work on this problem. Field-intensity measurements, including measurements on the ground

and in the air, were completed. Reports submitted by the different task forces were distributed to the interested parties. A summary of the carrier current measurements in the form of a mass plot was prepared by the division. This chart represented the first attempt to show graphically, and in a general way, how the radiation from carrier current systems varies with distance from the generating source or distribution lines.

Incidental radiation devices.—Incidental radiations from devices such as receivers, electric razors, heating pads, fluorescent lights, automobile ignition systems, etc., cause untold interference to radio reception. A considerable amount of time was spent in the study of such radiation with a view to determining the most troublesome sources and to finding effective remedies.

Receiver radiation.—Probably the most prolific offenders in the incidental radiation field are FM and TV receivers. Radiation from these receivers causes interference not only to FM and TV reception but to certain safety devices such as aviation navigational aids. Representatives of the division met with the industry committees dealing with this problem. As a result, two outstanding jobs were completed during the year. First, a standard method of making "open field" measurements of receiver radiation was evolved; second, definite limits of radiation for FM and TV receivers were agreed upon and recommended by the Radio-Television Manufacturers Association to its member companies. The Commission will continue to encourage better circuit design and more effective suppression methods among all receiver manufacturers. The problem of measuring receiver radiation and means of reducing the degree of radiation in the UHF bands is now under study.

Spurious and harmonic radiation.—Work in this field was carried on during the year as a continuing problem. Numerous interstaff meetings were held. A considerable amount of work is still to be performed before this troublesome problem can be presented to the Commission for action.

Radiolocation.—This problem, carried over from previous years, commanded division attention at various times during 1951. A promising proposal for the solution of the frequency problem involved the sharing of the 1750–1800-kilocycle band with the Disaster Communications Service. A general plan was drafted for presentation to the Commission.

Coordination of technical rules.—The desirability of maintaining uniformity of the technical phases of the rules throughout all parts and all services has long been sought, but the processes for this accomplishment have not been easy to inaugurate. However, the work under this project will be accelerated during the coming year.

GOVERNMENT-INDUSTRY COMMITTEES

The Commission is represented by its Technical Research Division on a number of important standing committees of Government and industry. Among these are executive groups of the Central Radio Propagation Laboratory, the URSI (International Radio Scientific Union), and CCIR (International Radio Consultative Committee), committees of the Institute of Radio Engineers and the Radio-Television Manufacturers Association, and panels of the Committee on Electronics of the Research and Development Board. The chief of the division continued to serve as chairman of the central committee which coordinated technical work related to restricted radiation devices and also served as chairman of the Ad Hoc Committee on television. He also attended the CCIR meetings in Geneva.

TECHNICAL CONSULTING SERVICE

Besides furnishing technical advice to the Commission, the division is called upon to answer technical questions of other Government agencies, industry, and private engineers. Unabated demands of this nature added to the backlogs of routine work.

MEDIUM FREQUENCY PROJECTS

Sunspot cycle recordings.—Solar activity has a profound effect upon radio-wave propagation. During daytime hours, standard broadcast stations are heard only over relatively short distances. At night, sky-wave signals may be heard from distant States as well as from Mexico and Canada. The sunspot cycle covers a period of about 11 years. The Commission's sunspot cycle project was inaugurated in 1938 and is still active. Continuous recordings of broadcast signals are being made at Baltimore, Md.; Grand Island, Nebr.; Portland, Oreg.; Powder Springs, Ga.; Fort Lauderdale, Fla.; Kingsville, Tex., and from time to time at other points. These data are needed to supplement that taken in previous years. In the cases of several stations under study, additional recordings are required to cover the full cycle. This information is being coordinated with similar recordings in Canada. An extensive analysis of the accumulated data is underway to determine the nature and magnitude of the medium frequency sky-wave propagation effects corresponding to variations in solar activity during the last sunspot cycle.

Atmospheric noise.—Continuous field intensity recordings of atmospheric noise between 200 and 1600 kilocycles were continued. This information is analyzed and correlated with thunderstorm data and the results are used in the preparation of a series of noise maps to show characteristic variations with the time of day and a percentage of time for each frequency band and for various latitudes. These maps are used in estimating the signal level required to provide an accept-

able radio service in the presence of atmospheric noise; hence, the possible service ranges when interference from other stations is absent. Because of the pressure of other duties, analyses of atmospheric noise charts and the preparation of noise maps could not be undertaken during fiscal year 1951.

North American Regional Broadcasting Conference.—Considerable time was devoted to preparation of technical standards for and attendance at the NARBA conference in Washington. A staff member of the division served as secretary of committee No. 1. This committee handled all matters related to technical standards in connection with the preparatory session.

3. LABORATORY DIVISION

GENERAL FUNCTIONS

The Commission maintains a Laboratory Division near Laurel, Md. This division makes technical measurements and engineering investigations to aid the Commission in allocating frequency bands, establishing and revising engineering standards and regulations for new as well as existing services, and drafting regulations covering noncommunications type of equipment employing radio-frequency energy which may interfere with the radio communication services.

The Laboratory Division's activities include:

1. Investigation of various methods of transmission and reception to determine which method permits the most efficient utilization of the spectrum and to ascertain the interference factors which limit the various methods.

2. Tests of transmitters to determine whether interference signals are emitted on frequencies other than the assigned channel.

3. Tests of receivers to determine how close together the Commission might place stations without the listeners receiving several stations at the same time.

4. Tests of receivers to determine what interference they may produce in other nearby receivers either in the same service or in other services.

5. Tests for reliability of operation of equipment such as apparatus involving safety at sea. This type of equipment is required by the Commission's rules and regulations or by treaty.

6. Tests of the accuracy and reliability of monitoring equipment required to be used by stations.

7. Investigation of interference produced by noncommunication uses of radio-frequency energy.

8. Development of special monitoring equipment for use of Commission engineers in the field, and maintenance of the accuracy of measuring installations and equipments.

The work of the laboratory generally is directed toward the testing of a type of equipment rather than the testing of individual units. Attempt is made to anticipate interference problems and to have remedial measures taken prior to the manufacture and distribution of a large number of units instead of waiting until the interference occurs in the field and requires numerous individual investigations.

In some instances type tests are required by the rules and regulations, and formal approval is given. In other cases the laboratory makes type tests not specifically required, in order that the Commission may be aware of the existing service and interference problems encountered in practical operation, so that either the allocation structure may be designed to fit the units available or the Commission may take other action leading to improved equipments which will permit more efficient use of the available radio frequencies.

Type testing also is required of certain noncommunications equipment, such as diathermy machines which employ radio frequencies and may cause serious interference unless the frequencies are properly maintained and the harmonic and spurious emissions sufficiently restricted.

Following is a summary of particular laboratory activities engaged in during the year.

BROADCASTING

Most of the Laboratory Division work in the broadcast field concerned tests as to receiver oscillator radiation and the various spurious responses of receivers, with especial emphasis as to impact of these problems on the implementation of the UHF television band. Studies were made of a number of proposed UHF tuners submitted by manufacturers. A number of exhibits were prepared and introduced in the TV allocation hearing. With regard to receiver oscillator radiation, the Laboratory Division participated in a number of conferences with manufacturers' representatives and observed the operation of receiver oscillator measurement ranges. A permanent new field intensity range is being installed at the laboratory to replace a tentative one used during the establishment of proposed measurement methods.

In order to obtain propagation data for the UHF television band, the laboratory provided a field intensity recording installation at the University of Connecticut for a portion of the year, and an additional recording installation continued in operation at the Laurel laboratory.

Certain observations were made at the laboratory to determine what interference the Luxembourg effect of high-power stations might cause on other channels.

The Laboratory Division participated in the color-TV hearing

leading to the establishment of the present Commission color standards, providing both oral testimony and a number of exhibits covering laboratory measurements. Observations have been made by the laboratory on the regular commercial color television program initiated near the close of the fiscal year. Changes are being made in the laboratory's television signal generator equipment to facilitate operations on both color and monochrome. Permanent facilities are being installed to permit examination of interference between several color television signals on the adopted standards, and to permit the examination of new systems or methods for television transmission.

SERVICES OTHER THAN BROADCASTING

Measurements were made of the selectivity, intermodulation, and other spurious responses of receivers used in other than broadcast services. Tests also were made of the oscillator radiation of nonbroadcast receivers. Examination was made of the performance of deviation limiting devices now required in many transmitters to reduce interference on channels near the one in use. The foregoing tests have indicated that the state of the art has progressed to the point where, with good equipment, consideration can be given to the implementation of closer used channel spacings to provide more communication facilities.

At the present time automatic equipment which responds to distress signals is required only on certain ships which are radiotelegraph-equipped. Through international conferences it now has been agreed to extend this general type of protection to radiotelephone-equipped vessels. A number of units operating on the United States proposed type of signal have been designed and constructed at the laboratory, and some of these have been furnished to foreign administrations for testing. In addition, tests have been conducted by the laboratory on these alarms and on proposed models submitted by the British and French Governments at four places in the United States to determine their reliability under the varying interference conditions. From these tests it appears that much added protection can be obtained at a modest cost.

CALIBRATION OF INSTALLATIONS AND APPARATUS

In its enforcement and investigation activities the Field Engineering and Monitoring Division uses a large amount of testing equipment. During the year calibrations of the recording equipment were checked at five of the field intensity recording installations operated by that division. Three field intensity meters and 21 signal generators were calibrated for the division during the year. Ten standard broadcast station monitors used by the division were adjusted and calibrated.

NONCOMMUNICATIONS EQUIPMENT

Industrial heating, medical diathermy, and other miscellaneous uses of radio-frequency energy for purposes other than communication have expanded to such an extent that the power used by this group exceeds the total transmitter power required for radio communication. Since such noncommunications equipment employs frequencies of the same order as used by the communications industry, severe interference may be expected unless these units are designed and operated properly. Some of these units use power far in excess of the 50-kilowatt maximum permitted AM broadcast stations. Devices in this category are covered by part 18 of the rules and regulations of the Commission.

Medical diathermy apparatus which falls within this classification is type-approved by the laboratory to insure that the frequency is maintained within one of the specified bands and that the harmonic and spurious radiations are within the limits of the Commission's rules and regulations. During the year 21 submissions of diathermy machines were received for test.

In addition, the Laboratory Division made tests on welding and other devices employing radio-frequency energy and capable of causing interference.

The Laboratory Division has been represented on the following committees which are working toward reduction of interference from industrial radio-frequency heating equipment, power lines, etc.: I. R. E. Industrial Electronics Committee, A. I. E. E. Subcommittee on Induction and Dielectric Heating, A. I. E. E. Subcommittee on Radiation Measurements above 300 Megacycles, and A. S. A. Technical Subcommittee No. 1 of Committee C63.

CHAPTER IX—FREQUENCY ALLOCATION AND TREATY ACTIVITIES

1. GENERAL

In the last 30 years, radio has grown to gigantic proportions and is a virile and dynamic industry. In many ways the growth of radio communication has been like the growth of transportation and has created many similar problems. Like the highways of commerce, radio channels can only handle a certain amount of traffic before new ones need to be added, the old ones made larger or the speed of traffic increased. Broadly speaking, frequency allocation may be defined as the study of the spectrum so that radio channels may be reserved, widened, and modified to keep pace with the developments in the art and to provide the maximum of usefulness to all of the users consistent with the public need.

Not all radio frequencies act alike and, although they encompass the spectrum from 10,000 cycles per second to about 30 billion cycles per second, the frequencies in the various portions of the spectrum exhibit different qualities. For example, 1000 kilocycles (1,000,000 cycles or 1 megacycle) is excellent for broadcasting aural programs but would be practically useless for television broadcasting. Similarly, 415 kilocycles is excellent for ship navigation by direction finding but would be useless for ship navigation by means of radar.

Because of the differing characteristics of the various orders of frequencies, certain bands of frequencies throughout the spectrum have been reserved (allocated) to specific kinds of uses (services). These bands have in many instances been further subdivided so as to reserve portions of them even more specifically. For example, frequencies in the range of 30 to 40 megacycles have been allocated in the United States to the mobile service (use between stations on vehicles

or between stations on vehicles and stationary stations). This band has been further subdivided, however, so as to reserve certain portions for specific categories of mobile use such as police mobile, industrial mobile, etc.

Inasmuch as the energy transmitted by a radio station cannot necessarily be confined to the borders of the transmitting country, the use of the spectrum must be coordinated by all of the countries of the world so as to prevent interference. The growth of the art has thus led to the adoption of international treaties governing the allocation and conditions of use of radio frequencies throughout the spectrum.

Although frequency allocation (reservation) is not the same as frequency assignment (authority to use) one cannot be accomplished without reference to the other. Because of this, an integral part of frequency allocation work is the maintenance of frequency assignment records of the United States and of the world.

2. INTERNATIONAL FREQUENCY ALLOCATION

The project in which the United States has been engaged since 1947, relating to the preparatory work for bringing into force the International Table of Frequency Allocations, continued during the past year. The various related conferences and meetings in which the Commission participated during the year are listed in section 5 of this chapter.

The work on the 2000–3500-kilocycle United States frequency list for region 2 was continued. This included a survey which involved the interception, recording, classification, tabulation, and preparation of a graphical display of more than 35,000 monitoring intercepts made in that band. A proposed list was released in August 1950 in the form of a complete frequency list (list A) of all the United States Government and non-Government stations proposed for this band as well as an abbreviated list of proposed non-Government entries. As the result of the consideration of public comments received and other factors, a revised list A was compiled in final form and was recommended to the Department of State for coordination with other region 2 countries. A public notice containing a discussion of the comments received and resulting changes, and a revised non-Government frequency list were issued at the same time. Lists of 2000–3500-kilocycle requirements have been received from most other American countries and, in all instances, coordination is continuing without difficulty.

While the lists of most countries did not reveal serious conflicts with the United States list, the Canadian list resulted in many conflicts. A week-long conference was held beginning March 9, 1951, for the purpose of resolving these differences. At the end of this confer-

ence, some 80 problems remained to be solved. Therefore, another conference was held beginning May 28, 1951, and ending June 8, 1951. This meeting resulted in resolving the interference conflicts between proposed United States and Canadian frequency assignments, and work is continuing in an effort to complete all region 2 coordination before the Extraordinary Administrative Radio Conference is convened in Geneva during August 1951.

With respect to the region 2 frequency lists below 2000 kilocycles, the few conflicts which appeared have been resolved. At the present time, bilateral agreements are being negotiated with the other American countries, and it is expected that the Atlantic City allocations below 2000 kilocycles can be implemented at an early date. Representatives of the Commission were present and assisted the Department of State at a 1-week meeting in Canada during July 1950, when solutions to certain conflicts in the 415–535-kilocycle band were found.

3. NATIONAL FREQUENCY ALLOCATION

During the year, 14 amendments to part 2 were adopted by the Commission. A complete new printing of part 2 was made by the Government Printing Office, including all revisions prior to December 20, 1950. A list of the 1950 amendments follows:

2–11 Appendix A, list of treaties amended.

2–12 A new footnote, US25, was added to the bands 172–174 megacycles and 406–420 megacycles wherein Government frequencies were made available to non-Government stations for hydrological and meteorological telemetering purposes. Footnote US7 was deleted since the frequency 140.58 megacycles was no longer required for civil aviation.

2–13 Appendix A, list of treaties amended.

2–14 The temporary allocation of 1750–1800 kilocycles to the radiolocation service was extended another 6 months to January 17, 1951.

2–15 Footnote NG13 was deleted from the band 890–940 megacycles because of the use of a specific frequency assignment plan in the band for broadcast STLs.

2–16 Appendix A, list of treaties amended.

2–17 The name "Interim Television relay station" was changed to "Television intercity relay".

2–18 Footnote US3, permitting temporary use of 72.2 megacycles for radiosonde, was deleted.

2–19 Added section 2.104 (c) which permits use of Government frequencies by non-Government stations where intercommunication is desirable.

2–20 Section 2.302 was amended to add WWVH as a call sign for standard frequency transmissions.

2–21 A new class of station, "Aeronautical Advisory", was added and defined and the frequency 122.8 megacycles was allocated for this use.

2–22 Station Symbols for Television Intercity Relay, Television Pickup and Television Relay, which were omitted from 2–17 were added.

Amendments to the December 20, 1950, revision which were adopted are:

2–1 Feotnote US19 to the band 162–174 megacycles was amended to permit use of a pair of the forestry frequencies by non-Federal conservation agencies.

2–2 Appendix A, list of treaties amended.

The problem of regulation of various radiating low power radio frequency devices has been the subject of further study with a great deal of effort concentrated on the nonbroadcast carrier current communication systems. Arc welders using radio frequency starting and arc stabilizing devices have been investigated as a result of a request for relief from the ISM rules (part 18) and a request for an allocation at medium and at low frequencies. Many of these devices radiate at levels considerably in excess of the rules limits.

Preparation of the Disaster Communications Service rules occasioned considerable study on the subjects of the listing of discrete frequencies in the rules and the determination of practical frequency separations. Final rules for this service were adopted during the year.

An amendment of parts 2 and 11 to provide rules for the Radiolocation Service was announced as proposed rule making on April 4, 1951. This proposal would make the band 1750–1800 kilocycles permanently available for radiolocation on a shared basis with the Disaster Communications Service where now available for radiolocation on a temporary basis. The remainder of the frequency bands listed are already allocated on a permanent basis in part 2 for the service. The proposed rule-making was the subject of a 2-day hearing, starting June 4, 1951. Decision was pending at the close of the fiscal year.

On June 8, 1951, the Mutual Telephone Co. of Hawaii submitted a petition requesting that the allocation of the bands 72–88 megacycles and 98–108 megacycles be changed from TV and FM broadcasting to the Common Carrier Domestic Public Fixed Service in the Territory of Hawaii. The company estimated that this much VHF space will be required to take care of demands for service for the next 10 years. This allocation problem is receiving current attention by the Commission.

The Commission received a petition from Federal Telecommunications Laboratories, Inc., to reallocate the band 2110–2200 megacycles to the Common Carrier Fixed Service. After a thorough study of the situation the Commission announced a decision on October 31, 1950, that it would only consider this problem in conjunction with other problems existing above 1000 megacycles such as the theater television request and the possible need for additional television pickup frequencies.

Two motion-picture companies continued their experiments in the microwave relaying of events of interest to theater audiences. A number of petitions were received from various interested parties in the motion-picture industry requesting the Commission to recognize this as a new radio service and to allocate frequencies for theater television purposes. A fact-finding hearing on the issues raised by these petitions was scheduled.

In order that amateur participation in civil defense might be on a sound basis it is necessary to assure that such amateur activity continue during times of national emergency although, in past wars, all amateur activity was shut down. By negotiating with the military agencies and the FCDA, arrangements were made whereby certain portions of some of the amateur bands will be available for use by amateurs properly identified with organized civil defense plans for civil defense purposes only. A public notice to this effect was released January 17, 1951.

On June 1, 1951, an informal conference with representatives of the power radio service industry and Commission staff members was held. The conference concerned an industry petition for the use of 72–76 megacycles for the purpose of tying in certain electric-power companies so as to provide for coordinated circuit switching and the transmission of instructions during times of emergency. A decision on the matter has not yet been made by the Commission.

4. FREQUENCY REGISTRATION AND NOTIFICATION

The past year required a continuation of extensive changes in the Commission's frequency records. Changes were made in the master frequency card records (consisting of an estimated 62,000 cards) to conform to the Atlantic City Radio Regulations. This was accomplished as modified licenses were issued and the International Telecommunication Union (ITU) notified accordingly.

The master frequency record comprises a card record of each new authorization issued by the Commission with the exception of aircraft, amateur, citizens, and ship stations; also information regarding the modification, renewal, and deletion is incorporated into the original card record. From these records and from lists furnished by the several Government agencies, notifications of frequencies assigned to stations in the various services are made to the ITU to safeguard the priority of frequency use by the United States.

Notifications to the ITU are prepared, on a weekly basis, to keep the lists published by the latter current insofar as the United States is concerned.

In addition to the master frequency card records, a supplemental record is maintained of all Commission authorizations, with excep-

973537—52——13

tions as noted above, on IBM cards. From these cards current lists are made available to the various units of the Commission and certain Government agencies. The reproduction of the master frequency record by mechanical means, whereby the lists may be reproduced in a number of different ways such as by frequency, by location, by service, etc., relieves the Commission and other Government agencies of considerable research concerning the assignment of frequencies to radio stations, location of towers, etc.

The task of converting all of the present master frequency record cards to the format and column-numbering system prescribed by the Atlantic City Radio Regulations remains to be accomplished.

5. INTERNATIONAL TREATY ACTIVITIES

Coordination with Canada.—The rapid increase in radio station occupancy of the VHF non-Government fixed and mobile bands has continued. Consequently, the activity relating to coordination between the Commission and the Canadian Department of Transport of proposed VHF frequency assignments has been an important one. The informal procedure for such coordination was announced May 3, 1950, by both Governments, and during the first year approximately 450 proposed assignments were exchanged for comment. Up to the present time this procedure appears to have been quite effective, in that no new cases of harmful interference caused by groundwave signals in this region of the spectrum have developed. Prior to the adoption of the procedure, several cases of harmful intereference existed between the two countries and they have not all been satisfactorily settled up to the present time.

International interference cases.—During the year, the Commission received complaints concerning approximately 350 new international radio interference cases. These, plus some 75 cases which already existed at the start of the year, were handled by the Frequency Allocation and Treaty Division, in some cases with the assistance of the Department of State. Because of the long-term nature of negotiations connected with some of these interference cases, about 80 such cases remained unresolved at the end of the year. A revised procedure was adopted for keeping records related to interference cases which resulted in considerably shortening the time required for this activity.

Reports of treaty infractions.—Infractions by foreign stations of the International Telecommunication Convention and Radio Regulations and of the radio provisions of the International Convention for the Safety of Life at Sea detected by the Commission's monitoring stations and inspection offices continued to be forwarded to the appropriate foreign administrations in accordance with those regulations. Prior to being sent abroad, these reports were processed to

insure that citations were based upon the appropriate treaty provisions.

Special studies.—Special studies were conducted concerning United States proposals for revision of the general technical provisions of the Radio Regulations (Atlantic City, 1947) in the light of recent experience. One of the most important of these studies relates to provisions of the regulations concerning the procedure for the international notification and registration of radio-frequency assignments for the purpose of obtaining international recognition of the use of frequencies.

Studies were conducted in connection with participation in Department of State preparatory committees for the Extraordinary Administrative Radio Conference scheduled to be held in Geneva in August 1951. One of the principal studies in this connection relates to the international problems of VHF assignments, resulting from the increasing occupancy of the VHF spectrum and of the consequently increasing seriousness of interference cases arising from the long distance propagation conditions which frequently occur.

Foreign requests for technical information.—During the last 2 months of the fiscal year some 10 instances of requests for technical information were forwarded to the Department of State for disposition.

International conferences.—During the fiscal year the Commission assisted in the United States preparation for and participated in 20 International conferences and other meetings. These conferences were world-wide, regional or bilateral in nature and most of the major ones were convened under the auspices of either the International Telecommunication Union or the International Civil Aviation Organization.

The international organization now known as the International Telecommunication Union first came into begin following the signing of a telegraph treaty in Paris in 1865. In 1906 the International Telegraph Convention at Berlin entrusted the Bureau of the Union with duties relating to radiotelegraphy and, at an International Conference in Madrid in 1932, the ITU was created. At a later conference in Atlantic City in 1947, the ITU became one of the specialized agencies of the United Nations. The seat of the union is at Geneva. More than 80 nations of the world participate in the union's activities.

The International Civil Aviation Organization was established under the Convention on International Civil Aviation at Chicago in 1944. The ICAO, which has its seat at Montreal, came into being April 4, 1947, after 2 years of activity by an interim organization, the Provisional International Civil Aviation Organization. The ICAO was established to develop the principles and techniques of international air navigation and to foster the planning and develop-

ment of international civil aviation so as to insure its safe and orderly growth by promoting uniformity in regulations, standards, and procedures throughout the world. Fifty-seven countries participate in the ICAO's activities.

The need and general desirability of convening regional conferences, concluding regional agreements and forming regional organizations, is recognized by the Atlantic City Convention of 1947 for the purpose of settling telecommunication questions which are purely regional in character and therefore more susceptible of being treated on a regional rather than on a world-wide basis, provided agreements so reached are not in conflict with the world convention. The American countries have observed this principle over a period of years, as is reflected by inter-American agreements reached at Havana in 1937, Santiago in 1940, Rio de Janeiro in 1945, and Washington in 1949. Meetings which may be termed subregional have been held to solve problems peculiar to Central, South, or North America. Typical of these are the North American Regional Broadcasting Conferences, convened in Havana in 1937, Washington in 1941, and Montreal in 1949, out of which have come the North American Regional Broadcasting Agreements (NARBA) discussed in the chapter on broadcasting.

In the fiscal year 1951, the Commission furnished two chairmen, six delegates or representatives, 14 advisers, and a small number of staff assistants for United States delegations to the following conferences:

1. May 1–Aug. 19, 1950	Florence and Rapallo.	Second International High Frequency Broadcasting Conference.
2. Sept. 6–Nov. 11, 1950	Washington	Third North American Regional Broadcasting Conference, second session.
3. Oct. 17–Nov. 7, 1950	Istanbul	ICAO Second Middle East Regional Air Navigation Meeting.
4. 1950 to 1951	Ottawa	Discussions between the United States and Canada on treaty covering ship radio requirements for the Great Lakes.
5. Mar. 5–22, 1951	Geneva	Meeting of study groups of International Telegraph Consultative Committee, ITU.
6. Apr. 5–June 2, 1951	Montreal	ICAO Communications Division, fourth session.
7. June 5–July 6, 1951	Geneva	International Radio Consultative Committee, ITU, sixth assembly.

In addition to the foregoing multilateral conferences, there were numerous bilateral meetings with Mexico, Cuba, and Canada concerning such problems as broadcasting, aeronautical communications and

interference, as well as the coordination of frequency lists for presentation to the forthcoming Extraordinary Administrative Radio Conference at Geneva.

At the end of the fiscal year there are projected the following conferences and meetings for which the Commission's staff is currently engaged in preparatory work:

1. Aug. 16, 1951	Geneva	Extraordinary Administrative Radio Conference, ITU.
2. Sept. 4, 1951	Montreal	ICAO Search and Rescue Division, third session.
3. Oct. 30, 1951	Site undetermined	ICAO South American-South Atlantic Regional Air Navigation meeting.
4. October 1951	Rome	International Telephone Consultative Committee, sixteenth assembly.
5. Jan. 22, 1952	Lisbon	ICAO Third European Mediterranean Regional Air Navigation meeting.
6. Feb. 19, 1952	Montreal	ICAO Personnel and Licensing Division meeting.
7. First half 1952	Site undetermined	ICAO Combined North Pacific-South Pacific Regional Air Navigation meeting.
8. First half 1952	Site undetermined	ICAO Third North Atlantic Regional Air Navigation meeting.
9. Last half 1952	Site undetermined	ICAO Second Southeast Asia Regional Air Navigation meeting.
10. Last half 1952	Site undetermined	ICAO special meeting.
11. October 1952	Buenos Aires	Plenipotentiary Conference, Administrative Telegraph and Telephone Conference, ITU.
12. 1952	Montevideo	Fifth Inter-American Radio Conference.
13. First half 1953	Site undetermined	ICAO Second African-Indian Ocean Regional Air Navigation meeting.
14. First half 1953	Site undetermined	ICAO special meeting.
15. Last half 1953	Site undetermined	ICAO Fourth European-Mediterranean Regional Air Navigation meeting.
16. Last half 1953	Site undetermined	ICAO Third Caribbean Regional Air Navigation meeting.
17. Last half 1953	Site undetermined	ICAO Communication Division, fifth session.
18. Last half 1953	Site undetermined	ICAO, 2 special meetings.
19. 1953	Holland	International Telegraph Consultative Committee, ITU.
20. 1954	Buenos Aires	International Telephone and Telegraph Conference, ITU.

6. INTERDEPARTMENT RADIO ADVISORY COMMITTEE

The Commission does not license United States Government radio stations or assign their frequencies. Such frequency assignments are made by the President upon recommendation of the Interdepartment

Radio Advisory Committee (IRAC), composed of 11 Federal agencies. The Commission provides the secretariat of the IRAC.

During the fiscal year the IRAC approved 6,264 new and deleted 1,967 regular assignments. In addition, it approved 3,095 changes in assignments, 2,283 temporary assignments and 500 deletions of temporary assignments.

APPENDIX

1. FIELD OFFICES

The Commission maintains 64 field installations geographically distributed throughout the United States and its possessions. Fifty-nine of these are engaged in engineering work, comprising 9 regional offices, 23 district offices, 6 suboffices, 3 ship offices, and 18 monitoring stations. There are also four Common Carrier Bureau field offices, and one Office of General Counsel field office. The complete list follows:

FIELD ENGINEERING AND MONITORING DIVISION

Regional offices	*Headquarters*
North Atlantic	506 Federal Bldg., New York 14, N. Y.
South Atlantic	411 Federal Annex, Atlanta 3, Ga.
Gulf States	332 U. S. Appraisers Bldg., Houston 11, Tex.
South Pacific	323–A Customhouse, San Francisco 26, Calif.
North Pacific	801 Federal Office Bldg., Seattle 4, Wash.
Central States	1300 U. S. Courthouse Bldg., Chicago 4, Ill.
Great Lakes	1029 New Federal Bldg., Detroit 26, Mich.
Hawaiian	P. O. Box 1142, Lanikai, Oahu, T. H.
Alaskan	52 Post Office and Courthouse, Anchorage, Alaska.

District offices	*Address*
1	1600 Customhouse, Boston 9, Mass.
2	748 Federal Bldg., New York 14, N. Y.
3	1005 U. S. Customhouse, Philadelphia 6, Pa.
4	508 Old Town Bank Bldg., Baltimore 2, Md.
5	402 New Post Office Bldg., Norfolk 10, Va.; (ship office) 106 Post Office Bldg., Newport News, Va.
6	411 Federal Annex, Atlanta 3, Ga.; (suboffice) 214 Post Office Bldg., Savannah, Ga.
7	312 Federal Bldg., Miami 1, Fla.; (suboffice) 409–410 Post Office Bldg., Tampa 2, Fla.
8	400 Audubon Bldg., New Orleans 16, La.; (suboffice) 419 U. S. Courthouse and Customhouse, Mobile 10, Ala.
9	324 U. S. Appraisers Bldg., Houston 11, Tex.; (suboffice) 329 Post Office Bldg., Beaumont, Tex.; (ship office) 406 Post Office Bldg., Galveston, Tex.

District offices	*Address*
10	500 U. S. Terminal Annex Bldg., Dallas 2, Tex.
11	539 U. S. Post Office and Courthouse Bldg., Los Angeles 12, Calif.; (suboffice) 15 U. S. Customhouse, San Diego 1, Calif.; (ship office) 326 U. S. Post Office and Courthouse, San Pedro, Calif.
12	323–A Customhouse, San Francisco 26, Calif.
13	307 Fitzpatrick Bldg., Portland 5, Oreg.
14	801 Federal Office Bldg., Seattle 4, Wash.
15	521 Customhouse, Denver 2, Colo.
16	208 Uptown Post Office and Federal Courts Bldg., St. Paul 2, Minn.
17	3200 Fidelity Bldg., Kansas City 6E, Mo.
18	1300 U. S. Courthouse, Chicago 4, Ill.
19	1029 New Federal Bldg., Detroit 26, Mich.
20	328 Federal Bldg., Buffalo 3, N. Y.
21	609 Stangenwald Bldg., Honolulu 1, T. H.
22	322–323 Federal Bldg., San Juan 13, P. R.
23	7–8 Shattuck Bldg., Juneau, Alaska; (suboffice) 53 U. S. Post Office and Courthouse Bldg., Anchorage, Alaska.

Primary monitoring stations	*Secondary monitoring stations*
Allegan, Mich.	Searsport, Maine.
Grand Island, Nebr.	Spokane, Wash.
Kingsville, Tex.	Twin Falls, Idaho.
Millis, Mass.	Fort Lauderdale, Fla.
Santa Ana, Calif.	Lexington, Ky.
Laurel, Md.	Muskogee, Okla.
Livermore, Calif.	Bay St. Louis, Miss.
Portland, Oreg.	
Powder Springs, Ga.	
Lanikai, Oahu, T. H.	
Anchorage, Alaska.	

COMMON CARRIER BUREAU FIELD OFFICES

Atlanta, Ga., 733 Hurt Building.
New York, N. Y., 604, 90 Church Street.
St. Louis, Mo., 334, 815 Olive Street.
San Francisco, Calif., 180 New Montgomery Street.

OFFICE OF GENERAL COUNSEL FIELD OFFICE

Los Angeles, Calif., 1031 South Broadway.

2. PUBLICATIONS

In general, the Federal Communications Commission's printed publications are sold by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., and are not distributed by the Commission.

Following is a list of such publications which are available from that source, at the prices noted, unless otherwise indicated:

Title	*Price*
Communications Act of 1934, with amendments and index, revised to Sept. 1, 1948	$0.30
Federal Communications Commission reports (bound volumes of decisions and orders exclusive of annual reports):	
Volume 3, July 1936 to February 1937	2.00
Volume 4, March 1937 to Nov. 15, 1937	1.50
Volume 5, Nov. 16, 1937 to June 30, 1938	1.50
Volume 6, July 1, 1938 to Feb. 28, 1939	1.50
Volume 7, Mar. 1, 1939 to Feb. 29, 1940	1.50
Volume 8, Mar. 1, 1940 to Aug. 1, 1941	1.50
Volume 10, Apr. 2, 1943 to June 30, 1945	2.00
Volume 11, July 1, 1945 to June 30, 1947	3.75
Volume 12, July 1, 1947 to June 30, 1948	3.50
Annual reports of the Commission:	
First Annual Report—fiscal year 1935	.15
Twelfth Annual Report—fiscal year 1946	.20
Thirteenth Annual Report—fiscal year 1947	.25
Fourteenth Annual Report—fiscal year 1948	.30
Fifteenth Annual Report—fiscal year 1949	.35
Sixteenth Annual Report—fiscal year 1950	.40
Seventeenth Annual Report—fiscal year 1951	(1)
Statistics of the Communications Industry:	
For the year 1939	.25
For the year 1940	.20
For the year 1942	.35
For the year 1943	.30
For the year 1944	.40
For the year 1945	.50
For the year 1946	.55
For the year 1947:	
Secs. A and B	.75
Sec. B (Broadcast only)	.25
For the year 1948:	
Secs. A and B	1.00
Sec. B (Broadcast only)	.35
For the year 1949:	
Secs. A and B	1.00
Sec. B (Broadcast only)	.25
Report on Public Service Responsibility of Broadcast Licensees [Blue Book], 1946	.25
The Safety and Special Radio Services—a Public Primer, 1950	.15
Telephone and Telegraph—a Public Primer, 1949	.10
An Economic Study of Standard Broadcasting, 1947	.40
Study Guide and Reference Material for Commercial Radio Operator Examinations, revised to Feb. 1, 1951	.35

[1] In the process of printing—available at Government Printing Office at a later date.

Title	*Price*
Standards of Good Engineering Practice:	
Concerning Standard Broadcast Stations, revised to Oct. 30, 1947	$1.25
Sec. 26, Sunrise and Sunset Table	.10
Concerning FM Broadcast Stations, revised to Jan. 18, 1950	.10
Concerning Television Broadcast Stations, revised to Dec. 19, 1945	.15
Rules and Regulations:	
Part 0, Organization. Delegation of Authority, etc	(*)
Part 1, Practice and Procedure, revised to Dec. 29, 1949	.20
Part 2, Frequency Allocations and Radio Treaty Matters; General Rules and Regulations, revised to Dec. 20, 1950	.20
Part 3, Radio Broadcast Services, revised to Dec. 13, 1950	.20
Part 4, Experimental and Auxiliary Broadcast Services, revised to Oct. 30, 1950	.15
Part 5, Experimental Radio Services, revised to Jan. 16, 1948	.10
Part 6, Public Radiocommunication Services, revised to Apr. 27, 1949	.10
Part 7, Stations on Land in the Maritime Services, effective July 23, 1951	.20
Part 8, Stations on Shipboard in the Maritime Services, effective July 23, 1951	.25
Part 9, Aeronautical Services, revised to July 1, 1947	.15
Part 10, Public Safety Radio Services, revised to Apr. 27, 1949	.15
Part 11, Industrial Radio Services, revised to Apr. 27, 1949	.10
Part 12, Amateur Radio Service, revised to June 6, 1951	.10
Part 13, Commercial Radio Operators, revised to June 27, 1950	.05
Part 14, Radio Stations in Alaska (other than Amateur and Broadcast), revised to Apr. 28, 1948	(*)
Part 15, Restricted Radiation Devices, recodified July 21, 1948	(*)
Part 16, Land Transportation Radio Services, revised to Apr. 27, 1949	.10
Part 17, Construction, Marking and Lighting of Antenna Structures, effective Feb. 15, 1951	.05
Part 18, Industrial, Scientific and Medical Service, revised to Jan. 25, 1950	.05
Part 19, Citizens Radio Service, effective June 1, 1949	.10
Part 20, Disaster Communications Service, effective Mar. 21, 1951	.05
Part 31, Uniform System of Accounts for Class A and Class B Telephone Companies, revised to May 12, 1948	.35
Part 33, Uniform System of Accounts for Class C Telephone Companies, revised to May 12, 1948	.25
Part 34, Uniform System of Accounts for Radiotelegraph Carriers, revised to Oct. 14, 1949	.20
Part 35, Uniform System of Accounts for Wire-telegraph and Ocean-cable Carriers, revised to Oct. 14, 1949	.25
Part 41, Telegraph and Telephone Franks, revised to Dec. 4, 1947	.05
Part 43, Reports of Communication Common Carriers and Their Affiliates, revised to July 21, 1948	.10
Part 45, Preservation of Records of Telephone Carriers, effective October 1, 1950	.10
Part 46, Preservation of Records of Wire-telegraph, Ocean-cable, and Radiotelegraph Carriers, effective October 1, 1950	.10
Part 51, Occupational Classification & Compensation of Employees of Class A and Class B Telephone Companies, effective Oct. 10, 1951	.05

* Obtainable temporarily from the Federal Communications Commission, Washington 25, D. C., without charge.

Title	Price
Rules and Regulations—Continued	
Part 52, Classification of Wire-telegraph Employees, effective July 11, 1944	$0.05
Part 61, Tariffs, Rules Governing the Construction, Filing, and Posting of Schedules of Charges for Interstate and Foreign Communications Service, revised to August 1, 1946	.10
Part 62, Applications under sec. 212 of the Act to Hold Interlocking Directorates, revised to May 23, 1944	.05
Part 63, Extension of Lines and Discontinuance of Service by Carriers, revised to December 30, 1946	(2)
Part 64, Miscellaneous Rules Relating to Common Carriers, revised to July 16, 1948	.10

[2] Obtainable temporarily from the Federal Communications Commission, Washington 25, D. C., without charge.

Purchasers of the Commission's Rules and Regulations are furnished a form by the Superintendent of Documents which, when filled out and forwarded to the Commission, entitles the purchaser to receive any future amendments to the part or parts purchased until a complete revision thereof is reprinted. In the event any exception is made in this procedure, rule purchasers will be advised by letter where the amendments may be obtained. All Standards of Good Engineering Practice and most of the rule parts are printed on 8- by 10½-inch pages and punched to fit standard three-ring binders.

The Commission is not able to supply lists of radio stations but, on request, will furnish a fact sheet about commercial sources of such lists, also one on commercial radio publications and services.

3. TREATIES AND OTHER INTERNATIONAL AGREEMENTS

International treaties, agreements, and arrangements relating to radio and telecommunications which were in force and to which the United States was a party as of June 30, 1951, are listed below. Unless otherwise indicated, copies of these documents may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. (TS relates to Treaty Series, EAS to Executive Agreement Series, and TIAS to Treaties and Other International Act Series.)

Date	Series	Subject
1910		Ship Act of 1910 as amended in 1912 (radiocommunication on the Great Lakes).
1925	TS 724-A	Arrangement with Great Britain, Canada, and Newfoundland to prevent broadcast interference by ships.
1928-29	TS-767-A	Arrangement with Canada concerning private experimental radio communication.
1929	TS 777-A	Arrangement with Canada, Cuba, and Newfoundland relating to high-frequency assignments.
1929	TS 910	Safety of Life at Sea Convention (London).
1930	TS 921	Amendment to Regulation XIX of Annex 1 of Safety of Life at Sea Convention.
1934	EAS 62	Arrangement with Canada concerning amateur and private experimental communication.
1934	EAS 66	Arrangement with Peru concerning amateur communication.

Date	Series	Subject
1934	EAS 72	Same, with Chile.
1937	EAS 109	Agreement with Canada concerning issuance of radio licenses (largely suspended by TS 777-A, TS 962, EAS 227 and TIAS 1553).
1937	TS 962	North American Regional Broadcasting Agreement (Havana) (supplemented by EAS 227 and TIAS 1553).
1937	TS 938	Inter-American Radio Communications Convention (First Inter-American Conference, Havana) (amended by TIAS 1802).
1938	TS 948	General Radio Regulations (Cairo Revision 1938); annexed to Telecommunications Convention (Madrid, 1932). (See TIAS 1901.)
1938	EAS 142	Agreement with Canada concerning radio communications between Alaska and British Columbia.
1938	TS 949	Regional Radio Convention (Guatemala—in behalf of the Canal Zone).
1938	EAS 136	Arrangement with Canada concerning broadcasting.
1939	EAS 143	Arrangement with Canada concerning civil aeronautical services.
1940	EAS 231	Inter-American Radio Communications Agreement (Second Inter-American Conference, Santiago, Chile).
1940	EAS 196	Agreement with Mexico concerning broadcasting.
1941	EAS 227	Supplementary North American Regional Broadcasting Agreement (Washington). (See TS 962 and TIAS 1553.)
1944	EAS 400	Wartime agreement with Canada re broadcasting stations in Northwestern Canada.
1945	----------	Inter-American Telecommunications Convention (Third Inter-American Conference, Rio de Janeiro). (Not yet ratified by United States.) (Not available from Government Printing Office.)
1946	TIAS 1553	North American Regional Broadcasting Interim Agreement (Modus Vivendi), Washington. (Amended by TIAS 1802.)
1946	TIAS 1527	Agreement with U. S. S. R. concerning commercial radio teletype communication channels.
1947	TIAS 1726	Agreement with Canada concerning FM broadcasting in 88–108 mc.
1947	TIAS 1670	Interim arrangement with Canada concerning mobile transmitters.
1947	TIAS 1901	Telecommunication Convention, Final Protocol, and Radio Regulations, Atlantic City, 1947. (Since the United States is not a party to the Additional Radio Regulations, they are not included in TIAS 1901 and are available only through the International Telecommunication Union, Geneva, Switzerland.)
1947	TIAS 1652	Agreement with Great Britain concerning standardization of distance measuring equipment.
1947	TIAS 1676	Agreement with the United Nations concerning its headquarters' use of radio.
1948	TIAS 1802	Arrangement with Canada on engineering standards applicable to allocation of standard broadcast stations.
1949	----------	Agreement between United States and certain British Commonwealth governments (London). (To be published by Government Printing Office.)
1949	TIAS 2175	Telegraph Regulations (Paris Revision, 1949) annexed to International Telecommunications Convention (Atlantic City, 1947) and Final Protocol to the Telegraph Regulations. Signed at Paris, Aug. 5, 1949; effective July 1, 1950. Instrument of ratification of United States deposited with International Telecommunication Union Sept. 26, 1950. (Not available as of June 30, 1951, but to be published by Government Printing Office. Available through International Telecommunication Union, Geneva, Switzerland.)
1950	----------	Arrangement with Ecuador concerning third-party amateur communication. (To be published by Government Printing Office.)
1951	TIAS 2223	Radio communications between amateur stations on behalf of third parties. Agreement between U. S. A. and Liberia effective Jan. 11, 1951. (Not yet available but to be published by Government Printing Office as a TIAS document.)

In addition, the United States is bound by certain other treaties and agreements which are generally considered as superseded because certain of the contracting countries other than the United States did not become a party to subsequent treaties and agreements. The United States is, in such instances, bound to the original document with respect to its relations with those particular countries. These include the following:

Date	Series	Subject
1912	TS 581	International Radiotelegraph Convention (London).
1927	TS 767	International Radiotelegraph Convention and General Regulations (Washington).
1932	TS 867	International Telecommunication Convention; General Radio Regulations (Madrid).
1937	EAS 200	Inter-American Arrangement concerning Radio Communications and Annex (Havana, 1937), was replaced by Inter-American Agreement concerning Radio Communications (Santiago, 1940, EAS 231).

The following treaties, agreements and arrangements have been signed by the United States and are included for informational purposes because of their importance or the imminence of their effective dates.

Date	Subject
1948	International Convention on Safety of Life at Sea (London), effective Jan. 1, 1951.
1949	Inter-American Radio Agreement between the United States, Canada and other American republics.[1] (Fourth Inter-American Conference) (Washington), effective Apr. 1, 1950. (Not yet available from Government Printing Office; available through ITU, Geneva.)
1950	North American Regional Broadcasting Agreement between the United States of America, Canada, Cuba, Dominican Republic, United Kingdom of Great Britain and Northern Ireland for the Territories in the North American Region (Bahama Islands and Jamaica). Signed at Washington, Nov. 15, 1950. Agreement will enter into force subsequent to ratification of at least 3 of these 4 countries, in accordance with pt. III, par. I, of the Agreement: Canada, Cuba, Mexico, and the United States. Subject to ratification procedure in the United States. (Not available from Government Printing Office. Available through the International Telecommunication Union, Geneva, Switzerland.)

[1] In addition, certain resolutions and recommendations were adopted by a number of member countries of the ITU in region 2 at Washington, July 9, 1949. (Not yet available from Government Printing Office but available through ITU, Geneva.)

There are, in addition to the foregoing, certain treaties, agreements, or arrangements primarily concerned with matters other than the use of radio but which affect the work of the Federal Communications Commission insofar as they involve communications. Among the most important of these are the following:

Date	Series	Subject
1944	TIAS 1591	International Civil Aviation Convention (Chicago).
1946		Special Radio Technical Meeting (COT), Montreal.[1]
1946		ICAO Regional Air Navigation Meetings, Communications Committee, Final Reports.[1]
1947		
1948		
1949		
1950		
1946		ICAO Communication Division, Second Session, Montreal.[1]
1949		ICAO Communications Division, Third Session, Motreal.[1]
1949		Frequency Allotment Plan for the Aeronautical Mobile Service and Final Agreement. Agreement between the United States of America and other Powers. Signed at Geneva Oct. 14, 1949. (Not available from Government Printing Office. Available through International Telecommunication Union, Geneva, Switzerland.)
1951		ICAO Communications Division, Fourth Session, Montreal.[1]

[1] Not available from Government Printing Office; available from Secretary General of ICAO, Dominion Square Bldg., Montreal, Canada.

○

EIGHTEENTH ANNUAL REPORT

FEDERAL COMMUNICATIONS COMMISSION

FISCAL YEAR ENDED JUNE 30, 1952

(With introductory summary and notation of subsequent important developments)

UNITED STATES GOVERNMENT PRINTING OFFICE • WASHINGTON • 1953

COMMISSIONERS

MEMBERS OF THE FEDERAL COMMUNICATIONS COMMISSION

(as of June 30, 1952)

CHAIRMAN

PAUL A. WALKER

(Term expires June 30, 1953)

VICE CHAIRMAN

ROSEL H. HYDE

(Term expires June 30, 1959)

EDWARD M. WEBSTER

(Term expires June 30, 1956)

ROBERT F. JONES*

(Term expires June 30, 1954)

GEORGE E. STERLING

(Term expires June 30, 1957)

FRIEDA B. HENNOCK

(Term expires June 30, 1955)

ROBERT T. BARTLEY

(Term expires June 30, 1958)

*Resigned September 19, 1952; succeeded by Eugene H. Merrill, October 14, 1952.

LETTER OF TRANSMITTAL

FEDERAL COMMUNICATIONS COMMISSION,
Washington 25, D. C.

To the Congress of the United States:

There is herewith submitted the eighteenth annual report of the Federal Communications Commission, covering the fiscal year ending June 30, 1952.

Subsequently, on July 16, 1952, the Congress amended section 4 (k) of the Communications Act to require certain additional data to be furnished in the first and second annual reports thereafter. The Commission has started compilation of this material which, in accordance with the new requirements, will be submitted as part of its nineteenth and twentieth annual reports.

Because of the interest in television and other developments, the introductory summary of the current annual report makes reference to noteworthy events up to the time of going to press.

Respectfully,

PAUL A. WALKER, *Chairman.*

TABLE OF CONTENTS

INTRODUCTORY SUMMARY

1. HIGHLIGHTS OF THE FISCAL YEAR

GENERAL

Historically, the fiscal year 1952 marked more than a century of land-line telegraph operation, over fourscore years of ocean-cable telegraph service, three-quarters of a century of land-line telephone usage, a half century of sea and global radiotelegraph communication, a quarter century of international radiotelephony, three decades of commercial radio broadcasting, and 18 years of unified regulation of electrical communication by the Federal Communications Commission.

When the Commission was established in 1934, most international communication was by cable. Now it is predominately radio—telegraph or telephone. Besides linking us with many foreign nations, radio is today being utilized for about 60 different kinds of services in our own country. As a result, the number of radio authorizations on the books of the Commission this year, for the first time, exceeded the 1,000,000 mark.

Because it enters the home, broadcasting commands so much popular interest the average person does not realize that there are now 45 times more nonbroadcast stations than there are broadcast stations, and that the former are equally important to the public interest and convenience. In other words, more than 200,000 radio authorizations are held by public agencies and by private industry and individuals as compared with less than 5,000 stations engaged in program broadcast. The broadcast total includes about 1,200 pickup and studio-transmitter links. The nonbroadcast figures, on the other hand, do not indicate the actual number of transmitters involved, since a single authorization—as in the case of a police or fire department, railroad, taxicab company, etc.—can cover many portable or mobile transmitters. Thus, the safety and special radio services collectively represent nearly 540,000 transmitters operating on the land, on the sea, and in the air.

Some of these nonbroadcast services—such as those devoted to public safety—protect life and property. Others—like aeronautical, marine, and land transportation—speed and safeguard transportation

of people and goods. Still another service—industrial—expedites production and delivery of essential products. Also, there are common-carrier (for hire) services which affect the rates the public pays for telephone and telegraph facilities.

In addition, more than 800,000 Commission radio-operator authorizations are now outstanding. These include 679,000 commercial authorizations of different classes to operators who depend upon radio for their livelihood or profession, and more than 100,000 authorizations to amateur radio operators who are interested in radio as a hobby or for training.

NATIONAL DEFENSE

The Commission's national-defense activities continued to multiply. They cut across all fields of electrical communication. Besides policing the spectrum with the Government's only monitoring network, the Commission is providing military, civilian defense, and defense industry with communication facilities far beyond peacetime requirements. This program, in general, consists of strengthening and expanding the Nation's communication systems to cope with the existing and any potential emergency, harnessing wire and radio facilities to the defense effort, helping safeguard plants and operations, and preventing subversive radio operation.

Of particular importance are measures to control electromagnetic radiations, both from communication and noncommunication sources, which could be used as "beams" to guide enemy aircraft and flying missiles. "Conelrad" (an abbreviation of the term "control of electromagnetic radiation") is the short name applied to this project. With the cooperation of broadcasters, a plan has been worked out for the Department of Defense for alerting broadcast stations and controlling their operations during an alert in a manner to confuse the enemy and, at the same time, assure continued broadcast service to the public and civilian defense and other emergency communication. Conelrad plans are proceeding for the other services and are expected to be put into effect during the next fiscal year.

On October 24, 1951, the President signed an amendment to the Communications Act which strengthens and clarifies his emergency powers with respect to electromagnetic radiation control. An Executive order of December 10 thereafter empowered the Commission to enforce regulations in this connection.

On June 27, 1952, the Commission finalized rules for a Radio Amateur Civil Emergency Service, to become effective the following August 15, in which amateur stations and operators can render further emergency service by providing communication for civil-defense purposes. March 21, 1952, marked the first year of operation of the Disaster Communications Service, which enables Government and non-Government stations to engage in emergency communication.

Other established radio services include the Special Emergency Radio Service, the State Guard Radio Service, the Civil Air Patrol, and various public safety services concerned with the protection of life and property under normal as well as abnormal conditions.

At different times the Commission has liberalized the commercial radio-operator rules because of the scarcity of certain classes of operators, especially on board ships. It has also made it easier for amateurs serving in the Armed Forces to keep up their licenses.

INTERNATIONAL

The most significant accomplishment in the international radio field was agreement reached at the Extraordinary Administrative Radio Conference of the International Telecommunication Union (ITU), held at Geneva in the latter part of 1951, on methods to bring into world force the allocations of spectrum space to various radio services.

Besides furnishing frequency usage data, the Commission resumed daily notifications to the ITU of new frequency assignments. The Commission's radio-frequency record now consists of 70,000 cards reflecting the historical use of each frequency, and over 90,000 machine punch cards giving particulars about the present Commission authorizations.

The Commission assisted the Department of State in preparing for, and participated in, a total of 20 international conferences, and was doing preparatory work for 27 future conferences.

A total of 670 cases of international radio interference received the Commission's attention during the year, of which number 445 were resolved; and 375 cases of treaty infractions were reported to appropriate foreign administrations.

COMMON CARRIERS

The public's use of communications services furnished by common carriers established new records. For calendar year 1951, the Bell System, which operates about 82 percent of the telephones in this country, reported new highs of a daily average of 139 million local and 6 million toll calls. Bell System's revenues amounted to $3.6 billion, which produced profits of $365 million, representing increases over 1950 of 10 and 5 percent, respectively. Over 45 million telephones are in service in this country with more than 2 million added during the past year.

Fiscal 1952 was also a record year in applications for telephone facilities, with the Commission authorizing $107.5 million in wire-line construction and $41.5 million in microwave radio-relay construction. Rapid growth continued in the mobile field, with the telephone carriers providing service in 180 cities to 21,000 mobile units, up 21 percent over a year ago. Mobile service by miscellaneous nontelephone com-

panies is furnished in 193 cities to 13,000 mobile units, up 45 percent over a year ago.

Outstanding new developments in telephony included the completion of the first transcontinental microwave radio relay system for telephone service as well as for Nation-wide transmission of television programs; television program transmission facilities of telephone carriers expanded to more than 30,000 channel miles; and customer dialing of long-distance toll calls began on a trial basis.

The Commission initiated and conducted negotiations which resulted in the public's telephone bill being about $16 million a year less than it otherwise would have been. In these negotiations, agreement was reached with representatives of the State commissions and the industry to change separations procedures so that $90 million in exchange telephone plant and $22 million in associated annual expenses would be transferred from intrastate to interstate jurisdiction for rate-making purposes. This decreased intrastate revenue requirements by about $30 million a year. Partially offsetting this, the show-cause aspect of the Commission's outstanding investigation of interstate telephone rates was settled by permitting a net increase of $14 million in interstate toll telephone rates. These arrangements also materially reduced the disparity between intrastate and interstate toll rates and eliminated several inconsistencies in the interstate toll rate schedule.

Western Electric reduced its sales prices at the rate of $45 million annually to affiliated Bell companies, effective April 1, 1952. This action came after the Commission had expressed to Western Electric the view that its earnings might be excessive.

Depreciation rates were prescribed for nine Bell companies, reducing their annual depreciation charges by $7.9 million a year.

During calendar year 1951, Western Union, the domestic telegraph carrier, handled 189.6 million messages on its land-line system, the highest volume since 1948. As a result of wage increases which became effective July 1, 1951, however, Western Union was permitted to increase its interstate telegraph rates, effective September 1, 1951, and intrastate rates on later dates, so as to add revenues of $10.5 million a year. This increase partially offset the wage increases. A reduction in the Federal excise tax on telegrams from 25 to 15 percent on November 1, 1951, was estimated to reduce the telegraph bills of users $14 million a year. Additional rate increases were proposed by the telegraph company in June 1952, to produce increased revenue of $13 million a year to offset increased wages which became effective September 1, 1951, and additional wage increases which the company proposed to pay. At the end of the fiscal year, the new rates had not yet gone into effect.

In February 1952, Western Union amended its tariffs to prohibit transmission of horse- and dog-racing news to certain classes of users, a measure designed to deny the service to gambling interests. Hearings were held before the Commission in June 1952, and decision was pending at the close of the fiscal year.

International carriers experienced continued growth in volume, with increases of 9.4 percent in telegraph message revenues and 23.6 percent in radiotelephone revenues over the previous year. Telegraph service is furnished to 84 foreign countries and oversea points and through them to nearly every other country in the world. Radiotelephone service is furnished directly to 55 foreign countries and oversea points and through them to 48 additional countries.

On November 14, 1951, the Commission authorized Commercial Pacific Cable Co. to discontinue operations. This was the only United States carrier operating trans-Pacific cables. The Commission determined that adequate substitute service would be furnished by the radiotelegraph carriers.

During the year extensive reassignments of radio frequencies were made to international carriers to comply with international agreements intended to obtain more orderly use of frequencies by all countries.

In response to requests for rate increases, the Commission held extensive formal hearings on marine telegraph rates. The decision was pending.

On March 5, 1952, the Commission ordered an investigation into all phases of the matter of Western Union complying with the requirement of the Communications Act that it divest itself of its cable system. Hearings were scheduled to begin early in fiscal 1953.

SAFETY AND SPECIAL RADIO SERVICES

Most of the nonbroadcast radio stations are grouped in what is known as the Safety and Special Radio Services. Their more than 212,000 authorizations represent the use of nearly 540,000 transmitters and constitute the largest number of radio stations licensed by the Commission.

Utilization of their services by individuals, industry, commerce, and State and local governments comprise a broad field of radio operations in connection with protection of life and property, industrial and agricultural production, transportation, disaster, and civil defense.

The more than 40 of these nonbroadcast services fall into four main categories:

The safety group, with nearly 80,000 authorizations, covers the use of nearly 190,000 transmitters by the Aeronautical (42,000 transmitters), Marine (35,000), Police (81,000), Fire (11,000), Forestry-

Conservation (14,000), Highway Maintenance (4,200), Special Emergency (1,900), and State Guard (140) Radio Services.

The industrial group, with nearly 14,000 authorizations, covers the use of more than 90,000 transmitters by the Power (51,000), Petroleum (15,000), Forest Products (5,200), Special Industrial (15,000), Low Power Industrial (2,300), Relay Press (nearly 450), Motion Picture (nearly 200), Agriculture (10) and Radiolocation (11) Radio Services.

The land-transportation group, with nearly 6,500 authorizations, covers the use of nearly 145,000 transmitters by the Railroad (9,000), Urban Transit (1,700), Intercity Bus (400), Taxicab (125,000), Highway Truck (3,200), Automobile Emergency (1,500) and Citizens (3,000) Radio Services.

The Amateur Radio Service has more than 113,000 authorizations covering about the same number of transmitters. The relatively new Disaster Communications Service has 69 authorizations but more than 400 transmitters.

The only new radio service in the safety and special category authorized during the year was the Industrial Radiolocation Service, which became operative February 1, 1952.

Interest in the Safety and Special Radio Services is attended by the fact that more than 141,000 applications were received during fiscal 1952, which was 34,000 more than in the year previous and 48,000 more than in fiscal 1950.

BROADCAST

Highlighting the broadcast year was removal of the "freeze" on the construction of new television stations which had been in effect since the fall of 1948 pending the outcome of the comprehensive proceedings affecting the future of video broadcasting.

This was accomplished by a final report and order of the Commission on April 11, 1952, which, by adding 70 UHF channels to the then available 12 VHF channels, opened the door for more than 2,000 TV stations to ultimately serve nearly 1,200 communities in the United States and its possessions, and reserved channel assignments in 242 communities for noncommercial educational use. To make Nation-wide TV coverage possible, the Commission had to change the rules with respect to station power, coverage, separation, etc.

The report fixed July 1, 1952, as the date for beginning the processing of applications for new TV stations under a temporary procedure designed to bring their first TV service to the greatest number of people in the shortest possible time. In general, priority was to be given places without TV stations according to their rank in popula-

tion, and applications from the Territories and possessions and for educational stations were to be processed as received.

Before the freeze was lifted, 108 commercial TV stations and more than 200 TV experimental and auxiliary stations held authorizations.

While the increase in the number of standard broadcast stations was not as great as during the year previous, the close of fiscal 1952 saw 2,420 authorized commercial AM stations with more than 1,000 pickup auxiliaries. Fewer AM authorizations were canceled during fiscal 1952 than during either of the previous 2 years.

Under international agreement, the Commission on June 18, 1952, proposed to add the channel 540 kilocycles to the broadcast band.

Though signed by the President in February 1951, the new North American Regional Broadcasting Agreement (NARBA) was not yet ratified by the Senate. Consequently, no action could be taken with respect to the so-called clear-channel and daytime-skywave hearings.

There was a decrease of only 11 commercial FM broadcast authorizations during the year in contrast with 73, 133, and 155 for the previous 3 years, respectively, and the number of such licensed stations grew from 534 to 582 in fiscal 1952. Six FM broadcast stations held authorizations to transmit incidental facsimile programs.

Ten new noncommercial educational FM broadcast stations were authorized, bringing the total number in that service to 104. Forty-two of these stations operate with power of 10 watts or less.

Forty international broadcast stations continued to beam the Voice of America programs overseas under the auspices of the Department of State.

FIELD ENGINEERING AND MONITORING

Field engineering and monitoring activities were conducted through nine regional offices which supervised 23 district offices, 6 suboffices, 3 ship offices, and a network of 19 monitoring stations.

The field staff inspected more than 20,000 ship, broadcast, and other radio stations, as a result of which nearly 9,500 discrepancies or deficiencies were observed. Most of these (6,810) involved ship installations.

Examinations given in the field resulted in the issuance of 179,000 new commercial operator authorizations, which was an increase of about 29 percent over the previous year. Owing to the establishment of several new classes of amateur licenses, more than 35,000 amateur examinations were given by the field staff in fiscal 1952 as compared with less than 12,000 in fiscal 1951.

Interference complaints required more than 10,000 field investigations during the year, or almost 500 over the 1951 figure. Most of these (6,800) related to TV. Complaints of interference to AM reception decreased to less than 2,300.

230960—52——2

A total of 114 illegal radio stations were located and closed in 1952 as compared with 101 in 1951. Prosecution of five cases of unlicensed operation resulted in the conviction of nine persons.

A new secondary monitoring station was established near Fairbanks, Alaska, but budget limitations called for closure of the secondary monitoring station at Bay St. Louis, Miss.

A mounting number of violations was observed by the monitoring system, which resulted in the serving of more than 10,000 violation notices, an increase of nearly 1,400 over the previous year.

Monitoring stations obtained more than 82,000 bearings, and were called upon to furnish direction findings for 138 lost or disabled ships and aircraft.

Interference and other cases requiring monitoring reached an all-time high of more than 2,700.

In addition to numerous monitoring surveys to obtain frequency data, the field staff was assigned 59 new engineering projects in addition to 102 carried over from the previous year. Also, nearly 6,500 antenna construction proposals were studied and cleared with respect to air-navigation safety considerations.

TECHNICAL RESEARCH AND LABORATORY

The Commission's technical activities are devoted largely to resolving problems relating to wave propagation, technical standards, and various allied subjects. A factual knowledge of propagation characteristics and equipment capabilities is fundamental to an intelligent allocation and use of frequencies.

Emphasis was given during the year to VHF and UHF propagation studies and to projects dealing with technical standards. Field intensity sunspot recordings of 17 stations, representing 10 years of data accumulated by each station, were analyzed.

In cooperation with industry, Government, and other interested groups, much attention is being given to the growing problem of interference to radio communication from carrier current systems, industrial heating equipment, diathermy apparatus, arc welders, garage-door openers and other remote-control devices, electric razors and heating pads and blankets, fluorescent lights, automobile ignition systems, and other items which emit radiation. The Commission has established standards for the control of such devices and has allocated specific frequencies to absorb some troublesome emissions, but the situation has been made acute by the mounting number of television receivers, which are particularly susceptible to interference.

In order to curb potential radiation at the source, the Commission tests certain proposed equipment before it is manufactured and distributed. Items which are submitted to it for "type approval" include those intended for marine radio, diathermy, and industrial heating

use, as well as the monitoring equipment used by broadcast stations. Certain other equipment is offered for "type acceptance." During the year the Commission type-approved 90 items and type-accepted 32 others.

Besides testing apparatus, the Commission's laboratory near Laurel, Md., helps draft regulations governing such equipment, makes technical measurements and engineering investigations in connection with the allocation of frequency bands to different communication services, and assists in establishing and revising engineering standards and regulations.

A total of 369 experimental radio stations, employing more than 1,500 transmitters, were in operation at the close of the year. They were in three groups: Class 1, operated by manufacturers and organizations to develop or improve equipment and techniques; class 2, for the development of new radio services or the expansion of existing services; and, class 3, for individuals conducting temporary experimental projects in their own behalf.

COMMISSION

The following changes in Commission membership occurred during the year: Chairman Wayne Coy resigned on February 21, 1952, and, on February 28, Paul A. Walker (then Vice Chairman) was named Chairman by President Truman. At the same time, Robert T. Bartley was nominated as a Commissioner to fill out Mr. Coy's unexpired term. Commissioner Bartley was confirmed by the Senate on March 4 following. On March 7, 1952, the Commission elected Commissioner Rosel H. Hyde as its Vice Chairman. Renominated for another term on May 5, 1952, Commissioner Hyde was confirmed by the Senate on May 15.

During the year the Commission completed the reorganization of its staff on functional lines, a process which had extended over several years. The final step—effective March 2, 1952—was creation of a Field Engineering and Monitoring Bureau and redistribution, realinement, and redefinement of certain other offices and functions. In consequence, the Commission now operates with four Bureaus—Common Carrier, Safety and Special Radio Services, Broadcast, and Field Engineering and Monitoring—and eight Offices, Administration, Chief Engineer, Chief Accountant, General Counsel, Secretary, Opinions and Review, Hearing Examiners, and Information.

At the close of the fiscal year the Commission personnel totaled 1,138, which is the smallest number it has had since 1941.

In fiscal 1952, the Commission operated with an appropriation of $6,585,550, which was less than that for each of the three previous years.

2. SUBSEQUENT EVENTS

COMMUNICATIONS ACT AMENDMENTS

On July 16 the President signed the Communications Act Amendments, 1952 (Public Law 554), which further amended the Communications Act of 1934. These amendments require various changes in existing Commission procedures and specify certain information to be reported to Congress.

COMMON CARRIERS

Increased Western Union interstate telegraph rates became effective September 1. They were expected to add $10.5 million in annual revenue, to partially offset wage increases to Western Union employees.

In a decision of October 9, the Commission found insufficient evidence to presently require interconnection of Western Union microwave facilities with the Bell microwave-coaxial cable system for TV relay purposes.

SAFETY AND SPECIAL RADIO SERVICES

On August 13 the Commission proposed a new ship licensing procedure which would permit licensees to plan ahead for the numerous frequency changes required by international treaty.

A Radio Amateur Civil Emergency Service, which enables amateurs to provide radio communication for civil defense purposes, became operative August 15.

On October 1 the Commission reminded amateurs in the Armed Forces that they can take the examination for advanced class operating privileges by mail, before the end of the 1-year waiting period.

As of October 15, the number of authorizations in the Safety and Special Radio Services approximated 220,000, covering the use of some 550,000 transmitters.

BROADCAST

Television.—When processing of TV applications was resumed on July 1, there were on file more than 700 applications for new stations, 450 of which had either been amended or submitted after the April 14 announcement of the lifting of the freeze.

Between July 11 (when the first post-freeze grants were made) and November 6, 98 new TV stations were authorized. Of this number 9 were for noncommercial educational operation. Total TV authorizations were 206. Pending applications were approaching the 900 mark.

Post-freeze commercial grants made up to November 6 promised initial TV service for 65 communities: Gadsden, Mobile, and Montgomery, Ala.; Little Rock, Ark., Fresno and San Bernardino, Calif.;

Denver and Pueblo, Colo.; Bridgeport, New Britain, and Waterbury, Conn.; Peoria and Rockford, Ill.; Muncie and South Bend, Ind.; Sioux City, Iowa; Fort Lauderdale and St. Petersburg, Fla.; Ashland, Ky.; Baton Rouge, La.; Frederick, Md.; Fall River, Holyoke, New Bedford, and Springfield, Mass.; Ann Arbor, Battle Creek, East Lansing, Flint, and Saginaw, Mich.; Duluth, Minn.; Jackson, Miss.; St. Joseph and Springfield, Mo.; Lincoln, Nebr.; Elmira, N. Y.; Asbury Park and Atlantic City, N. J.; Asheville and Raleigh, N. C.; Akron, Massilon, Warren, and Youngstown, Ohio; Portland, Oreg.; Bethlehem, Harrisburg, New Castle, Reading, Scranton, Wilkes-Barre, and York, Pa.; Columbia and Charleston, S. C.; Chattanooga, Tenn.; Amarillo, Austin, El Paso, Lubbock, and Wichita Falls, Tex.; Lynchburg and Roanoke, Va.; Spokane, Wash.; San Juan, P. R.; and Honolulu, T. H.

The first post-freeze TV grants (July 11) were for three Denver, Colo., commercial stations. The first TV station to go on the air since the freeze lift was KFEL–TV, Denver (July 19). The first UHF video station to begin operation was KPTV, Portland, Oreg. (September 20). The first Territorial TV grant was for a commercial station at San Juan, P. R. (July 23).

The first noncommercial educational TV grant went to the Kansas State College of Agriculture and Applied Science, Manhattan, Kans. (July 25). Subsequent educational grants to October 15 were to the University of Southern California, Allan Hancock Foundation, Los Angeles, Calif.; the Board of Regents, University of the State of New York, for stations at Albany, Binghamton, Buffalo, New York City, Rochester, and Syracuse, that State; and the University of Houston and Houston Independent School District, Houston, Tex.

Hearings on contested TV applications, on a city-by-city basis under the temporary processing procedure, began October 1. On October 15 the Commission suspended the processing of competitive applications for new TV stations facing hearing so that, for the time being, it could concentrate on the many pending noncompetitive TV applications.

By November, more than 19 million TV sets were estimated to be in use, and nearly 30,000 miles of Bell System coaxial and microwave facilities were serving 110 TV stations in 67 cities.

Frequency modulation.—The first FM Territorial grant was made on September 18 for a commercial station at Honolulu.

As of November 1, there were 641 commercial and 110 noncommercial educational FM authorizations.

Amplitude modulation.—On the same date, outstanding authorizations for AM stations totaled 2,506.

COMMISSION

Commissioner Robert F. Jones resigned on September 19 and, on October 6, the President appointed Eugene H. Merrill to fill out Mr. Jones' term which expires June 30, 1954. Commissioner Merrill took office on October 14.

Four additional hearing examiners were appointed since the close of the fiscal year, bringing the total number of examiners to 12 as of October 15.

The first foreign national completing a course in telecommunication studies with the Commission under the Government's point 4 program of foreign economic assistance was a representative of Honduras (September 19). Several members of India's Government and representatives of Pakistan completed the course thereafter.

CHAPTER I—GENERAL

1. AUTHORITY AND PURPOSE

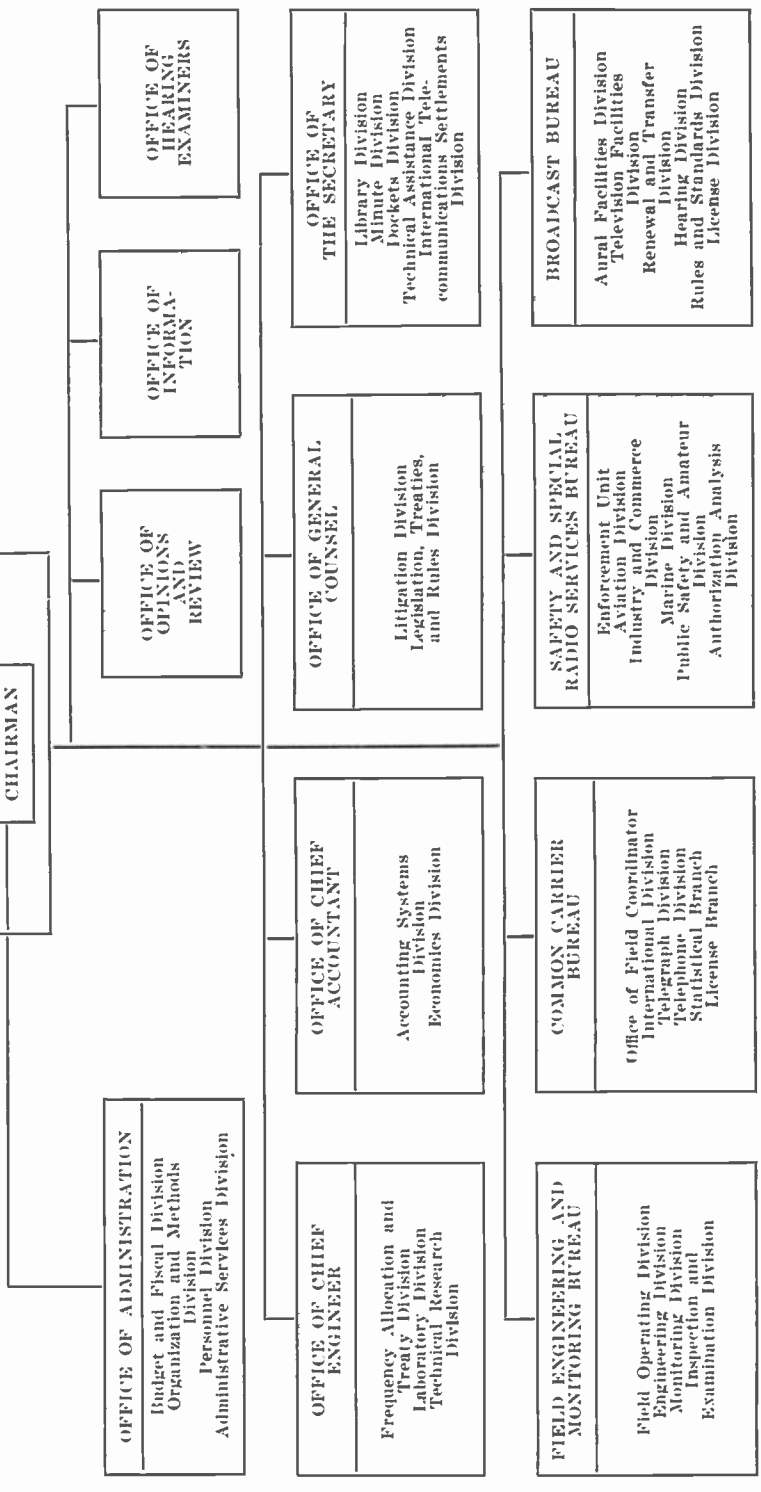
The Federal Communications Commission was created by the Communications Act of 1934 and administers that act, as amended.

The Commission was established "for the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all the people of the United States a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense, for the purpose of promoting safety of life and property through the use of wire and radio communication, and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communication."

2. COMMISSION

As an independent Federal agency established by Congress, the Commission reports directly to Congress. It is composed of seven Commissioners appointed by the President, subject to confirmation by the Senate. The Chairman is designated by the President without Senate confirmation; the Vice Chairman is elected by the Commission membership. The normal term of a Commissioner is 7 years.

FEDERAL COMMUNICATIONS COMMISSION
Organization Chart as of June 30, 1952



3. FUNCTIONS

Commission regulation covers three major fields of communication: Interstate and international common carrier operation by wire and radio (telegraph, telephone, and submarine cable); nonbroadcast radio facilities (safety and special); and broadcast (program) stations.

This involves supervision of rates and services of telephone and telegraph companies subject to Commission jurisdiction; allocating radio bands for different services and assignment of frequencies to individual stations; licensing of radio transmitters and radio operators; encouraging more effective and widespread utilization of radio; promoting protection of life and property through the use of radio on land, water, and in the air; participating in the formulation and domestic administration of wire and radio provisions of treaties and other international agreements to which the United States is a party; and helping coordinate the many forms of electrical communication to the national security program.

The authority of the Commission extends to the United States Territories and possessions, but not to the Canal Zone. Communications facilities operated by the Federal Government are not subject to its jurisdiction.

The act limits licensing by the Commission to citizens of the United States, and denies the license privilege to corporations of which any officer or a director is an alien, or of which more than one-fifth of the capital stock is owned or controlled by foreign interests.

The Commission exacts no fee or charge of any kind in connection with its regulatory or licensing functions.

4. COMMISSIONERS

The Commissioners function as a unit, directly supervising all staff activities and making all important policy determinations. From time to time, committees of Commissioners are designated to make special studies and supervise particular undertakings. The performance of specified functions is delegated to individual Commissioners, and members of the staff as units or individuals.

Changes in the membership of the Commission during the year were as follows: Chairman Wayne Coy resigned on February 21, 1952, and on February 28 Paul A. Walker (then Vice Chairman) was named Chairman by President Truman. On that same day the President nominated Robert T. Bartley as Commissioner to fill out Mr. Coy's unexpired term ending June 30, 1958, and he was confirmed by the Senate on March 4. On March 7, 1952, the Commission elected

Commissioner Rosel H. Hyde as its Vice Chairman. Renominated for another 7-year term (to June 30, 1959), by the President on May 5 following, Commissioner Hyde was confirmed by the Senate on May 15.

5. STAFF ORGANIZATION

During the year the Commission completed the reorganization of its staff on functional instead of professional lines. The final step, effective March 2, 1952, made these changes:

Created a Field Engineering and Monitoring Bureau with four divisions—Engineering, Inspection and Examination, Monitoring, and Field Operating—and created a new district field office to serve the District of Columbia and adjacent counties in Maryland and Virginia;

Redistributed the functions of the Office of the General Counsel between two divisions—Litigation and Legislation, Treaties and Rules—and abolished, as of March 30, 1952, the only remaining field office of the Office of the General Counsel, at Los Angeles;

Realined the Office of the Chief Engineer into three divisions—Frequency Allocation and Treaty, Technical Research, and Laboratory—and retained supervision of various special engineering projects under the Chief Engineer;

Redefined the duties of the Office of the Chief Accountant with two divisions—Accounting Systems and Economics;

In the cases of these advisory professional staff offices (General Counsel, Chief Engineer, and Chief Accountant), the Commission provided for Assistant General Counsels, Assistant Chief Engineers, and Assistant Chief Accountants, as the case may be, to be in charge of their respective divisions;

Changed the name of the Bureau of the Secretary to the Office of the Secretary, and designated its component divisions as Docket, Minute, Library, and Technical Assistance;

Transferred the broadcast license functions from the Office of the Secretary to the Broadcast Bureau;

Transferred service, mail and files, messenger, and certain records supervision from the Office of the Secretary to the Office of Administration, which will now have four divisions—Budget and Fiscal, Organization and Methods, Personnel, and Administrative Services;

Transferred the technical assistance functions from the Office of the Chief Engineer to the Office of the Secretary;

Transferred the reference room of the Common Carrier Bureau and the library of the Technical Research Division of the Office of the Chief Engineer to the Library Division of the Office of the Secretary;

Transferred certain functions of the Experimental and Miscellaneous Branch of the Office of the Chief Engineer to the Technical Research Division in the same office;

Changed the name of the Office of Formal Hearings to Office of Hearing Examiners;

Changed the name of the Office of Formal Hearing Assistants to Office of Opinions and Review.

The over-all reorganization program was initiated by the Commission as the result of a long-range study of its administrative needs. Establishment of the Common Carrier Bureau (1950), the Safety and Special Radio Services Bureau (1950), and the Broadcast Bureau (1951), with their resultant organizational changes, was effected through the Commission's own management studies. On June 21, 1951, the Commission contracted with McKinsey & Co., management consultants, to study the remaining phases—those dealing with field activities and staff offices. Creation of the Field Engineering and Monitoring Bureau is the result of the first of the McKinsey studies, and changes in the staff offices are based on its second study. The entire reorganization was effected through transfer of personnel.

In consequence, the Commission's staff organization and related general activities are:

Office of the General Counsel, whose function as chief legal advisor to the Commission covers matters involving litigation, legislation, rule making, international treaty and other matters, and general administrative activities presenting legal problems;

Office of the Chief Engineer, whose duties deal with the engineering phases of frequency allocations and related treaties, radio rules and standards, technical research and experimentation, and study of radiation devices with a view toward minimizing interference;

Office of the Chief Accountant, whose work includes matters of accounting regulation and economic and statistical research;

Office of the Secretary, which has charge of official records, processing of correspondence and official documents, administration of the library and certain functions relating to the internal management of the Commission;

Office of Administration (executive officer), under the direction of the Chairman, reviews the programs and procedures of the Commission and handles its budget and personnel work;

Office of Hearing Examiners, which conducts hearings and prepares and issues initial decisions;

Office of Opinions and Review, which, under Commission direction, advises and assists in the preparation of decisions;

Office of Information, which is the central source of public releases and information;

Common Carrier Bureau, which supervises telephone and telegraph matters;

Safety and Special Radio Services Bureau, which supervises non-broadcast radio services other than common carrier;

Broadcast Bureau, which supervises the broadcast services;

Field Engineering and Monitoring Bureau, which is responsible for field engineering activities, including station inspections, surveys, monitoring, direction finding, signal measurement, operator examinations, and certain enforcement activities.

An organization chart of the Commission, as of May 1952, appears as a separate page of this report.

6. PERSONNEL

A total of 1,138 persons were in the employ of the Commission as of June 30, 1952. This was a reduction of 67 since the previous year. Approximately one-third of all Commission employees are in the field. The distribution of personnel was as follows:

Office or Bureau	Washington	Field	Total
Commissioners	35	0	35
Office of Opinions and Review	8	0	8
Office of Hearing Examiners	15	0	15
Office of Information	4	0	4
Office of Administration	129	0	129
Office of Secretary	37	0	37
Office of General Counsel	17	0	17
Office of Chief Accountant	24	0	24
Office of Chief Engineer	94	15	109
Common Carrier Bureau	81	31	112
Safety and Special Services Bureau	113	0	113
Broadcast Bureau	131	0	131
Field Engineering and Monitoring Bureau	54	350	404
Total	742	396	1,138

7. APPROPRIATIONS AND EXPENDITURES

The Commission received an appropriation of $6,585,550 to cover all of its operations in the 1952 fiscal year. This, despite an increased workload, was less than the appropriation for each of the three preceding years.

A tabulation of its working appropriations for the previous 10 years follows:

1951	$6,600,000	1946	$5,954,900
1950	6,729,345	1945	6,312,343
1949	6,717,000	1944	7,884,914
1948	6,240,000	1943	7,777,135
1947	6,236,900	1942	5,655,924

A breakdown of the Commission's fiscal 1952 income and expenditures is set forth below:

Appropriation	
Regular appropriation (salaries and expenses)	$6,116,650
Supplemental	468,900
Total funds available	6,585,550

Obligations	
Personal services	$5,957,642
Travel	76,370
Transportation of things	13,998
Communication services	152,183
Rents and utilities	48,247
Printing and reproduction	29,225
Other contractual services	62,312
Supplies and materials	137,295
Equipment	107,419
Refunds, awards, and indemnities	20
Total obligations	6,584,711
Savings, unobligated balance	839
Total	6,585,550

8. LITIGATION

Section 401 of the Communications Act confers upon the district courts of the United States jurisdiction to enforce the Communications Act and the orders of the Commission. Judicial review of Commission actions is provided for in section 402 of the act. Section 402 (a) gives jurisdiction to the courts of appeals (under Public Law 901, 81st Cong., effective January 28, 1951) over suits to enforce, enjoin, set aside, annul, or suspend any order of the Commission with the exception of orders granting or refusing applications for licenses. Section 402 (b) provides for direct appeal from such other orders of the Commission to the United States Court of Appeals for the District of Columbia Circuit. The great majority of cases involving review of Commission action is instituted in the latter court.

During the fiscal year, there were 18 cases in which the Commission was a party in the Federal courts. Eight of these were instituted during that period—two in the Supreme Court, five in the Court of Appeals for the District of Columbia Circuit, and one in the Court of Appeals, Third Circuit. The other 10 cases were pending at the beginning of the year.

The Supreme Court denied certiorari in the one case brought before it on petition for review of a decision of the Court of Appeals for the District of Columbia Circuit affirming the Commission. In the latter court, the Commission was sustained in one case and reversed in three cases, and one case was dismissed by agreement of the parties.

As of June 30, 1952, one case was pending in the Supreme Court, five cases in the Court of Appeals for the District of Columbia Circuit, one case in the United States Court of Appeals, Third Circuit, and five cases were pending in United States district courts.

The status of litigation for the fiscal year may be tabulated as follows:

Court	Total	Decisions affirming Commission	Decisions reversing or remanding case	Dismissed by agreement of parties	Cases pending June 30, 1952
Supreme Court	2	1	----	----	1
Court of Appeals for District of Columbia Circuit, under sec. 402 (b)	9	1	3	----	5
United States Courts of Appeals including District of Columbia Circuit, under sec. 402 (a)	2	----	----	1	1
District courts	5	----	----	----	5
Total	18	2	3	1	12

The following cases decided during the fiscal year were of particular interest:

1. In *Scripps-Howard Radio, Inc.* v. *Federal Communications Commission* (342 U. S. 830), the Supreme Court denied certiorari, refusing to review a decision of the Court of Appeals which had affirmed a decision of the Commission granting a broadcast station in Cleveland, Ohio, to Cleveland Broadcasting, Inc., and denying the appellant's mutually exclusive application for the same facilities. The principal contention of the petition for certiorari was that the Commission had improperly decided against petitioner because of its newspaper affiliation. The Court of Appeals had sustained the Commission's authority to consider diversification of the media of mass communications in choosing between mutually exclusive applicants.

2. In *Independent Broadcasting Company* v. *Federal Communications Commission* (— U. S. App. D. C. —, 193 F. 2d 900 (1951)), the Commission had denied a construction permit for an FM station and a station license for an AM station to an applicant who, the Commission found, had misrepresented material facts and did not possess the requisite character qualifications. Knowledge of these matters came to the attention of the Commission after the AM construction permit had been granted and the hearing was held on the AM station license application together with the FM construction permit application. The Commission found that the applicant, controlled by Rev. J. Harold Smith, had misrepresented material facts concerning stock ownership, its assets and liabilities, and the business interests of Smith. It also found Smith had used intemperate language in his writings and broadcasts, that he had a habit of attacking

the honesty and sincerity of those with whom he disagreed, and that there was other evidence he lacked the character to be a licensee. This decision was affirmed by the Court of Appeals which held the record justified and supported the findings, that the procedure followed was proper, and that the Commission was not limited to a procedure of revoking the AM construction permit. The court also held that other contentions of applicant, including a claim that the action of the Commission violated the first and fifth amendments, were not grounds for reversing the Commission's decision.

3. In *American Broadcasting Company, Inc.* v. *Federal Communications Commission* (Albuquerque Broadcasting Company, Intervenor) (— U. S. App. D. C. —, 191 F. 2d 492 (1951)), the Commission had granted Albuquerque special service authorizations to use the frequency on which the appellant regularly operated as a class I–A station. These special service authorizations had been issued since 1941. Albuquerque had been moved from its regular assignment pursuant to the North American Regional Broadcasting Agreement and the Commission had been unable to determine a new permanent frequency assignment for it due to problems concerned with the NARBA shifts, the clear channel hearing, and frequency measurement considerations. The Court of Appeals held that a special service authorization permitting operation on a frequency other than that specified in a station's license was not illegal per se, and that, since section 312 (b) of the Communications Act (now sec. 316) does not necessarily require the same type of hearing in all types of factual situations, the Commission might, in appropriate circumstances, grant special service authorizations without affording a hearing to existing licensees who would receive interference as a result. The court went on to hold, however, that the propriety of the original special service authorization was not in issue and that the Commission could not continue such authorizations indefinitely without affording other affected licensees an appropriate hearing.

4. In *Democrat Printing Company* v. *Federal Communications Commission* (— U. S. App. D. C. — (1952)), the Court of Appeals reversed the Commission's decision granting a construction permit to Texas Star Broadcasting Co. for a new standard broadcast station in Dallas, Tex., upon the appeal of Democrat Printing Co., the licensee of station KSEO, Durant, Okla., which would have suffered adjacent-channel interference from the proposed operation. The court held that the Commission had erred in failing to make a comparison of the proposed program service of Texas Star with that of KSEO in the area of interference, which was of substantial size and population and where the Texas Star signal would be substituted for that of KSEO, since this comparison was a necessary factor in determining

whether the grant to Texas Star was in the public interest despite the alleged interference to KSEO. The court also held that the Commission had improperly permitted a deviation by Texas Star from one of the Commission's Standards of Good Engineering Practice without requiring fulfillment of the requirements set forth in the standard itself as conditions for such deviation and without making any finding as to why these requirements need not be met. The matter was remanded to the Commission for further proceedings.

5. In *Beaumont Broadcasting Corporation* v. *Federal Communications Commission* (— U. S. App. D. C. — (1952)), the appellant sought review of a Commission decision granting an application of Ozarks Broadcasting Co. for an increase in power. The court held that the Commission properly granted a previous application by the appellant subject to possible interference which it might receive from a later grant to Ozarks, since appellant had been offered a full hearing at that time, and that appellant therefore was not entitled to a comparative hearing on the Ozarks application. The court also held that a deviation from the Commission's Standards of Good Engineering Practice is not per se illegal since the standards are flexible, and that the Commission may, as it did here, make a grant which involves a departure from the standards when the public interest requires. However, the court held that the Commission had erred in refusing to admit engineering evidence sought to be introduced by appellant concerning a method of operation other than that proposed by Ozarks which it was contended would have avoided objectionable interference the Ozarks operation would cause, since the public interest might not be served by a grant to Ozarks with attendant interference if such interference could be eliminated by an antenna design not advanced by Ozarks. The court noted the absence of any Commission rule requiring submission of such evidence in advance of the hearing. The case was remanded to the Commission.

9. LEGISLATION

Two laws were enacted during the fiscal year by Congress which directly affected the Commission. The first of these was Public Law No. 200, Eighty-second Congress, which was approved on October 24, 1951, and which had been introduced by Senator Johnson of Colorado as S. 537. This law clarified the scope of the President's emergency powers contained in section 606 (c) of the Communications Act and added a new section 606 (h) to the act which provides criminal sanctions which may be applied against persons who violate any orders issued by the President pursuant to section 606. The new law authorizes the President to control or use devices emitting electromagnetic radiations capable of being utilized by an enemy for navigational purposes. [See chapter on national defense.]

The second law enacted by Congress which affected the Commission was Public Law No. 320, Eighty-second Congress, which was introduced by Congressman Norblad as H. R. 5369 and which was approved on April 15, 1952. This law authorized the Commission to convey to the State of Oregon two tracts of land located within the boundaries of the Commission's primary monitoring station in Portland and to accept, in exchange for those tracts, another parcel of land from the State.

The most important legislation affecting the Commission which was considered by Congress during the fiscal year was S. 658, introduced by Senator McFarland, which would extensively amend the Communications Act. This bill would make significant substantive changes in the Communications Act and would substantially alter the Commission's operating procedures and organization. The bill was passed by the Senate on February 5, 1951, and, after extensive hearings, was passed by the House on June 19, 1952, and submitted to a conference committee of the Senate and the House.[1]

The Commission resubmitted to the Bureau of the Budget various legislative proposals for consideration during the second session of the Eighty-second Congress. These proposals included (1) an amendment to section 4 (g) of the Communications Act which would authorize the Commission to purchase land and construct buildings necessary for monitoring and research purposes; (2) an amendment to section 319 of the Communications Act, which would simplify the procedure for obtaining licenses for certain types of radio stations by eliminating the existing requirement of first securing a construction permit from the Commission; (3) an amendment to section 410 (b) of the Communications Act to provide for reimbursement to the Commission by the States for the salary and expenses of Commission employees who are made available to State commissions to act as consultants or expert witnesses in common carrier regulatory matters pending before such commissions; (4) the addition of a wire and radio fraud statute to the United States Criminal Code; and (5) an amendment to section 315 of the Communications Act to provide that broadcast station licensees must afford equal opportunities to use their facilities to persons speaking for or against a legally qualified candidate for public office, as well as to the candidates themselves, as is presently provided. This amendment would also provide that equal time must be afforded for the presentation of opposing views on a public question to be voted upon at any public election. In addition, this proposal would provide that station licensees are not liable for any material broadcast pursuant to the provisions of section 315.

[1] The conference committee reported the bill on July 1, 1952, and the Senate and House adopted the conference report on July 2, 1952. The bill was finally approved as Public Law No. 554, 82d Cong., on July 16, 1952.

The Commission's proposals with respect to amending section 4 (g) of the Communications Act and adding a radio- and wire-fraud statute to the United States Criminal Code were included in S. 658, introduced by Senator McFarland. Numerous bills were introduced in Congress which would have amended section 315 of the Communications Act relating to the use of broadcasting facilities by candidates for public office. The Commission submitted comments on all of these bills but no congressional action has been taken.

Various other legislative proposals were considered by Congress which directly or indirectly affected the Commission. Hearings were held by the Senate Committee on Interstate and Foreign Commerce on four bills (S. 1563, 1564, 1624, and 2116) which propose to restrict the use of communications facilities for the interstate transmission of gambling information. The Chairman and General Counsel of the Commission participated extensively in those hearings and the four bills were subsequently reported to the Senate, where no further action has been taken. Several bills were introduced which proposed the establishment of a National Citizens Advisory Board on Radio and Television. Other bills which were considered dealt with various aspects of the problem of allocating television channels and of providing channels for use by noncommercial educational television stations. In addition, there were numerous proposals concerning television and radio programing including resolutions calling for an investigation to determine whether such programing includes immoral or otherwise offensive matter.

During the fiscal year the Commission submitted to Congress and the Bureau of the Budget reports on more than 45 proposed bills which were concerned with the Commission's functions, in addition to drafting numerous legislative proposals and participating in several congressional hearings.

10. HEARINGS

Broadcast matters continued to predominate the Commission's hearing schedule, with standard (AM) broadcast accounting for more than 80 percent of the cases disposed of during the fiscal year.

Docket statistics for that period follow:

Class	Pending, June 30, 1951	Designated for hearing	Disposed of without hearing	Disposed of following hearing	Pending, June 30, 1952
Broadcast:					
AM	260	140	105	85	210
FM	7	8	7	1	7
TV	179	8	175	4	8
Other	5	0	3	0	2
Safety and special	11	38	20	3	26
Common carrier	69	17	11	22	53
Joint and general	10	32	15	4	23
Total	541	243	336	119	329

11. CORRESPONDENCE, RELEASES, AND PUBLICATIONS

A total of 1,116,000 pieces of correspondence in the form of letters, telegrams, etc., were received or dispatched through the Commission's Mail and Files Branch during the year. Of this number, about 776,000 were incoming and nearly 340,000 were outgoing.

Regulatory and administrative procedure required the issuance, during the same period, of mimeographed public notices, orders, decisions, opinions, and rule making. These necessitated the use of approximately 41,000 stencils, 7,700,000 sheets of paper, and 12,411,000 impressions. The Commission issues no press releases and maintains no public mailing lists.

The Commission makes no public distribution of its printed publications. The latter are processed by the Government Printing Office and are sold by the Superintendent of Documents. They include rules and regulations, standards of good engineering practice, bound volumes of decisions and orders, annual and special reports, statistics of the communications industry, and miscellaneous publications. A list appears in the appendix.

12. LICENSES AND OTHER AUTHORIZATIONS

For the first time, the number of active authorizations on the records of the Commission passed the 1 million mark during fiscal 1952. This was 123,000 more than in the preceding year.

In fiscal 1952 approximately 214,000 nonbroadcast radio authorizations were outstanding. They covered the use of almost two and one-half times that many transmitters. Broadcast authorizations totaled nearly 4,800, including 1,200 auxiliary transmitters. Common carriers held nearly 1,000 radio authorizations, and experimental radio authorizations exceeded 350.

Radio operator authorizations exceeded 800,000, including 679,000 commercial operator authorizations, over 100,000 amateur operator authorizations, and more than 100,000 special aircraft radiotelephone operator authorizations.

13. APPLICATIONS AND OTHER FILINGS

During the year the Commission received more than 357,000 applications of all kinds, or 89,000 more than in fiscal 1951. Of this total, over 200,000 concerned commercial radio operators, over 140,000 involved the nonbroadcast services, nearly 5,700 had to do with broadcast, and more than 3,500 were from common carriers.

These figures do not include filings of a legal nature, periodic reports, and tariff schedules. During the year, common carriers and holding companies filed more than 29,500 tariffs and nearly 2,100 annual reports which required Commission attention. This was 10,400 more tariffs and about the same number of annual reports filed in fiscal 1951.

CHAPTER II—NATIONAL DEFENSE

1. GENERAL

An efficient communication system is invaluable in time of peace but is vital in time of hot or cold war. Indeed, the nerve system of the defense of the Nation is represented by its communication facilities. They must not only be adequate for their respective normal services but must be integrated into national and regional plans for operation under threat of armed attack or other emergency.

Practically every communication service—whether it is wire, radio, or submarine cable—is a part of the program for the military defense and the protection of civilian life and property. This extends from the broadcast services to the services rendered by public safety agencies, such as police and fire departments, and a myriad of other services concerned with marine, aviation and land transportation, as well as aids to industry.

It is significant that the same transmitters, the same radio frequencies, the same wires and the same cables which are used under normal conditions must be harnessed during times of threat to our national security, and during periods of warfare. These communication facilities, always important to our peacetime national economy, are doubly important to defense industries, to our armed forces and to civilian defense under threatened or actual conflict.

2. DEFENSE ACTIVITIES

Since all forms of radio and wire communication are inseparably linked to the national security effort, the workload of the Commission has continued to increase during the present emergency. Many of its activities which previously required peacetime regulation have taken on high-priority aspects because of their importance to the military and civilian defense program.

One example is the necessity of intensifying surveillance of the radio spectrum. Another example is the work involved in meeting the

needs of the military, civilian defense and defense industry for communication facilities above and beyond the normal requirements of the civilian economy.

The work of the Commission in regulating the marine, aeronautical, public safety, land transportation and industrial radio services has taken on new importance because of the increasing demands of the national productive schedule and to insure that there will be no hampering or interruption of land, sea and air communication under any emergency condition.

The widespread network of communication so essential to the Nation's defense also includes broadcasting. Apart from its morale consideration, this service has to play its part in civilian defense through its ability to bring information to the public with instantaneous speed.

Communication by telephone, telegraph, and cable are likewise essential to the defense program because of accelerated use, most of which is directly due to the defense effort. There is an additional burden on the Commission in regard to these common carriers; that is to provide international radio-telegraph circuits and domestic telegraph and telephone facilities for military and defense production use.

During the past year the Commission has made studies for and participated in numerous meetings and discussions with officials of defense establishments (military and civilian) with respect to plans and projects involving problems cutting across the whole field of electrical communication.

For security reasons, these matters cannot be mentioned at this time. The same is true of a number of projects under study by the various governmental committees on which this Commission is represented. In general, it might be said that the Commission is deeply concerned with and is busily engaged in strengthening and expanding the communications system to accommodate the Nation's keyed-up requirements, thus helping to safeguard existing communication facilities, and in preventing illegal operations inimical to the interests of the United States.

3. CONTROL OF ELECTROMAGNETIC RADIATIONS

On October 24, 1951, the President signed a bill (S. 537) which amended section 606 of the Communications Act, concerning emergency powers of the Chief Executive, to provide for the control of electromagnetic radiations which might serve as navigational aids to an enemy, and to provide penalties for violations (Public Law 200, 82d Cong.).

Section 606 (c) was amended to read as follows:

(c) Upon proclamation by the President that there exists war or a threat of war, or a state of public peril or disaster or other national emergency, or in

order to preserve the neutrality of the United States, the President, if he deems it necessary in the interest of national security or defense, may suspend or amend, for such time as he may see fit, the rules and regulations applicable to any or all stations or devices capable of emitting electromagnetic radiations within the jurisdiction of the United States as prescribed by the Commission, and may cause the closing of any station for radio communication, or any device capable of emitting electromagnetic radiations between 10 kilocycles and 100,000 megacycles, which is suitable for use as a navigational aid beyond five miles, and the removal therefrom of its apparatus and equipment, or he may authorize the use or control of any such station or device and/or its apparatus and equipment, by any department of the Government under such regulations as he may prescribe upon just compensation to the owners. The authority granted to the President, under this subsection, to cause the closing of any station or device and the removal therefrom of its apparatus and equipment, or to authorize the use or control of any station or device and/or its apparatus and equipment, may be exercised in the Canal Zone.

Section 606 of the act was further amended by adding a new subsection:

(h) Any person who willfully does or causes or suffers to be done any act prohibited pursuant to the exercise of the President's authority under this section, or who willfully fails to do any act which he is required to do pursuant to the exercise of the President's authority under this section, or who willfully causes or suffers such failure, shall, upon conviction thereof, be punished for such offense by a fine of not more than $1,000 or by imprisonment for not more than one year, or both, and, if a firm, partnership, association, or corporation, by fine of not more than $5,000, except that any person who commits such an offense with intent to injure the United States, or with intent to secure an advantage to any foreign nation, shall, upon conviction thereof, be punished by a fine of not more than $20,000 or by imprisonment for not more than 20 years, or both.

An Executive Order of December 10, 1951, empowers the Federal Communications Commission to enforce regulations in this connection. The main text of this Executive order reads as follows:

SECTION 1. The authority vested in the President by section 606 (c) of the Communications Act of 1934, as amended, is hereby delegated to the Federal Communications Commission to the extent necessary for preparing and putting into effect plans with respect to radio stations as defined in section 5 hereof, except those owned and operated by any department or agency of the United States Government, to minimize the use of the electromagnetic radiations of such stations, in event of attack or of imminent threat thereof, as an aid to the navigation of hostile aircraft, guided missiles, and other devices capable of direct attack upon the United States. The authority so delegated to the Commission shall be exercised subject to the following limitations:

(a) Nothing in this order shall be construed as authorizing the Commission to exercise any authority with respect to the content of station programs.

(b) Nothing in this order shall be construed to authorize the Commission to take over and use any radio station or to remove the apparatus and equipment of any radio station.

(c) The plans of the Commission for exercising its authority under this order shall not become effective until they have been concurred in by the Secretary of Defense and the Chairman of the National Security Resources Board.

SECTION 2. With respect to radio stations belonging to and operated by any department or agency of the United States Government, the head of each government department or agency the stations of which are involved shall, pursuant to the authority vested in the President by section 305 of the Communications Act of 1934, as amended, prepare and put into effect such plans as may be necessary to minimize the use of electromagnetic radiation of these stations in event of attack or imminent threat thereof as an aid to hostile aircraft, guided missiles, and other devices capable of direct attack upon the United States. Such plans shall not become effective until they have been concurred in by the Secretary of Defense and the Chairman of the National Security Resources Board.

SECTION 3. Whenever, pursuant to the provisions of this order, any radio station shall have been required to cease operations or whenever the normal operations of any radio station have been interfered with, such station shall be allowed to resume operations or return to normal operations, as the case may be, at the earliest possible time consistent with the national security. In exercising the authority delegated by this order, due consideration shall be given to civil defense and other national-security requirements.

SECTION 4. The Federal Communications Commission, the Secretary of Defense, and the head of each government department or agency the stations of which are involved, are hereby authorized to issue appropriate rules, regulations, orders, and instructions, and to take such other action as may be necessary, to assure the timely and effective operation of the plans and for carrying out their respective functions hereunder, and are authorized to require full compliance with their respective plans.

SECTION 5. Wherever the words "station" or "radio station" are used in this order, they shall be deemed to include any station for radio communication, and also any device capable of emitting electromagnetic radiations between 10 kilocycles and 100,000 megacycles, suitable for use as a navigational aid beyond five miles.

SECTION 6. (a) Any reference herein to the Federal Communications Commission shall, except for the purpose of issuing rules and regulations, be deemed to include the Chairman or any other member of the Commission as the Commission may designate; any reference to the Secretary of Defense shall be deemed to include the Secretary or such person as he may designate; and any reference to the Chairman of the National Security Resources Board shall be deemed to include the Chairman or such person as he may designate.

(b) Such rules and regulations as the Federal Communications Commission may issue pursuant to this order shall be issued by the Commission, except that the Commission may provide that, in the event of hostile action against the United States or imminent threat thereof, such rules and regulations may be issued by the Chairman.

SECTION 7. Every government department and agency shall give such aid and assistance to the Secretary of Defense, and shall render such cooperation with one another, as may be necessary to accomplish the purpose of this order.

SECTION 8. The Federal Communications Commission is hereby authorized to appoint such advisory committees as it may consider necessary or desirable to advise and assist the Commission in the performance of its duties hereunder.

The Federal Communications Commission is utilizing these additional delegated powers in carrying out the program for the control of radioelectric radiation in the national defense effort, which it began some time previously at the request of the Department of Defense.

The subject of control of electromagnetic radiation for defense purposes has received mounting interest and attention during the present emergency. It concerns electronic equipment which can produce radio signals of such a character and intensity that they can be used as "beams" to guide aircraft, missiles, and other devices which might be employed in an armed attack upon the United States.

"CONELRAD" (an abbreviation of the term "control of electromagnetic radiation") is the short name given to the present Commission project for such emergency control. In developing this program for the Department of Defense, the Commission has worked closely with other Government departments and agencies, both State and Federal, particularly those concerned with national defense and civil defense, and with all segments of the radio industry, especially the broadcast industry.

From the standpoint of persons whose equipment is involved, the program has been a voluntary and cooperative one. Thus far, the Commission has given primary attention to the broadcast stations. The response of the broadcasters has been excellent. In fact, their assistance has been so productive that the Commission has been able to develop a sound basic plan for alerting broadcast stations and controlling their operations during an alert in a manner to confuse an enemy.

In brief, the objective of the CONELRAD program is to minimize the use of radio signals which might guide enemy craft and, at the same time, assure the maximum possible availability of radio stations and equipment for civil defense purposes and for use in connection with other essential emergency activities, such as the production and distribution of essential goods and services and the maintenance of communication services in the interest of public safety and morale.

The Executive order is being used to implement and facilitate the accomplishment of this program along the same line that it has been following since it was started, with revisions or modifications being made from time to time as increasing knowledge and experience becomes available.

4. MISCELLANEOUS DEFENSE AND PROTECTIVE SERVICES

During the year (on December 19, 1951), the Commission moved to establish a Radio Amateur Civil Emergency Service in which amateur radio stations and operators could provide communication for civil defense purposes during the emergency. The Amateur Radio Service, which has long furnished temporary regional networks in time of flood, hurricane, and other disaster, also has a military amateur radio system operating in conjunction with the Army and Air Force.

Earlier in 1951 the Commission established a Disaster Communications Service, which enables Government and non-Government stations to engage in emergency communication, and it also set up rules to permit non-Government stations to use Government frequencies in an emergency. In the same year it reactivated the State Guard Radio Service, which affords radio facilities for State guards in States where the National Guard has been called into Federal service. At different times it has liberalized the commercial operatior rules because of the scarcity of certain operators, especially on board ships.

Other established public safety services include the Special Emergency Radio Service, which is concerned with the protection of life and property under emergency conditions; and services devoted to police, fire, forestry, conservation, and highway protection. Radio is also used by the Civil Air Patrol, a civilian auxiliary of the Air Force.

All these services are described in more detail elsewhere in this report.

The Commission adopted plans to carry on essential operations with a minimum of interruptions under any foreseeable circumstances. Commission facilities and personnel would be improvised to the extent possible to (1) continue the most urgent Commission functions, (2) protect its personnel, property and records, and (3) assist others, insofar as possible. Staffing and training in such emergency measures were well advanced at the close of the fiscal year.

CHAPTER III—COMMON CARRIERS

1. REGULATION

Interstate and foreign communication by telegraph and telephone—whether by wire, ocean cable, or radio—is subject to Commission regulation.

The Communications Act, among other things, requires that every subject common carrier furnish service upon reasonable request and at reasonable charges. No carrier may add or acquire facilities, or curtail or discontinue service, without Commission approval. Their charges, practices, classifications, and regulations must be just and reasonable and nondiscriminatory. To implement this requirement, the common carriers concerned file tariff schedules with the Commission, and those schedules are subject to Commission review and regulation.

Rates for interstate telephone and telegraph services, as well as rates for such services between the United States and foreign and overseas points, are regulated by the Commission, which also reviews the adequacy and quality of these services.

The Commission is further empowered to prescribe the forms of records and accounts is kept by these carriers. Under this authority, it has established uniform systems of accounts for them to follow.

The Commission is required by law to approve construction of new lines and extensions or supplementations of lines which are to be used for or in connection with interstate service before any such construction may be undertaken. Further, the Commission regulates the interlocking of officers and directors of subject common carriers, it being unlawful for any person to hold office in more than one carrier unless specifically authorized by the Commission. The Commission also passes upon applications of such telephone and telegraph carriers for authority to merge or consolidate.

Common carrier wire service which is purely intrastate in character is not, in general, subject to Commission jurisdiction. However, operation of common carrier radio facilities come under provisions of the act which require the licensing of all radio transmitters.

The Commission receives applications to land or operate submarine cables connecting the United States with other countries, and advises the President with respect to the granting of such licenses, after receiving the approval of the Secretary of State.

2. DOMESTIC TELEPHONE

GENERAL

Expansion of the domestic telephone industry continued at an accelerated pace throughout fiscal 1952 and current indications are that this growth will continue during the coming year. During the calendar year 1951, the Bell System expended $1,059 million for new facilities, thereby increasing its gross plant investment to approximately $11 billion. While no totals are currently available, it is known that substantial expenditures were also made by the independent telephone industry (non-Bell companies) which, it is estimated, if added to the Bell System figures would bring the total gross plant investment of the industry to more than 12 billion.

An indication of this tremendous expansion is the fact that the amount expended to build new telephone plant in the last 6 years is greater than the total investment in such plant at the end of World War II. The highlights of this development during fiscal 1952 included the opening of the transcontinental microwave radio relay system providing the seventh basic coast-to-coast voice communications system, over which telephone calls and television programs are relayed by radio beam; the use on a large scale of microwave radio relay systems to "backbone" long-distance telephone routes, 450,000 miles of telephone channels now being provided by this method; and the initiation on November 10, 1951, on a trial basis at Englewood, N. J., by the New Jersey Bell Telephone Co., of customer dialing of long-distance calls.

The telephone companies also pursued a program to assure the continuation of essential services during emergencies. The Bell System program includes arrangements and facilities for shunting telephone traffic around disaster points, provision of stand-by power units at central offices, utilization of mobile radio and portable telephone units at strategic locations, and preparation of detailed plans for restoration of essential lines of service.

At the end of calendar year 1951 there were over 45 million telephones in service in the United States, of which 37.4 million were op-

erated by the Bell System and approximately 8 million by the independents. The Bell System added 2,070,000 phones during 1951 as compared with 1,950,000 the previous year, and reported 718,000 orders for main service and 1,606,000 requests for up grades in service as of June 30, 1952.

For the calendar year 1951 there were approximately 139,125,000 average daily local telephone conversations, and long-distance traffic was greater than in any previous year, averaging over 6 million calls a day. This constitutes an increase of 2.9 percent in local conversations, and 7.5 percent in toll and long distance conversations over 1950. In addition, the teletypewriter exchange service (TWX) calls increased almost 10 percent during the same period.

Dialing of both local and long distance calls continued to increase. Seventy-seven percent of all Bell System telephones now in use are dial, with the independent companies also vigorously pursuing their dial conversion programs. Expansion of extended area service was continued by Bell System and independent companies during 1951. Approximately four million telephone users are now able to dial their own calls to many nearby communities. At the end of 1951, Bell System operators were dialing 38 percent of all long distance calls directly through to destination; and, 1,375 cities and towns in all parts of the country—300 more than a year ago—were connected to the long distance operator dialing network. Customer dialing of long distance calls permits approximately 10,000 one and two party line subscribers in the area of Englewood, N. J., to dial their own station-to-station long distance calls to some 11 million telephone subscribers in the vicinities of Boston, Providence, New York, Pittsburgh, Cleveland, Detroit, Chicago, Milwaukee, Sacramento, Oakland and San Francisco without the assistance of a toll operator. These calls are timed and billed automatically.

Operating revenues of the Bell System increased 10 percent over the previous year, reaching a new high of $3,639,462,365 for 1951. Bell System consolidated net income applicable to American Telephone and Telegraph Company capital stock amounted to $364,874,176, an increase of 5 percent over 1950. Owing to increases in number of shares outstanding, however, net income applicable to A. T. & T. stock dropped from $12.58 per share in 1950 to $11.76 in 1951. At the end of fiscal 1952, there were 1,100,000 A. T. & T. stockholders. Some adjustment in interstate rates including both increases and decreases were authorized by the Commission during fiscal 1952, as a result of changes in separation procedures.

The expansion in the Bell System is illustrated by the following table of selected data:

Year	Number of telephones	Plant investment	Revenues	Employees
1940	17, 483, 981	$4, 701, 177, 364	$1, 174, 322, 517	275, 317
1945	22, 445, 519	5, 702, 056, 557	1, 930, 889, 452	387, 300
1950	35, 343, 410	10; 101, 521, 562	3, 261, 528, 032	523, 251
1951	37, 413, 614	10, 949, 685, 522	3, 639, 462, 365	551, 415

DOMESTIC TELEPHONE SERVICES

Construction of facilities.—As previously indicated, the telephone industry expended about $1.2 billion in the expansion and improvement of existing facilities during 1951. As in the past years, the bulk of the additions to physical plant has been in central office equipment, buildings, station apparatus and exchange lines. Commission authorizations for the construction of facilities to be used in connection with interstate and foreign services reached an all time high of more than $149 million. During fiscal 1952, the Commission granted 323 applications for authority for construction, lease or acquisition and operation of wire and cable toll facilities for use in connection with interstate and foreign telephone services, compared to 218 granted during fiscal 1951. These applications involved estimated construction costs in excess of $107.5 million. This included the annual blanket application of A. T. & T. and some of its associated companies which, for the calendar year 1952, authorized the construction and installation of facilities at an estimated cost of $59,175,000, almost twice the amount requested in the 1951 blanket application.

The following table shows the estimated costs and amounts of wire and cable construction authorized by the Commission since 1943.

Fiscal year	Number of projects	Cost	Sheath miles of cable	Tube miles of coaxial units	Conductor miles of open wire
1944	121	$9, 582, 239	574. 8		7, 968
1945	210	70, 091, 140	2, 378. 3	7, 902	2, 963
1946	239	78, 896, 450	3, 193. 8	16, 580	12, 261
1947	289	126, 325, 771	5, 587. 7	23, 490	15, 976
1948	348	127, 162, 199	2, 637. 5	46, 080	16, 373
1949	313	38, 638, 919	1, 370. 5	1, 323	7, 278
1950	141	13, 230, 678	399. 3		3, 491
1951	218	45, 795, 686	957. 1	2, 704	5, 461
1952	323	107, 533, 688	1, 388. 7	2, 972	5, 998

In addition to the construction included in the above table, during fiscal 1952 the Commission received applications from the Bell System companies for authority to construct 10 major microwave radio relay systems, and applications from non-Bell companies to construct seven projects, with an over-all estimated construction cost of $31 million. During the same period, the Commission authorized 11 Bell System companies and six independent company projects representing over-all estimated expenditures of $41.5 million. These micro-

wave radio relay systems, employed in the transmission of both telephone toll messages and television programs, together with those previously approved, will bring the industry investment in microwave radio relay facilities to more than $90 million, all since World War II.

By the end of the fiscal year, the Bell System had linked, via its microwave radio relay facilities, 28 States and the District of Columbia, and had also embarked upon microwave radio system construction to link two additional States. Provision had also been made for transmission of television program material from the United States to Toronto, Canada, by linking the Bell System microwave relay facilities with similar facilities of the Bell Telephone Co. of Canada. By means of its microwave systems together with its coaxial cable facilities (almost 30,000 miles of television channels) the Bell System was able to render television network program transmission service to 107 out of the 108 TV stations in 65 cities.

Although the expansion of operations in this field of domestic common carrier radio was predominantly by A. T. & T. and its associated companies, increasing interest in the use of microwave radio for point-to-point communications has been shown by various independent communications companies, as evidenced by grants for new radio systems to five such companies in the United States, Puerto Rico, and the Territory of Hawaii.

Discontinuance, reduction or impairment of service.—During fiscal 1952, the Commission granted 10 applications for authority to discontinue telephone service. Six involved the substitution of one carrier for another in the furnishing of wire line toll service. The remaining four were filed by miscellaneous carriers for authority to discontinue service furnished through domestic public land mobile radio service stations in De Ruyter and South Bristol Township, N. Y.; Taunton, Mass., and Centralia, Wash. Three applications for authority to discontinue wire telephone toll service were pending as of June 30, 1952.

Speed of service.—The average time required by the Bell System to complete a telephone toll call, as measured by Bell (see seventeenth annual report) was 1.8 minutes per call during 1951, or 14 seconds slower than the average for the year 1950. This slower speed was reported to have been due to the heavy load on facilities, particularly on routes where demand increased sharply, or where many circuits had been devoted to the military services. The Bell System also reported that it completed 93 percent of all toll calls on a "no hang-up basis".

Foreign attachment cases.—The last annual report noted that an initial decision had been rendered and exceptions had been filed in the case of *Hush-A-Phone Corp. et al.* v. *American Telephone and Tele-*

graph Co. et al. (Docket 9189), which involved the lawfulness of the so-called foreign attachment provisions of the defendant's tariffs insofar as they were construed to prohibit the use of the Hush-A-Phone device. Oral argument in this proceeding was heard November 30, 1951, and the Commission's final decision is pending. Oral argument on the complaint of *Jordaphone Corporation of America et al.* (Docket 9383) and *In the Matter of the Use of Telephone Answering Devices in Connection with Interstate and Foreign Telephone Service* (Docket 9701), both of which proceedings involve the lawfulness of the foreign attachment regulations as applied to automatic telephone answering devices in connection with interstate and foreign service, was held before the Commission en banc on June 24, 1952, and a final decision is pending.

Domestic Public Land Mobile Radio Service.—This service provides communication facilities for hire, primarily between fixed points and mobile units on land and, secondarily, to vessels and remote fixed points. The service is of two general classes: that furnished by landline telephone common carriers interconnected with the landline telephone system; and that furnished by the so-called miscellaneous or nontelephone company carriers which do not provide direct connection with the landline telephone system. There is also a one-way signaling or radio paging service to mobile units, and a mobile facsimile service by which telegraph messages are sent to and from mobile units in connection with the message handling and delivery procedure of landline telegraph systems.

A continued expansion marked this service during the year. The service provided by landline telephone company carriers (Bell System and independent companies) was extended to 17 more cities, making it available in 180 cities (an increase of 10.4 percent over last year) in 41 States, the District of Columbia and the Territory of Hawaii. The number of associated mobile units aggregated 20,866 units, an increase of 21.4 percent over the preceding fiscal year. The service provided by the miscellaneous (nontelephone company licensees) carriers was extended to 41 additional cities (an increase of 27 percent over last year), making it available in 193 cities in 38 States, the District of Columbia, Puerto Rico, and the Territories of Alaska and Hawaii. The number of mobile units in this latter group totaled 12,969, an increase of 44.6 percent over the preceding year. Many adjacent communities receive mobile radiocommunication service from the established systems.

During the year, the first common carrier land mobile radiocommunication systems were authorized to operate in Alaska and Puerto Rico, respectively. Previously, similar systems had been licensed to operate in the Territory of Hawaii.

Final decisions were issued by the Commission in cases involving applications to establish mobile radiocommunication systems by miscellaneous common carriers in the Chicago area (Dockets 9837 et al.) and the Dallas-Fort Worth area (Dockets 9849 et al.). An initial decision was issued in the proceeding involving applications in the Los Angeles area (Dockets 9723 et al.) and an oral argument held thereon. A decision has not yet been reached with respect to the applications in the New York City area (Dockets 9761 et al.). One new hearing was held during the year on applications in the Miami-Fort Lauderdale area (Dockets 10017 et al.) and an initial decision was issued and oral argument held thereon. The conflicting applications in the St. Paul-Minneapolis area (Dockets 9882 et al.), which were pending at the end of the preceding fiscal year, were dismissed at the request of the applicants.

In the Matter of Application of Martin J. Nunn for construction permit for one base station and 10 mobile units to operate in the Domestic Public Land Mobile Radio Service in the vicinity of Rome, N. Y., the Commission considered the question of the extent to which competition between miscellaneous common carriers would be desirable. A protest had been filed, principally on the basis that one system was already established and that there was not sufficient business to support two such systems. By memorandum opinion and order dated December 11, 1951, the Commission held that the institution of a competitive service, in that instance, would be desirable and in the public interest and may spur the growth and development of the service.

In the latter part of the year, a treaty was concluded between the United States and Canada permitting mobile radio units properly licensed in either country for common carrier service to obtain like communication service while in the territory of the other country. Procedures for the registration of such units, in accordance with the applicable provisions of the treaty, were being developed.

A sharp increase in interest in the one-way signaling service was shown in the past year. Prior to that time, only one radio station (in New York City) had been licensed to provide such service. However, during the last quarter of the fiscal year, 17 new applications were received. By the close of the fiscal year, construction permits had been issued for the establishment of such service in 3 other cities and 16 applications were pending for similar facilities in 8 additional cities. In the cases of New York City, Chicago, and in the Washington-Baltimore areas, the number of applications exceeded the frequencies available for assignment, and will probably require the holding of comparative hearings to determine which, if any, should be granted.

An initial decision was issued and oral argument held on the competing applications for one-way signaling service in Los Angeles (Dockets 9847 et al.) and this case was awaiting final decision. The applications for one-way signaling service in Washington, D. C. (Dockets 9825 et al.), which were pending at the close of the previous fiscal year, were dismissed at the request of the applicants.

In an important policy determination, involving the one-way signaling service, the Commission by memorandum opinion and order dated September 19, 1951, *In the Matter of Petition of Robert C. Crabb for rule-making proceeding to determine maximum number of radio-paging authorizations to be issued to a single licensee*, held that it did not deem it advisable to establish a rule, at this time, that would limit the number of authorizations to be issued a single licensee.

The petition of Bell Telephone Laboratories, Inc. (Dockets 8736 et al.), requesting the allocation of approximately 40 megacycles of frequency space between 400 and 500 megacycles for the development of a broad band multichannel system of public mobile operation, which was pending at the end of the preceding year, was denied without prejudice. At the end of the year there were pending two related petitions filed by the Bell System and the United States Independent Telephone Association, respectively, requesting the assignment of additional radio frequency channels for public mobile and point-to-point telephone services.

A rule-making proposal was initiated and concluded (Docket 10088) establishing two new frequency zones and assigning additional frequencies thereto in order to help meet the increasing demand for highway radiotelephone service and afford greater flexibility in the use of stations providing highway mobile service between large metropolitan areas. The rule change also made provision for an additional frequency available for stations providing exclusively a one-way signaling service to mobile units.

Rural subscriber and short haul toll radiotelephone services.—There was a continued expansion in these services which provide short distance radio communication to areas where rugged terrain, etc., make it impractical to construct wire lines. Such facilities play an important function in operations involving farming, ranching, mining, oil drilling, etc., in areas remote from wire-line communication. During the year, the Commission authorized the first rural subscriber radiotelephone system to be constructed with funds made available through the Rural Electrification Administration. In that case, the radiotelephone facilities were licensed to provide a communication service with subscriber dialing for a group of persons in an area where it was not economically feasible to provide wire line telephone service.

Radiocommunication service in Territories and possessions (except Alaska).—The increased use of radio for communication in the Territories and possessions was accented by the construction of new microwave radio relay facilities in Puerto Rico and the Territory of Hawaii for intraisland transmission of telephone and telegraph traffic. In connection with the petition filed by Mutual Telephone Co. of Hawaii, mentioned in the 1951 annual report, the Commission initiated a rule-making proceeding (Docket 10094), proposing to allocate frequencies in the bands 76–88 and 98–108 megacycles for assignment to stations of communications common carriers operating in that territory.

Coastal and Alaskan services.—These services, though largely authorized on a common carrier basis, are discussed in a separate chapter on Safety and Special Radio Services because of their close relationship to radio aids for the safety of life and property.

Acquisitions and consolidations.—During fiscal 1952 four applications were filed by domestic telephone carriers for authority under section 221 (a) of the Communications Act to acquire the property of another domestic telephone company. After due notice and public hearings, three of these applications were granted and an initial decision was issued looking toward a grant of the fourth.

Interlocking directorates.—The Commission received 23 applications filed by individuals pursuant to section 212 of the Communications Act for authority to hold positions of officer or director of more than one domestic telephone carrier subject to the act. Twenty-one of these applications had been granted and two were pending.

RATES AND TARIFFS

Tariff schedules.—At the close of the year, 294 telephone carriers had tariffs and concurrences on file with the Commission, an increase of 33 over the previous year. New carriers in the domestic public land mobile radio service accounted for the increase. During the year a total of 26,406 tariff publications establishing new rates or modifying rates, regulations, practices and classifications of service were filed. Of these, 6 were rejected for failure to comply with the Commission's rules. There were no suspensions of tariffs. The large increase in tariff publications over last year (10,487) was due primarily to the March 1, 1952, message toll rate change referred to elsewhere in this report.

Special permissions.—Eighteen applications for special permission to make changes in tariffs to become effective on less than statutory notice or involving waiver of certain rule requirements were received. All were granted.

Charges based on cost.—Last year's annual report referred to the Commission's progress in securing elimination of provisions in the

tariffs of the telephone carriers which provide that when special types of facilities or services are furnished to meet specific customer needs, the charges therefor will be based on the costs involved. By the close of the year, specific charges had been published for all facilities or services then being furnished by the Bell System telephone carriers with the exception of charges for special construction where suitable facilities are not available and construction involves unusual costs.

Unlawful use of telephone facilities.—Previous annual reports have mentioned the complaint of Harry and Bertha Katz against the American Telephone & Telegraph Co. and the Chesapeake & Potomac Telephone Co. alleging the unlawfulness of the Bell System companies' tariff regulations which provide that telephone service is furnished subject to the condition that it will not be used for an unlawful purpose and further providing for the discontinuance of service upon notification to the telephone company by a law-enforcement official that the service is being or will be used for an unlawful purpose (Docket 9500). On December 21, 1951, the Commission issued its decision holding that the second portion of the regulation relating to discontinuance upon notification by law-enforcement officials was unjust and unreasonable. The Commission stayed the effective date of its decision, however, pending consideration of a petition for rehearing and reconsideration filed by the defendant companies.

Investigation of Bell System rates.—The seventeenth annual report discussed the reasonableness of the level of earnings from Bell System interstate and foreign communication services.

On November 21, 1951, the Commission vacated that portion of its order of January 19, 1951, in Docket 9889 which directed the Bell companies to show cause why their rates for interstate message toll telephone service should not be reduced pending conclusion of the proceedings of investigation instituted by the January order. This was done because the revised plan for apportioning local telephone exchange costs between intrastate and interstate telephone service, which was proposed by the Commission and accepted by the National Association of Railroad and Utilities Commissioners at its 1951 annual convention, had the effect of shifting revenue requirements from intrastate to interstate in a total amount on the order of $30 million annually and thus removed the immediate bases for the show cause aspect of the January order. (See subsequent item on separation procedures.)

To compensate the Bell System companies for about one-half the amount of revenue requirements transferred from intrastate to interstate operations by the modification of cost-allocation procedures, interstate message toll telephone rates were revised effective March 1, 1952. In general, these rates were increased at the shorter distances (within 582 miles) and were decreased at distances in excess of 582 miles. The

increases were estimated to produce additional annual revenues amounting to $22¼ million and the reductions were calculated at $7¾ million which, after allowance for an increase in payouts to connecting companies of one-half million dollars, left a net increase in Bell System interstate revenues of $14 million annually.

The increased rates at the shorter distances served to lessen substantially the number of instances where intrastate long-distance rates were higher than interstate rates for equivalent distances. These disparities have been the subject of concern and joint study for several years by state regulatory authorities, this Commission, and the Bell System. The increases in short-haul rates, in addition to alleviating the disparity situation, brought such rates into closer alinement with the best estimates of costs of rendering service at those hauls so that an apparent inequity which had existed as between short- and long-haul users was removed, or at least greatly eased.

Numerous rate structure reforms were included in the March 1, 1952, interstate rate changes. For example, for over 30 preceding years the basic station-to-station day rate for 1 through 12 miles for an initial period of 5 minutes had been 10 cents. There had, however, been exceptions to this rate where the initial period charge for 5 minutes was 5 cents for distances of 6 miles or less, and these exceptions included such heavy traffic routes as Philadelphia-Camden and St. Louis-East St. Louis. These 5-cent exceptions were eliminated on March 1, 1952, along with adjustments in the length of the rate steps. At the same time the former 5-minute initial period was reduced to 4 minutes and the former 3-minute overtime period applicable in this rate step was reduced to 2 minutes with the overtime unit charge left at 5 cents. Similar reductions in the initial period from 5 minutes to 4 minutes were made in other rate steps through 24 miles, and in the 25- to 30-mile rate step the initial period was reduced from 5 minutes to 3 minutes. These reductions in initial periods were accompanied by reductions in the length of the overtime periods and there was also a rationalization of the rates and chargeable time practices on collect calls at these shorter hauls.

The differential in day person-to-person initial period rates over day station-to-station rates was adjusted to approximate a uniform 40 percent with a minimum differential amount of 15 cents substituted for the former 10 cents. The former rate schedule provided for 49 rate steps wherein the day station-to-station rate was increased by 5 cents for each succeeding step. The schedule adopted March 1, 1952, was shortened to 36 rate steps which was accomplished by inserting several 10- and 15-cent steps at the greater distances.

In the years since the creation of the Commission in 1934, there has been a steady movement toward uniform interstate message toll

telephone rates throughout the United States. By 1941, when the Pacific Telephone & Telegraph Co. was ordered to reduce its intraterritorial interstate rates to the level of the schedule in general use throughout the country (8 F. C. C. 342), this Nation-wide uniformity had been substantially achieved. One exception not cleared up, however, was in the five States served by New England Telephone & Telegraph Co., where, between 1 and 48 miles, there were various deviations from the standard pattern of rates. These deviations were eliminated on March 1, 1952.

Between points on Long Island, on the one hand, and points in nine Northeastern States, on the other hand, rate distances for long-distance telephone calls have historically been measured via New York City as a turning point. This method of distance computation followed the physical routes of toll lines but was inconsistent with the direct airline distance method of measurement ignoring geographical barriers in use elsewhere. Elimination of the New York City turning point for these distance measurements was among the reforms made effective March 1, 1952.

The investigation phase of the proceedings in Docket 9889 is being continued in order that the Commission may observe the effects of the March 1 rate revisions and the changes in allocation procedures upon the Bell System's level of interstate earnings.

Separation procedures.—One of the highlights of fiscal 1952 was the revision of the procedures for separating and apportioning telephone plant investment and expenses between interstate and intrastate operations. Since a major portion of telephone property is used in common for these services, a uniform method of separation, acceptable to both the State and Federal regulatory bodies, is essential so that property and expenses of each company subject to the respective jurisdictions may be determined for rate-making purposes.

As outlined in the previous annual report, serious questions had been raised by various State regulatory authorities, through the National Association of Railroad and Utilities Commissioners (NARUC) with respect to the reasonableness of the separation procedures, particularly in view of the fact that intrastate message toll telephone rates in the large majority of the States, were considerably higher than interstate rates for equivalent distances; and that these disparities would be further aggravated by pending intrastate rate increase applications and by possible interstate rate reductions.

This matter received intensive study by representatives of the State commissions and of the FCC during fiscal 1952 and culminated in revised procedures proposed by FCC Chairman Paul A. Walker at the annual convention of the NARUC at Charleston, S. C., in October 1951. The proposal, which had been approved by the Commission for

use on an interim basis, was unanimously approved by the convention for interim use by the States in State-rate proceedings.

In brief, these revised procedures have the effect of transferring from intrastate to interstate operations of the Bell System approximately $90 million exchange plant gross book cost and $22 million of associated annual expenses, thereby reducing the intrastate revenue requirements of the Bell System companies in every State and increasing the revenue requirements applicable to interstate long-distance telephone service, as more fully discussed in the previous section on Investigation of Bell System Rates.

Toll rate study.—The toll rate study referred to in the 1951 annual report was completed and the report of the FCC–NARUC committee, entitled "Message Toll Telephone Rates and Disparities" was issued by the NARUC prior to its convention in October 1951. The report, in printed form with 429 pages, is for sale by the National Association of Railroad and Utilities Commissioners, Washington 4, D. C.

OTHER REGULATORY MATTERS

State telephone rate cases.—Within the limits of budget and staff availability, the Commission continued to give technical assistance to State commissions and municipalities in connection with telephone rate increases proposed by Bell System companies. This assistance was generally in the form of consultation in Washington and correspondence on specific questions of mutual concern in State and Federal regulation. A condensed compilation of selected earnings and balance sheet data for each Bell telephone company and for the Bell System as a whole has been prepared and distributed to State commissions at 6-month intervals in recent years. Because of the apparent usefulness of these data to the State commissions, the NARUC's committee on telephone regulatory problems in January 1952 requested continued distribution of these as well as other related data.

Charges for interstate telephone service within the Washington metropolitan area (WMA) (Dockets 8110 and 8112).—On March 26, 1952 the Chesapeake & Potomac Telephone Cos. of Virginia and Baltimore City petitioned the Commission to dismiss the above proceedings which involve the reasonablness of increased charges for interstate telephone calls between metropolitan area points in Virginia and Maryland, and the jurisdiction of the Commission over such charges. In the alternative, the companies ask relief from an order of the Commission requiring them to keep records of charges collected in excess of the previously effective rates for the purpose of possible refunds to subscribers. This matter is currently receiving attention.

Depreciation.—Further progress was made in carrying out the Commission's continuing program of prescribing, pursuant to section 220 (b) of the Communications Act, depreciation rates for telephone com-

panies. Depreciation rates were prescribed during the year for six additional companies of the Bell System, namely, Illinois Bell, Ohio Bell, Indiana Bell, Southern New England Telephone Co., and for each of the operating areas served by Southwestern Bell in six States and by Northwestern Bell in five States. The rates prescribed for these six companies resulted in annual depreciation charges aggregating $93,388,200 and represented a total reduction of $6,838,200, or 6.8 percent in the annual charges based on the depreciation rates in effect prior to the Commission's action. In addition, the Commission modified certain of the depreciation rates previously prescribed for the Bell Telephone Co. of Pennsylvania, Southern Bell, and New Jersey Bell. In the case of these three companies, the represcribed rates produced annual charges amounting to $73,913,300 and represented a total reduction of $1,069,800, or 1.4 percent in the annual charges based on the rates prescribed previously.

By the end of the fiscal year, the program of prescribing depreciation rates for telephone companies has been carried out with respect to 18 Bell companies, including the long-lines department of the A. T. & T., out of a total of 23 companies within the system. The net effect of these prescribed rates, estimated on the basis of the annual depreciation charges for 12 months ending April 30, 1952, represents a total reduction of over $27,000,000 or 7.8 percent in these charges on an annual basis. This net effect does not reflect a reduction in depreciation charges of the Pacific Telephone & Telegraph Co. As noted in the last annual report, this company has adopted on its own initiative the depreciation rates recommended by the Commission's staff, although formal prescription of these rates has been deferred pending completion of further studies conducted by certain of the State commissions within the territory served by the company. Studies have been completed looking toward prescription of rates for two additional Bell companies and revision of certain of the rates previously prescribed for the four telephone companies comprising the Chesapeake and Potomac group.

Due to considerable increase in telephone plant facilities, depreciation expense charges of telephone companies continued to increase in spite of the downward adjustments in depreciation rates noted above. For the 12 months ending April 30, 1952, these charges in the case of the 23 companies within the Bell System amounted to almost $387,500,000, an increase of $25,000,000, or 6.9 percent over the charges for the previous 12 months. This increase, however, was proportionately less than the increase in plant average book cost which was 8.3 percent during the corresponding period.

NARUC committee on depreciation.—The Commission's representatives actively participate in the work of this committee. During the year the committee initiated inquiries and studies looking toward the

development of (*a*) new improved service-life study methods for classes of property for which mortality data are not available; (*b*) improved depreciation practices and accounting with respect to telephone apparatus and other station equipment; and (*c*) possible modification of the system of accounts to classify station installations and drop and block wires as depreciable accounts.

Western Electric earnings and prices.—Cooperation with the NARUC special committee on telephone regulatory problems was continued during the year on the matter of prices, costs, and profits of Western Electric Co., Inc. The position of this company as the manufacturing and supply unit of the Bell System means that the prices it charges the Bell operating companies for equipment, supplies, and services can have a considerable influence on rates and charges for telephone exchange, and intrastate and interstate toll service. Such sales to Bell companies amounted to $805 million in the calendar year 1951. Western Electric in that same year realized a return on its net investment in assets of over 9 percent. Effective April 1, 1952, Western reduced its sales prices by about 11 percent on switchboards of its own manufacture. These price reductions amount to about $45 million annually at Western's current level of sales. Prior to the announcement of the price reductions, the Commission had called Western's attention to the level of its earnings with a suggestion that price reductions appeared to be in order.

Bell System Federal income taxes.—As a result of changes introduced into the income tax laws by the Excess Profits Tax Act of 1950, A. T. & T. commenced filing consolidated Federal income tax returns for itself and those of its telephone operating subsidiaries eligible for inclusion in such returns. The consolidated basis of filing necessitates an allocation of the consolidated tax liability among the companies included in the return. There are a number of methods of allocation. The method adopted by the Bell System is esentially allocation on the basis of source of consolidated return taxable income with a provision that no subsidiary shall bear more taxes than it would have had it continued to file a separate return. The staff of the Commission discussed the matter with representatives of the A. T. & T. and also with representatives of State regulatory commissions. While the question had not been finally resolved at the close of the year, it appeared that no changes may be required at this time in accounts of the Bell System companies, but that they would undertake to make available periodically to the various regulatory bodies full information on the tax allocation including the effects on income taxes of the parent and each subsidiary of apportioning the corporate debt of the parent A. T. & T. among the subsidiaries before computing the tax allocations.

NARUC committee on accounts and statistics.—During fiscal 1952 this committee made substantial progress in drafting proposals for revised uniform accounting rules which incorporate recommendations of the several regulatory agencies, the affected industries, and Nationwide accounting organizations. These proposals will be of value to the Commission in future revisions of its rules and regulations. The committee also recommended that the several State commissions exercising jurisdiction over telephone carriers adopt the interpretations issued by this Commission and the revised CPR rules referred to hereinafter.

During the year the committee conducted studies and discussions with respect to appropriate allocation among the companies included in the consolidated tax return of the Federal taxes on income of A. T. & T. and its telephone subsidiaries.

The Commission's staff participated actively and furnished a substantial portion of the data used in these studies and discussions.

Continuing property records.—The detailed studies reported in the last annual report were continued during fiscal year 1952 and resulted in the drafting of revisions of CPR requirements prescribed in part 31 of the Commission's rules. At the end of the fiscal year these revisions were in process of rule making.

Pensions and relief.—In the calendar year 1951, pension and other benefit costs for the Bell System, including manufacturing and research activities, amounted to approximately $217,000,000. As of December 31, 1951, the combined pension trust funds of these companies totaled approximately $1,385,000,000. Periodic studies are made to determine the reasonableness of the selection of data underlying each of the basic actuarial factors used in the Bell System pension studies.

During the fiscal year 1952 studies were continued with respect to the treatment acorded pension costs in numerous state rate cases and the relationship thereof to prescribed accounting regulations.

Preservation of records.—In cooperation with the United States Senate Special Committee to Investigate Organized Crime in Interstate Commerce, the Commission required retention, for periods in excess of normal, of toll call records by telephone companies. Since the committee's purposes have been served, the normal periods of retention of these records have been restored.

An interpretation of the microfilm rules, permitting utilization of the full capacity of microfilm reels in storing records, had the effect of permitting more economical usage of this method of record-keeping.

Restatement of plant accounts on basis of original cost.—The accounting for several current acquisitions of plant (including mergers of small companies) at original cost was handled during the fiscal year. As stated in the 1951 report, the restatement of telephone plant

accounts on basis of original cost has been substantially completed. There remain, however, a few significant items among Bell System companies and several items among non-Bell companies where final adjustments of the accounts have not been affected. Certain of these items are being given current attention and efforts are being made to complete the remaining adjustments as soon as possible. In this connection, during the fiscal year the Commission was successful in obtaining a transfer of $1,665,449.09 from the surplus account to the depreciation reserve account of the New England Telephone & Telegraph Co., as part of its efforts to restate plant investment on a sound basis.

Annual and monthly report forms.—A complete revision of Annual Report Form M (applicable to class A and class B telephone companies) was adopted during the year. While continuing to provide for the filing with the Commission of information needed for regulatory purposes, the revised report form eliminates many of the details included in previous forms. The revised form also makes use of modern reproduction processes, effecting considerable saving in costs to both the Commission and the respondents.

The monthly report form required to be filed with the Commission by class A telephone companies (those having annual operating revenues exceeding $250,000) was also revised. The revision incorporated a few additional items needed by the Commission on a monthly basis, and clarified the instructions, in addition to making use of modern reproduction processes.

Annual Report Form L (applicable to nontelephone company common carriers operating in the Domestic Public Land Mobile Radio Service) was modified through the issuance of a letter of instruction to the respondents, permitting further condensation of the information filed with the Commission by these common carriers.

Uniform systems of accounts for telephone companies.—Amendments to the accounting rules were made effective which relieved the smaller carriers from keeping the more detailed accounts formerly required. Likewise, existing rules were clarified by the issuance of revised accounting interpretations which, in one instance, relieved the carriers from performing detailed accounting with respect to smaller acquisitions of property and, in another instance, provided for simplification of the accounting with respect to certain types of work performed by the carrier, for which work it is reimbursed for the costs incurred. An interpretation was issued with respect to appropriate accounting for acquisitions by Bell System companies of farmer lines and service stations.

At the end of the year staff studies were in progress which have for their objectives the amendment or clarification of the accounting rules for the purpose of (*a*) coordination of the accounting prescribed for class C telephone companies with that prescribed for class A and

class B companies; (*b*) revision of the lists of retirement units (which are used in determining whether costs are to be included in the operating expense accounts or the capital accounts); and (*c*) recognition in the accounting rules of modern concepts of accounting applicable to public utilities, which are presently in process of development by several national accounting organizations.

Revised classification of telephone employees.—On October 10, 1951, the Commission adopted a comprehensive revision of part 51 of its rules, including a change of title to "Occupational Classification and Compensation of Employees of Class A and Class B Telephone Companies". The revised rules simplify and condense the data required to be prepared by these carriers and exempt the class C companies from preparing such information.

Accounting research.—Many of the telephone companies that are subject to the accounting requirements of the Commission are subject, also, to State regulation, and section 220 (i) of the act requires the FCC to consider the views and recommendations of State commissions concerning accounting requirements. Some of the telephone companies engage in other public utility services such as furnishing gas or electric services, and all of the larger companies are subject to regulations (including accounting regulations) issued by the Securities and Exchange Commission and certain other Federal agencies. Constant research and review of current accounting regulations of other agencies, as well as contacts with the several accounting organizations, is necessary to avoid issuance of conflicting rules or interpretations with respect to accounting requirements for these telephone companies.

During fiscal 1952, problems of joint property ownership between telephone companies and electric utilities (particularly joint use of poles) occasioned research with respect to both past and current accounting practices of these industries, as well as a determination of the needs of the Rural Electrification Administration in accounting for joint projects of this nature. Research was also conducted with respect to the credit-extension practices of the Bell System companies, and the effect of such practices on the write-off of uncollectible accounts. Research was made for the purpose of determining the reasons underlying changes in accounting regulations, as revealed by five new uniform systems of accounts adopted or proposed by other regulatory agencies, and the desirability of incorporating similar changes in the accounting regulations promulgated by the Commission.

At the close of the fiscal year research studies were in progress with respect to the accounting concepts and practices of various industries, accounting organizations, and regulatory agencies in (*a*) determination of current income, and (*b*) disposition of the cost of issuance of capital stock.

3. DOMESTIC TELEGRAPH

GENERAL

The Western Union Telegraph Co.'s land-line telegraph system comprises substantially the entire domestic message telegraph industry in the United States. (Although Western Union renders private line and other nontransmission telegraph services, the telephone companies furnish a major portion of such services, as well as teletypewriter exchange service.)

During fiscal 1952, Western Union experienced marked set-backs in the improvement in financial and operating conditions enjoyed in the previous fiscal year. Western Union became obligated to increase wages on July 1, 1951, and again on September 1, 1951. Following hearings before the Commission, increased rates for interstate telegraph service to offset, in part, the July wage increases were permitted to become effective in the latter part of August and on September 1, 1951. The interstate rate increases, together with similar increases for intrastate services, were designed to increase Western Union's revenue about $10,500,000 a year.

In the third calendar quarter of 1951, operating results turned downward, reflecting the 2-month lag in effecting rate increases to offset wage increases. For the calendar year 1951, Western Union reported for its system-wide operations (including international ocean-cable as well as domestic land-line telegraph operations) net income before Federal income taxes of $10,305,000 as compared with $9,820,000 in 1950. The effect of Federal income taxes, $2,500,000 in 1950 after applying Federal income tax net operating loss carry-overs of prior years and $4,900,000 in 1951, with the loss carry-over benefits no longer available, brought 1951 net income down to $5,405,000, compared with $7,320,000 for 1950. Regular dividend payments, which were resumed in December 1950 amounted to $2 per share in 1951 with an extra dividend of 75 cents per share declared in December 1951 and paid in January 1952. The dividend rate was increased to $3 per share annually as reflected by the quarterly declarations for the first half of 1952. Western Union also effected a change in its capital stock in April 1952; although legal capital remained unchanged, its no-par capital stock, having a book value of approximately $85 per share, was changed to common stock of $10 par value. This change was undertaken for the alleged purpose of securing for Western Union's stockholders the benefit of the lower Federal capital stock transfer taxes.

The reduction of the Federal excise tax rate on telegrams from 25 percent to 15 percent effective November 1, 1951, reduced the public's annual telegraph bill by $14,000,000.

Employees of Western Union engaged in a Nation-wide strike which lasted from April 3 to May 25, 1952. In settlement, the company agreed, among other things, to the establishment of a 40-hour basic workweek and wage increases to be effective concurrently with the effective date of an FCC approved revision in telegraph rates sufficient to offset the additional cost of the wage adjustments, and subject to other governmental approvals. The cost of the proposed wage adjustments is estimated to add $9,800,000 to operating expenses annually. In June 1952, Western Union filed proposals for increased telegraph rates which would add $13,000,000 to operating revenues on an annual basis, for the purpose of recovering the cost of the wage increases agreed to in May 1952 and the cost of the September 1951 wage increase, the recovery of which was not provided for in the 1951 rate increases. Commission analysis of the voluminous data underlying the proposed rate increases, the effective date of which had been postponed from time to time, was underway at the close of fiscal 1952.

SERVICES AND FACILITIES

Speed of service.—The quality of domestic telegraph service rendered by Western Union during fiscal 1952, as measured by the company's daily speed of service studies made at 25 of its largest offices and reported monthly to the Commission, showed slight improvement (with the exception of messages delivered by telephone) when compared with the preceding fiscal year. The average origin to destination speed of service (interval between the time a message is filed by sender and the time it is delivered to addressee, or first attempt) and the average office relay drag (time required to relay a message through a large message center) as reported to the Commission by Western Union for fiscal years 1951 and 1952 are shown in the following table:

	Average speed in minutes	
	1951	1952 (10 months)[1]
Origin to destination:		
Delivered by—		
Telephone	41.2	41.6
Messenger	45.4	45.1
Private tie-line	37.9	37.5
Office relay drag	8.7	8.5

[1] Speed of service studies suspended during April and May 1952, because of strike of telegraph employees.

When possible, the Commission's Common Carrier Bureau makes spot checks of service conditions. However, due to limited personnel and funds, these investigations are necessarily restricted to the most pressing situations. On February 13, 1952, the Commission adopted

a program whereby the Field Engineering and Monitoring Bureau personnel located in some 17 district offices will, to the extent feasible, assist the Common Carrier Bureau by making routine inspections of Western Union offices and agencies during their regular field inspection trips.

Western Union modernization program.—There were no outstanding developments in Western Union's mechanization program during 1951. The most important phase of the program (the installation of automatic and semiautomatic equipment for the intercity relaying of messages) was completed in November 1950 with the inauguration of the reperforator switching center at Portland, Oreg. By the end of 1951, 99 branch offices in nonreperforator cities had been furnished with direct circuit connections to distant reperforator cities for sending messages only. In addition, all branch offices in San Francisco and St. Paul were operating into the reperforator offices at Oakland and Minneapolis, respectively, for both sending and receiving messages. During the year, Western Union provided additional Canadian message centers with direct connections to reperforator switching centers in the United States.

Western Union continued to operate its microwave triangle connecting New York, Washington, and Pittsburgh, for relaying telegrams, but had undertaken no construction to the south or west.

During the year, Western Union continued the development and use of the facsimile process for picking up and delivering telegrams. As of January 1, 1952, approximately 3,800 small machines, known as "Desk-Fax", were in operation on customers' premises, and 7,400 installations were planned for 1952.

The sixteenth and seventeenth annual reports referred to the investigation instituted by the Commission on December 23, 1949, to determine whether or not it is necessary or desirable in the public interest to require interconnection of the intercity video transmission facilities of the Bell System companies with existing and proposed intercity video transmission facilities of Western Union (Docket 9539). Hearings were completed on June 30, 1950, and the examiner's initial decision, issued in January 1951 concluded that such interconnection is not necessary or desirable. Oral argument was held before the Commission in July 1951 and at the end of the fiscal year the matter was awaiting final decision.

Construction of wire facilities.—The Commission received five requests from Western Union covering wire telegraph construction and extensions. Three such applications were carried over from the preceding year, making a total of eight, all of which were granted. The applications granted covered the leasing by Western Union of 196,836 telegraph channel miles of line at an annual rental of $299,612 and the

construction of 43,873 telegraph channel miles of line and associated equipment at a cost of $2,175,000.

Discontinuance, reduction, or impairment of service.—During the year 1,149 applications for reduction in hours of service or closure of public telegraph offices were filed by Western Union. In addition, 156 such applications were pending at the beginning of the year. Of the total, 1,138 applications were granted, 19 were withdrawn and 148 were pending at the close of the fiscal year. Generally, where hours were reduced or offices closed, substitute service was made available.

The last annual report referred to the Commission's report and order issued on January 18, 1950, in Docket 8088, in which it granted Western Union's application for authority to close permanently a branch office in Dallas, Tex. At that time, the Commission reserved jurisdiction to consider whether conditions should be imposed for the protection of employees who may have been adversely affected by the discontinuance of the office. On February 25, 1952, the Commission adopted a supplemental report and order terminating its jurisdiction and concluding that the public convenience or necessity did not require the imposition of conditions providing for the protection of adversely affected employees. In its report, the Commission referred to its memorandum opinion of February 21, 1951, in which it concluded that public convenience and necessity did not require that such conditions be attached to certificates or authorizations for the discontinuance, reduction, or impairment of service by communications carriers.

RATES AND TARIFFS

Tariff schedules.—At the end of the year, 40 domestic telegraph carriers had tariffs or concurrences on file with the Commission. During the year, they filed 1,098 tariff publications establishing or changing rates, regulations, practices, and classifications of service, including concurrences.

Western Union filed revised tariff schedules reflecting its acquisition of the message telegraph business of the Pacific Telephone & Telegraph Co. and the Bell Telephone Co. of Nevada. Tariff schedules filed by Western Union also reflected its discontinuance of public message toll telephone service and its withdrawal from the business of leasing private-line frequency circuits for voice, music, or program transmission, pursuant to the authority granted by the Commission in its decision and certificate in Docket 9235, issued April 9, 1951.

Special permissions.—Thirty-two applications for special permission to make changes in tariffs or file new tariffs to become effective on less than statutory notice, or involving waiver of certain requirements of the Commission's rules, were granted.

Western Union domestic rates.—As previously reported, Western Union filed revised tariff schedules to become effective June 1 and

July 1, 1951, containing certain new and increased rates for interstate message telegraph, money order, and miscellaneous services. By order of May 23, 1951, the Commission, on its own motion, suspended the operation of these schedules and entered into an investigation of the matter (Docket 9980). After public hearings, the Commission on August 24, 1951, concluded that the rate adjustments proposed with respect to Telemeter Service, CND Services, and Leased Facility Services, and the adjustments in the money order premium charges should be permitted to become effective. The Serial Service classification was held to be an unjust and unreasonable classification and Western Union was required to amend its tariffs accordingly. The rate adjustments proposed with respect to message and money order service were found to contain certain discriminatory and other objectionable provisions and Western Union was required to design new schedules eliminating these discriminations and objectionable provisions. It did so, effective September 1, 1951. Subsequently, corresponding intrastate tariff revisions were filed with the various State commissions and have become effective.

On June 6 and 10, 1952, Western Union filed revised tariff schedules, effective July 6 and 10, 1952, respectively, containing certain new and increased charges and regulations for interstate message telegraph, press, money order, and miscellaneous services. The increased charges, according to the company, are designed to produce additional revenues required to offset the major part of a $13,200,000 annual increase in operating expenses, consisting of additional wage expenses which became effective September 1, 1951, in an annual amount of $3,402,000, and further wage expenses in an annual amount of $9,779,000 to be incurred as from the effective date of the subject rate revision as provided for in agreements with the telegraph unions. The effective dates of the new and increased rates for telegraph services subsequently were deferred by the company until September 1, 1952.

On June 20, 1952, Western Union filed revised tariff schedules, effective September 1, 1952, containing certain new and increased charges and regulations applicable to the United States-Canada and St. Pierre-Miquelon Islands message and money order services. These new and increased charges, according to the company, are designed to produce the additional revenues necessary to recover the added wage expense incident to the previously mentioned wage increases and at the same time to place the United States-Canada rates on a uniform and consistent basis.

Leased facility-teleprinter "ticker" equipment charges.—Western Union filed revised tariff schedules to become effective July 6, 1952 (subsequently deferred until August 1, 1952), establishing new and increased charges and new regulations applicable to "tickers" used in

leased facility service. The company estimated that the increased rates would produce additional annual revenue in the amount of about $69,000, based on current volume. The company advises that the New York Stock Exchange plans to lease from Western Union ticker networks for the purpose of disseminating to the public its stock and bond quotations. Up to this time, Western Union has distributed such information directly to the public subscribing to its Commercial News Department, Quotation Ticker Service. The telegraph company estimated that it will receive approximately $1 million per annum less revenue for the lease of the ticker networks to the stock exchange than it receives from the CND Quotation Ticker Service which will be displaced.

Use of leased telegraph facilities for transmission of horse- or dog-racing news.—Western Union amended its tariffs applicable to interstate and foreign leased facilities service used for the transmission of horse- and dog-racing news to become effective February 1, 1952, restricting such service to (1) a press association; (2) a publisher of a newspaper or other periodical entered as second-class matter in the United States Post Office Department; (3) a radio station; or (4) a person, firm, or corporation engaged in the collection or transmission of horse- or dog-racing news to press associations, newspapers, or radio stations for publication or broadcasting. Requests for suspension were received; and, by order of January 30, 1952, the Commission suspended the new tariff provision and ordered a hearing thereon (Docket 10112). Hearings were held in June 1952, and a decision was pending at the close of the fiscal year.

Original cost of plant and continuing property records.—Over a period of 6 years Western Union has made substantial progress in complying with the Commission's accounting regulations that became effective January 1, 1943, which required a revised plant account classification, the restatement of plant investment to basis of original cost, and the establishment of continuing property records of plant and equipment. The Commission has been engaged in a comprehensive analysis of these plant accounting records and procedures in order to be assured of the propriety and reasonableness of the final results.

Depreciation.—As a result of a depreciation study Western Union's depreciation reserve applicable to landline plant was increased and depreciation rates were prescribed effective January 1, 1948. In cooperation with the Commission staff, Western Union is modifying these depreciation rates to reflect developments since that date in connection with plant classifications, changes in the art of record communication and underlying service life and salvage characteristics of plant.

OTHER REGULATORY MATTERS

Uniform system of accounts.—During fiscal year 1952, Western Union changed its outstanding no-par common stock to common stock of a par value of $10 per share. This transaction required an interpretation of the accounting rules to assure retention in the capital accounts of the amounts in excess of par value that had been paid in by stockholders.

Accounting research.—The sale by Western Union, during the year 1948, of its office building at 60 Hudson Street, New York City, and lease back for a term of 25 years, created a problem as to the appropriate accounting thereof. This required research both as to disposition of the amounts received in connection with the transaction and the distribution of annual rental charges.

4. INTERNATIONAL TELEGRAPH AND TELEPHONE

GENERAL

The upward trend of international telegraph business which began in the middle of the calendar year 1950, has continued.

In calendar 1951, the United States cable and radiotelegraph carriers handled a total of 536,608,633 paid words, an increase of 3½ percent over the 1950 level of 518,523,407 paid words.

Revenues from message traffic accruing to the international telegraph carriers in 1951, amounted to $46,466,766, an increase of 9.4 percent over 1950 revenues of $42,469,888. Net operating revenues before Federal income taxes amounted to $7,861,188, an increase of 58.5 percent over 1950 when the comparable figure was $4,960,545.

The volume of international radiotelephone calls in 1951 as well as revenues therefrom reached new highs. The chargeable calls in 1951 advanced to 932,484, an increase of 25.2 percent over 1950. The revenues (including associated landline charges) for 1951 amounted to $10,128,354, which were 23.6 percent more than the revenues for 1950.

INTERNATIONAL SERVICE

Telegraph circuits.—At the close of fiscal 1952, 84 foreign countries and overseas points were served by United States radiotelegraph carriers, either by direct radiotelegraph circuits or via the Tangier, North Africa, relay stations. Of this number, 73 were served via direct circuits and eleven via Tangier. In addition, a number of countries in the Far East, which were not reached by these means, were served by relay stations operated by the United States carriers at Manila in the Philippine Islands. Connections with the facilities of foreign carriers made possible communication with most other points in the world. As in previous years, the United States radiotelegraph carriers continued to transmit program material to various foreign coun-

tries originating, among others, with the United Nations and the Department of State.

Telephone circuits.—Radiotelephone message toll service was in effect with 93 foreign countries and overseas points at the close of the year. Of this number, 55 were served directly while the rest were served through connecting carriers. The Bell System companies provided program transmission service to 61 foreign countries and overseas points and private line service was available to 12 foreign countries and overseas points.

Applications.—During the fiscal year, licensees in the international fixed public service filed a total of 711 applications for authorizations for additional frequencies, additional transmitters, and additional points of communication, as well as applications for renewal of licenses and temporary authorizations. Licensees in the radiotelegraph service accounted for 472 of these applications while the balance was filed by licensees in the radiotelephone service. The Commission acted on 608 of these applications.

Applications for authority to use additional frequencies continued to constitute a large proportion of the total number received and acted upon. This resulted to a considerable extent from the necessity of shifting operations to frequencies which are "in band"; that is, frequencies which are in accordance with the Atlantic City Table of Frequency Allocations, as agreed upon at the Extraordinary Administrative Radio Conference held in Geneva during August–December 1951. (See "International conferences".)

In addition, the Commission received and acted upon a number of miscellaneous applications filed by international carriers. These included requests for authorization to hold interlocking directorates in two or more companies, authorizations to decrease or discontinue service, and authorizations to supplement facilities of the international companies by the use of wire lines.

Discontinuance of service.—The past year saw the cessation of communications service by the Commercial Pacific Cable Co., the only United States cable company operating between this country and points in the Pacific ocean area. On November 14, 1951, the Commission granted Commercial Pacific's application for authority to discontinue service over its submarine cables between San Francisco and Honolulu, Honolulu and Midway Island, Midway Island and Guam, Guam and Manila, Manila and Shanghai, and Guam and Japan. In approving the discontinuance, the Commission noted that some of the cables had been interrupted since 1941; that others were subject to frequent interruptions requiring heavy expenditures for repairs; that the company was losing money on its operations; and that adequate substitute service to the points served by Commercial

Pacific is available by means of radiotelegraph circuits to and from the United States.

Docket cases.—In preceding annual reports, reference was made to the applications of Mackay Radio & Telegraph Co. for authority to communicate with Portugal, Surinam, and the Netherlands (Docket 8777). In the seventeenth annual report it was noted that the Commission's decision in this case, adopted February 21, 1951, had been appealed by RCA Communications, Inc., and that this appeal was then pending before the United States Court of Appeals for the District of Columbia. On May 20, 1952, oral argument in this matter was heard by the court, and a decision is now pending.

In the last annual report reference was made to the proceeding (Docket 9362) occasioned by the complaint of the International Bank for Reconstruction and Development and the International Monetary Fund against certain United States telegraph carriers. This case presented for determination by the Commission the question of whether these agencies should be accorded the same rates for their outbound official telegraph communications as those accorded to certain other governments for similar communications. Hearings were concluded in February 1951 and, on November 20, 1951, the hearing examiner's initial decision was issued. In this decision it was held that the rate charged by the defendant carriers for official messages of the bank and fund should not exceed, for any message, the rate charged by such defendant carriers for a similar message sent from the United States by a foreign government, which is a member of the bank and fund, to its own territory. Exceptions to the initial decision and replies to the exceptions were filed and the matter is now awaiting oral argument before the Commission.

Decision in Docket 9292 is also pending before the Commission. This proceeding, referred to in the seventeenth annual report, concerns complaints involving the lawfulness of certain agreements between Western Union, on the one hand, and Globe Wireless, Ltd., and Tropical Radio Telegraph Co., on the other hand, for the exchange of specified international telegraph traffic. Exceptions to the hearing examiner's initial decision, wherein it was held that the agreements were illegal, were filed, and on December 10, 1951, oral argument was heard by the Commission.

During March 1952, hearings were held on the applications of Mackay Radio & Telegraph Co. and All America Cables & Radio, Inc., for modification of their licenses to permit them to operate a radiotelegraph circuit between the United States and Puerto Rico on a regular instead of an emergency basis (Docket 10056). A grant of the applications was opposed by RCA Communications, Inc. Proposed findings have been filed, and the hearing examiner's initial decision is pending.

Western Union divestment.—Section 222 of the Communications Act, which authorized the merger of the Western Union Telegraph Co. and Postal Telegraph, Inc., specifically required that any plan for such merger should provide for the divestment by Western Union of its international telegraph operations within a reasonable time, as soon as its legal obligations permitted, and after the Commission found the compensation for the property to be commensurate with its value. In its order approving the aforementioned merger in 1943, the Commission required Western Union to exercise due diligence to effect such divestment (Docket 6517). Since Western Union has not as yet effected this divestment, the Commission, by order dated March 5, 1952, instituted an investigation and hearing (Docket 10151) into all phases of the matter of divestment in order to determine what action the Commission should take or recommend in this matter. Hearing in this matter was scheduled to begin October 7, 1952.

Equipment and operating techniques.—New interest has been evidenced in the International Control Service as improved equipment has become available for the ultra high frequency bands between 1,850 and 3,000 megacycles allocated to this service. Stations in this service are used for transmitting traffic by radio, instead of by wire lines, over relatively short distances between message centers, transmitting stations, and receiving stations of the international carriers. In addition to the two stations previously authorized for International Control Service, one company in the New York area was granted an experimental license and another company in the same area has applications pending for four new stations.

Development of new methods of multichannel transmission continues. During the past year multichannel telegraph transmissions have been authorized which utilize new single sideband and frequency shift techniques. This development will assist in accommodating the growing service demands within the reduced spectrum space allocated to the Fixed Services.

International conferences.—The Commission participated in the Extraordinary Administrative Radio Conference held in Geneva, Switzerland, August–December 1951. At this conference agreement was reached on certain new international frequency lists, frequency assignment plans for some services, and a method of gradually transferring Fixed Service operations to frequencies which are in accordance with the Atlantic City Table of Frequency Allocations, with a view eventually to bringing this table into force for the entire range between 14 and 27,500 kilocycles. Most of the world's medium and long-distance radiocommunication services are conducted within this frequency range.

As a result of the United States effort to carry out this agreement, new assignments of frequencies in the appropriate Atlantic City bands

have been made to licensees in the International Fixed Public Service. Such assignments have been made on a temporary basis pending trial to determine their workability.

Steps toward implementation of the Atlantic City table have also been taken on a "frequency band" basis. For example, all assignments between 20,000 and 27,500 kilocycles have been adjusted so as to be in accordance with the table. This process required that the Fixed Services vacate the band 21,000–21,450 kilocycles so that it could be made available to the amateur service. The band 14,350–14,400 kilocycles previously used by amateurs has been allocated to the Fixed Services and new assignments have been made therein.

The Commission and licensees in the Fixed Services are now engaged in intensive studies and meetings with a view to completing the transfer of operations to the proper Atlantic City frequency bands as rapidly as possible. (For a more detailed discussion of the results of the above conference, see chapter on frequency allocation and treaty activities.)

RATES AND TARIFFS

Tariff schedules.—At the end of the fiscal year, 101 international cable and radiotelegraph carriers had tariffs or concurrences on file with the Commission. During the year, these carriers filed 2,042 tariff publications establishing or changing rates, regulations, practices, or classifications of service.

Special tariff permissions.—During fiscal 1952 the Commission received and acted upon 54 applications wherein special permission was requested to make changes in existing tariff schedules or to establish new schedules on not less than 1 day's notice.

Contract filings.—The international and marine telegraph carriers filed 367 new contracts, 727 amendments to existing contracts, and 119 reports of negotiations with other carriers or with foreign administrations. In addition, the various international telegraph carriers filed 1,386 statements showing revisions in the divisions of charges for telegraph messages exchanged between these companies and their overseas correspondents.

Marine rate case.—As was noted in the previous annual report, during 1950 the Commission received requests from marine radiotelegraph carriers for rate relief. At the same time, Western Union, which originates and terminates much of the marine traffic, also advised the Commission that it desired to revise its landline charges for handling this traffic. This proposed revision also made provision for establishing uniform division of charges with the various marine carriers. On March 14, 1951, the Commission adopted an order instituting an investigation (Docket 9915) into the matter of the charges for coast station and landline handling of marine traffic as well as the

legality of the divisions of charges between Western Union and the various marine carriers.

The Commission had pending before it a formal complaint by Tropical Radio Telegraph Co. against Western Union (Docket 9822) wherein it was charged that Western Union had failed to comply with the provisions of the formula for the distribution of outbound marine traffic in its division of tolls for marine traffic. Since this complaint involved issues which were similar to those before the Commission in its general marine investigation, the Commssion consolidated this complaint with the proceeding in Docket 9915. Hearings were held in this consolidated proceeding during June, July, and August of 1951. Proposed findings were filed by the carriers in November 1951, and the case is awaiting decision by the Commission.

OTHER REGULATORY MATTERS

Depreciation.—Limited progress was made in studies to determine the reasonableness of annual depreciation rates and charges, and the recorded depreciation reserves, and to determine the propriety of the depreciation practices of the international telegraph carriers. Pending completion of such a study, tentative approval was given to the proposal of one carrier to effect changes in its annual depreciation accrual rates, and the carrier was required to make certain adjustments in its depreciation accounting. Studies will be continued with the view of developing information necessary for the Commission to prescribe annual rates of depreciation for these carriers as required by section 220 (b) of the Communications Act.

Continuing property records.—The three international telegraph carriers that had not completely fulfilled the requirement to establish and maintain continuing property records at the end of fiscal 1951 made substantial further progress during the year, and are expected to complete their records during fiscal 1953. The Commission's staff gave advice and assistance to these carriers, and further pursued the verification of the form and content and evaluation of the effectiveness of these records.

Relief and pensions.—Three carriers introduced changes in their pension arrangements during fiscal 1952, primarily to effect liberalization of benefits.

Reclassification of plant.—Although further progress was made during fiscal 1952 toward completing the restatement of the plant of the international telegraph carrriers on the basis of original cost, final adjustments in the accounts of four carriers were not consummated. It is expected that the work will be completed next year.

Uniform systems of accounts.—Progress was made in the drafting of unified accounting rules to be incorporated into a new uniform system of accounts for international telegraph carriers (both cable

and radio). It is anticipated that such unified rules can be made applicable, also, to the domestic operations of Western Union.

During the year accounting interpretations were issued with respect to (*a*) Western Union's program for equalization of cable-maintenance costs; (*b*) appropriate recording of transactions with respect to the quasi-reorganization of Press Wireless, Inc.; (*c*) the use of delayed income accounts in connection with original cost adjustments; and (*d*) the stock transaction of Western Union that was referred to under the subject of domestic telegraph.

Preservation of records.—Interpretations were issued during the year as to the intent of the rules with respect to (*a*) tape recordings of Scheduled Transmission Service; and (*b*) retention of the records of Commercial Pacific Cable Co. which ceased operations and is in process of dissolution.

Accounting research.—Extensive accounting research, including several of those projects listed under "Domestic telephone" was required in connection with the afore-mentioned interpretations and in anticipation of the new international system of accounts.

5. STATISTICS

TELEPHONE CARRIERS

Reports were filed on an annual basis by 230 common carriers and 25 controlling companies for the calendar year 1951. The reports received from common carriers include those from 89 telephone carriers and 119 carriers engaged in rendering mobile radiotelephone service. Selected financial and operating data concerning large telephone carriers for the year 1951 as compared with 1950 are shown in the following table:

Telephone carriers [1]

Item	1950	1951	Percent of increase (or decrease)
Investment in plant and equipment (as of Dec. 31)	$10, 704, 134, 171	$11, 546, 812, 614	7. 87
Depreciation and amortization reserves	$2, 980, 061, 346	$3, 186, 343, 655	6. 92
Net investment in plant and equipment	$7, 724, 072, 825	$8, 360, 468, 959	8. 24
Local-service revenues	$2, 058, 311, 931	$2. 258, 925, 770	9. 75
Toll-service revenues	$1, 245, 351, 804	$1, 403, 479, 156	12. 70
Total operating revenues	$3, 415, 154, 483	$3, 817. 536, 794	10. 81
Operating expenses	$2, 464, 080, 999	$2, 698, 098, 095	9. 50
Taxes	$526, 043, 113	$659, 279, 145	25. 33
Net operating income after all taxes	$455, 030, 671	$460, 159, 854	1. 13
Net income	$371, 592, 086	$377. 423, 081	1. 57
Dividends declared	$269, 770, 556	$303, 374, 705	12. 46
Company telephones:			
Business	11, 775, 231	12, 346, 101	4. 85
Residence	26, 269, 563	27, 568, 621	4. 95
Number of calls originating during the year:			
Local [2]	65, 327, 982, 660	66, 620, 928, 423	([3])
Toll [2]	2, 115, 425, 304	2, 140, 402, 987	([3])
Number of employees at end of October	565. 105	586, 809	3. 84
Male	196, 996	198, 209	0. 62
Female	368, 109	388, 600	5. 57
Total compensation for the year	$1. 798, 193, 394	$1, 975. 535. 384	9. 86

[1] Intercompany duplications, except in minor instances, have been eliminated.
[2] Partly estimated by reporting carriers.
[3] The number of calls shown are not comparable, as many calls were reclassified from "Toll" to "Local" during 1951, due to enlargement of numerous local calling areas.

BUSINESS AND RESIDENCE TELEPHONES BY STATES

There were 45,636,400 telephones in the continental United States of which 31,911,000 are located in residences, and 13,725,400 in business establishments, as of January 1, 1952. The number of telephones, arranged by States, are shown in the following table. The figures were compiled by the American Telephone & Telegraph Co. and are partly estimated.

State	Business	Residence	Total
Alabama	130,500	334,800	465,300
Arizona	66,100	110,000	176,100
Arkansas	83,800	179,100	262,900
California	1,369,200	2,692,200	4,061,400
Colorado	147,600	323,200	470,800
Connecticut	229,000	602,700	831,700
Delaware	39,400	88,300	127,700
District of Columbia	249,500	274,600	524,100
Florida	305,000	447,000	752,000
Georgia	195,900	431,100	627,000
Idaho	42,100	105,700	147,800
Illinois	1,008,900	2,140,100	3,149,000
Indiana	300,000	896,500	1,196,500
Iowa	172,400	671,100	843,500
Kansas	143,300	477,100	620,400
Kentucky	134,900	361,700	496,600
Louisiana	163,200	393,000	556,200
Maine	59,800	176,900	236,700
Maryland	206,200	508,800	715,000
Massachusetts	482,800	1,166,200	1,649,000
Michigan	562,500	1,593,100	2,155,600
Minnesota	233,900	713,100	947,000
Mississippi	71,600	170,400	242,000
Missouri	347,700	850,600	1,198,300
Montana	46,500	109,300	155,800
Nebraska	100,900	317,100	418,000
Nevada	23,100	31,500	54,600
New Hampshire	38,700	115,600	154,300
New Jersey	508,300	1,252,000	1,760,300
New Mexico	55,500	75,600	131,100
New York	2,090,100	3,778,300	5,868,400
North Carolina	185,100	434,200	619,300
North Dakota	32,600	97,300	129,900
Ohio	703,800	2,062,900	2,766,700
Oklahoma	174,400	422,300	596,700
Oregon	138,300	327,600	465,900
Pennsylvania	893,200	2,430,400	3,323,600
Rhode Island	73,400	176,800	250,200
South Carolina	85,300	193,200	278,500
South Dakota	37,500	122,200	159,700
Tennessee	186,600	491,800	678,400
Texas	650,500	1,395,000	2,045,500
Utah	60,600	152,200	212,800
Vermont	24,800	72,900	97,700
Virginia	234,000	510,300	744,300
Washington	233,200	559,000	792,200
West Virginia	99,400	271,200	370,600
Wisconsin	277,800	749,300	1,027,100
Wyoming	26,500	55,700	82,200
United States	13,725,400	31,911,000	45,636,400

LAND-LINE TELEGRAPH

Annual reports containing statistical data for the calendar year 1951 were received from 21 domestic and international telegraph carriers. Financial and operating data compiled from the report received from the Western Union Telegraph Co. relating to its domestic land-line operations for the calendar year 1951 as compared

with 1950 are shown in the following tabulation. The data pertaining to its international ocean-cable operations are included in a subsequent table relating to ocean-cable carriers.

The Western Union Telegraph Co.[1]

Item	1950	1951	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$294,451,126	$284,293,024	(3.45)
Depreciation and amortization reserves	$128,226,700	$123,925,430	(3.43)
Net investment in plant and equipment	$166,224,426	$160,467,594	(3.46)
Message revenues	$152,248,121	$161,739,467	6.23
Total operating revenues	$177,993,880	$192,089,102	7.92
Operating expenses, depreciation, and other operating revenue deductions	$167,279,568	$182,022,613	8.81
Net operating revenues	$10,714,311	$10,066,489	(6.05)
Income taxes	$2,050,000	$4,007,000	95.46
Net income	$7,352,472	$4,711,159	(35.92)
Dividends declared	$2,458,972	$3,381,229	37.51
Revenue messages handled	[2] 188,946,490	[2] 189,636,984	.37
Number of employees at the end of October	40,482	40,319	(.40)
Total compensation for the year	$116,936,815	$127,818,175	9.31

[1] Represents data for landline operations. Figures covering cable are included in another table.
[2] Includes domestic transmission of transoceanic and marine messages (about 8,462,000 in 1950 and about 8,882,000 in 1951).

RADIOTELEGRAPH AND OCEAN-CABLE CARRIERS

There are set forth in the tables below financial and operating data tabulated from the annual reports filed by radiotelegraph and cable carriers furnishing international communications service. The tables compare the figures for the calendar year 1951 with those for 1950.

Radiotelegraph carriers

Item	1950	1951	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$38,885,097	$38,812,497	(0.19)
Depreciation and amortization reserves	$18,845,689	$18,508,966	(1.79)
Net investment in plant and equipment	$20,039,408	$20,303,531	1.32
Message revenues:			
Domestic [1]	$1,743,566	$1,901,113	9.04
Transoceanic	$19,223,350	$21,974,835	14.31
Marine	$1,271,847	$1,400,484	10.11
Total operating revenues	$25,683,717	$29,887,139	16.37
Operating expenses, depreciation and other operating revenue deductions	$23,110,006	$25,258,232	9.30
Net operating revenues	$2,573,711	$4,628,907	79.85
Provision for Federal income taxes	$706,220	$2,450,550	247.00
Net income	$2,373,250	$2,577,215	8.59
Dividends declared	$7,500	$10,000	33.33
Number of revenue messages handled:			
Domestic [2]	52,866	57,957	9.59
Transoceanic	9,939,645	10,980,268	10.48
Marine	895,347	958,473	7.05
Number of employees at end of October	5,264	5,472	3.95
Total compensation for the year	$18,208,915	$20,062,510	10.29

[1] Includes revenues from the domestic transmission of transoceanic and marine messages and revenues from domestic classifications (primarily Canadian and Mexican).
[2] Represents domestic classification messages (primarily Canadian and Mexican).

Ocean cable carriers (including cable operations of the Western Union Telegraph Co.)

Item	1950	1951	Percent of increase (or decrease)
Investment in plant and equipment (as of Dec. 31)	$97, 283, 249	$88, 497, 874	(9. 03)
Depreciation and amortization reserves	$63, 910, 819	$55, 419, 954	(13. 29)
Net investment in plant and equipment	$33, 372, 430	$33, 077, 920	(. 88)
Message revenues:			
Domestic [1]	$157, 521	$187, 605	19. 10
Transoceanic	$20, 073, 604	$21, 002, 729	4. 63
Total operating revenues	$24, 649, 414	$27, 061, 680	9. 79
Operating expenses, depreciation, and other operating revenue deductions	$22, 262, 580	$23, 829, 399	7. 04
Net operating revenues	$2, 386, 834	$3, 232, 281	35. 42
Provisions for Federal income taxes	$450, 000	$1, 053, 000	134. 00
Net income	$2, 165, 793	$1, 949, 012	(10. 01)
Dividends declared	$883, 670	$353, 468	(60. 00)
Number of revenue messages handled:			
Domestic [2]	41, 168	79, 037	91. 99
Transoceanic	9, 856, 802	9, 903, 807	. 48
Number of employees at end of October	5, 495	5, 453	(. 76)
Total compensation for the year	$12, 030, 892	$13, 037, 247	8. 36

[1] Includes revenues from the domestic transmission of transoceanic messages and revenues from domestic classification messages (primarily Canadian).
[2] Represents domestic classification messages (primarily Canadian).

INTERNATIONAL TELEGRAPH TRAFFIC

Reports of international traffic statistics received from cable and radiotelegraph carriers indicate that a total of 536,608,633 paid words were handled during the calendar year 1951. The outbound traffic during the year amounted to 265,970,828 words, while inbound traffic accounted for 270,637,805 words. The following table contains an analysis of the traffic handled between the United States and the principal countries of the world.

International telegraph (radio and cable) traffic, 1951

Country	Number of words	
	Out-bound from the United States	In-bound to the United States
EUROPE, AFRICA, AND THE NEAR EAST		
Algeria	189,553	153,287
Arabia	840,355	873,643
Austria	1,521,892	1,779,432
Belgian Congo	373,962	315,536
Belgium	5,359,112	4,788,204
British East Africa	243,408	224,237
British West Africa	257,489	273,112
Czechoslovakia	794,251	690,257
Denmark	1,764,553	1,252,056
Egypt	1,558,923	1,602,758
Ethiopia	151,118	211,675
Finland	578,011	587,376
France	15,997,237	14,863,574
French West Africa	131,601	98,659
Germany	9,992,004	11,110,647
Greece	2,099,777	1,677,790
Hungary	352,649	213,315
Iceland	174,158	182,140
Iran	882,467	1,413,629
Iraq	268,664	206,921
Ireland	922,040	1,254,471
Israel	3,352,806	3,412,372
Italy	9,130,429	7,906,367
Lebanon	1,087,551	1,118,925
Liberia	503,595	586,434
Luxembourg	101,770	89,412
Morocco—French	681,626	639,813
Morocco—Tangier	638,007	558,987
Netherlands	6,467,623	5,887,376
Norway	2,651,310	2,067,060
Palestine	123,089	175,090
Persian Gulf	332,392	406,356
Poland	507,725	390,560
Portugal	1,479,465	1,034,603
Rhodesia	87,867	113,189
Roumania	127,346	62,037
Spain	3,102,109	2,434,952
Sweden	3,347,991	3,046,324
Switzerland	7,641,340	5,434,540
Syria	251,767	246,112
Transjordania	306,699	122,726
Trieste, Free Territory of	195,318	158,672
Turkey	1,176,425	831,046
Union of South Africa	3,067,426	3,114,844
U. S. S. R.	5,551,989	2,460,854
United Kingdom	47,858,245	47,813,541
Yugoslavia	991,083	815,542
All other places	1,163,870	2,366,499
Total	146,380,087	137,066,952
WEST INDIES, CENTRAL, NORTH, AND SOUTH AMERICA		
Argentina	7,586,353	9,172,153
Bahamas	746,453	837,330
Barbados	190,298	166,938
Bermuda	1,039,924	963,928
Bolivia	834,787	863,516
Brazil	11,426,811	12,110,060
British Guiana	161,896	154,930
British Honduras	122,793	138,298
WEST INDIES, CENTRAL NORTH AND SOUTH AMERICA—continued		
British West Indies [1]	140,111	106,734
Canada	7,081,480	8,274,347
Canal Zone	791,513	736,342
Chile	2,655,866	3,134,848
Colombia	4,362,014	3,778,797
Costa Rica	772,838	582,263
Cuba	6,279,402	8,591,839
Dominican Republic	1,173,470	1,102,808
Ecuador	1,218,329	810,141
Guatemala	1,173,373	1,304,771
Haiti	793,068	715,207
Honduras	639,062	592,117
Jamaica	813,640	656,194
Mexico	2,013,789	1,461,961
Netherlands West Indies	1,104,499	1,235,427
Nicaragua	684,054	554,270
Panama	1,024,089	773,303
Paraguay	240,479	285,248
Peru	2,157,444	1,697,060
Puerto Rico	3,394,948	2,976,812
Salvador	*828,227	684,463
Surinam	123,941	112,337
Trinidad	545,008	403,094
Uruguay	2,142,172	1,923,566
Venezuela	6,269,957	7,041,815
Virgin Islands	270,256	276,321
All other places	142,861	76,746
Total	70,945,205	74,296,013
ASIA AND OCEANIA		
Afghanistan	165,668	136,567
Australia	4,221,715	3,679,472
Burma	689,981	182,998
Ceylon	635,855	562,877
China (excluding Hongkong)	183,779	198,659
Formosa	922,915	994,399
French Indo China	207,174	294,486
Guam	540,047	729,655
Hawaii	4,595,185	4,475,284
Hongkong	2,170,486	810,100
India	5,189,246	5,314,132
Indonesia	2,444,792	2,788,327
Japan	12,238,070	21,171,045
Korea	920,564	600,146
Malaya, Federation of	1,618,718	1,856,593
New Zealand	1,207,309	1,141,260
Okinawa	355,070	636,351
Pakistan	1,896,872	1,874,150
Philippines	5,034,121	6,415,045
Society Islands	140,840	141,418
Thailand (Siam)	1,354,333	1,214,645
All other places	138,621	152,765
Total	46,871,661	56,370,374
Unknown destination or origin	1,773,875	3,904,466
Grand total	265,970,828	270,637,805

[1] Points not listed separately.

CHAPTER IV—SAFETY AND SPECIAL RADIO SERVICES

1. GENERAL

Most of the nonbroadcast radio services are grouped together in what is known as the Safety and Special Radio Services. They constitute the greatest number of radio stations licensed by the Commission. Utilization of these services by individuals, industry, commerce, and state and local government comprise a broad field of operations in connection with protection of life and property, industrial and agricultural production, transportation, disaster, and civil defense.

The services fall into four main categories:

Safety services.—Aeronautical, Marine, Police, Fire, Forestry-conservation, Highway Maintenance, Special Emergency, and State Guard.

Industrial services.—Power, Petroleum, Forest Products, Special Industrial, Low-power Industrial, Relay Press, Motion Picture, Agriculture, and Radiolocation-land.

Land transportation services.—Railroad, Urban Transit, Intercity Bus, Taxicab, Automobile Emergency, Highway Truck, and Citizens.

Amateur and disaster services.

As can be seen from the statistical tables at the end of this chapter, these services, now comprising over 212,000 radio stations, continue to expand. The need for full employment of the capabilities of radio in connection with police and fire protection, aids to navigation (both ship and aircraft), emergency calls for doctors and ambulances and other activities directly related to the public safety is readily apparent.

The indirect public benefit from the employment in commerce of modern radio equipment and procedures is gaining increased recognition. More and more industries, in addition to the transportation, pipe line, power and other utilities, are finding that the efficiency of their operations may be greatly increased by the use of radio techniques. Thus, the licensing and regulatory problems become progressively complex as additional transmissions are introduced into the available spectrum space. Since one may not operate a transmitter without regard to other licensees, it is necessary that there be maintained a high level of compliance with the detailed regulations governing operation and maintenance of radio stations. This places an increasing importance upon the function of enforcement on a nationwide scale.

2. MARINE RADIO SERVICES

GENERAL

Marine radio stations licensed by the Federal Communications Commission consist of stations on land and aboard ships. Most of these stations intercommunicate and serve marine safety, navigation, operational and general communication purposes. Some of these stations, however, such as ship radar stations, do not "communicate" in the ordinary sense of the word but simply emanate and receive radio signals which are useful to assist ships in navigating safely.

Marine radio stations may be classified into various categories which often overlap but which also possess important characteristics unique to each category. For example, ship stations may be divided into radiotelephone and radiotelegraph, public correspondence and nonpublic correspondence, domestic and international, compulsory installed and voluntarily installed. Except for the latter, marine stations on land may be divided into similar categories. Further divisions may be made on the basis of the portion of the radio spectrum used by marine radio stations for they are also unique in the extent to which frequencies utilized are scattered throughout the radio spectrum.

Because of the multiplicity of these overlapping categories of marine radio stations, developments in any particular category of marine radio station often affect various other categories as well.

SAFETY AT SEA

The basic radio laws currently governing marine safety at sea are contained in the International Convention for the Saftey of Life at Sea, Title III, Part II of the Communications Act, and the Ship Acts of 1910 and 1912. These laws require for safety purposes the installation of radio equipment, and provide for qualified radio operators and other features desirable for the creation and maintenance of a

marine radio system. They apply respectively to certain classes of ships engaged on international voyages and which are registered in countries signatory to the Safety Convention, to vessels of the United States when navigated on the high seas (as of June 30, 1952 approximately 1,850 ships) and to vessels on the Great Lakes. In addition, vessels of countries not parties to the Safety Convention are subject to the requirements of Title III, Part II of the Communications Act when leaving United States ports.

In 1948 a new Safety Convention was negotiated at London. During the past year a sufficient number of ratifications of the convention were completed so that under its terms it will come into force on November 19, 1952. The new convention will impose radio installation requirements which, in several respects, exceed those now contained in the Communications Act or the 1929 Safety Convention. Cargo ships of from 500 to 1,600 gross tons not heretofore compusorily equipped with radio installations will be compelled to carry radio installations (either radiotelegraph or radiotelephone). Cargo ships of 1,600 gross tons and over will be required to carry radio direction finders. Ships will be required to carry portable radio installations capable of being used in lifeboats. There will also be a number of minor additional radio requirements applicable to vessels navigated on international voyages. In order to translate these new requirements into rules for the guidance of industry and to facilitate Commission administration, several studies were instituted during the past year, although as of June 30, 1952, much of this work had not been completed because of insufficient staff.

Aside from the matter of necessary implementation of the Safety Convention, changes in Title III, Part II of the Communications Act were found to be desirable in order to avoid inconsistencies between the two laws, and to bring the requirements of the act up to those of the new convention. A study of such changes to the act has been completed. Formal proposals to Congress for amendment of the act in this regard have not yet, however, been submitted.

In 1940 the Commission completed a report to Congress on marine radio safety requirements for the Great Lakes. Further action in this regard was, however, withheld because of World War II. Subsequent to the termination of the war, discussions with Canada were instituted and finally on February 21, 1952, at Ottawa, Canada, an "Agreement for the Promotion of Safety on the Great Lakes by Means of Radio" was signed. This agreement, which will come into force two years after the date on which the instruments of ratification are exchanged between Canada and the United States, will require that several hundred Great Lakes vessels be equipped with radiotelephone installations and maintain radio watches for safety purposes. These

requirements are in contrast to existing radio safety requirements contained in the Ship Act of 1910 and 1912, under which an extremely limited number of passenger ships are required to be equipped with radiotelegraph installations.

Significant developments took place during fiscal year 1952 in maritime safety radio systems using radiotelephony. Traditionally, such systems have been based upon the use of telegraphy. The heart of a maritime safety radio system is the use of a common distress and calling frequency. For radiotelegraphy, this has been the frequency 500 kilocycles. In 1947, however, at the International Telecommunication and Radio Conference (Atlantic City), the frequency 2182 kilocycles was selected as the future international calling and distress frequency for maritime stations using telephony. At Geneva in 1951, international agreement was reached on a world-wide effective date for use of this frequency beginning May 1, 1952. The Great Lakes Treaty referred to above is based upon the use of 2182 kilocycles by ship radiotelephone stations as are the provisions of the 1948 Safety Convention dealing with compulsorily installed radiotelephone stations. In addition and beyond the radio installations subject to these international requirements, Commission rules adopted on April 23, 1952, will eventually require coast and ship stations voluntarily employing radiotelephony within the frequency band 1600 to 3500 kilocycles to be equipped to transmit and receive on 2182 kilocycles as well as maintain a watch on that frequency during their hours of service.

In connection with the establishment of marine radiotelephone safety systems, efforts have continued to be made looking toward the adoption of a universal radiotelephone automatic alarm signal. The International Radio Consultative Committee (CCIR) at its sixth meeting in Geneva, Switzerland, in June of 1951, established a study program of international scope for the purpose of determining the suitability of a provisionally adopted radiotelephone automatic alarm signal on the basis of thorough practical tests. This signal is for use on the maritime radiotelephone distress frequency 2182 kilocycles. Since the CCIR recommendation for a radiotelephone auto alarm signal stands to be incorporated in the future in international agreements, the selection of the signal involves an important, precise, and long-term decision. The Commission, because of other demands on its personnel, has not found it possible to participate actively in the study program. The Radio Technical Commission for Marine Services, looking toward the possible participation of commercial interests in the program, has brought the matter to industry attention but, because of defense, economic, and other considerations, no activity has been developed in the study program. Reports from abroad indicate that the French and United Kingdom administrations are actively par-

ticipating in the study program. Commercial prototype auto alarm equipment is being constructed and tested and those two administrations are proceeding with coordinated field tests.

The Commission is authorized by the Communications Act and the Safety of Life at Sea Convention to exempt certain categories of ships from radio installation requirements if it finds that the route or the conditions of their voyages or other circumstances are such as to render compliance with these requirements unnecessary or unreasonable. Pursuant to this authority, the Commission renewed for 1 year blanket exemptions for passenger vessels of 15 or less gross tons when navigated in coastal waters of the United States not more than 20 nautical miles from the nearest land or more than 200 nautical miles between two consecutive ports, and also renewed or reestablished blanket exemptions for passenger vessels of less than one hundred gross tons when navigated within three designated coastal areas. Individual applications for ship radio exemption received during the year numbered 45 of which 42 were granted. Renewal of exemption was granted to several cargo vessels used as tenders and moored most of the time to oil well drilling platforms located within 15 miles of the Louisiana coast in the Gulf of Mexico. These vessels are voluntarily equipped with two-way radiotelephone installations capable of communicating with similarly equipped ships, with nearby coast stations and with stations of the United States Coast Guard.

In connection with its responsibility for maritime safety through the use of radio, the Commission conducts continuing studies of distress cases and radio distress logs. These logs indicated that the radiotelegraph distress signal "SOS" was used throughout the world 225 times during the year. This includes its use by 32 United States ships, on all but one of which the majority of all of the personnel abroad were rescued or possible loss of the ship averted.

Such rescues and prevention of property loss serves to demonstrate the importance of radio as an element of safety at sea. One of the major marine disasters during the fiscal year involved the United States vessel *Flying Enterprise* which, on December 28, 1951, sent an SOS reporting that the ship had developed a crack in her hull during a hurricane in the North Atlantic and was drifting helplessly with a 45 degree list. A number of vessels responded and rescued the passengers and crew. The ship's master elected to remain aboard, and personally continued to use the ship's compulsorily installed radiotelegraph equipment as well as radiotelephone equipment voluntarily carried to summon further aid and direct salvage attempts.

RADIO AIDS TO NAVIGATION

Authorizations were renewed for operation on a developmental basis of shore-based radar stations in the harbors of Long Beach, San

Francisco, and Los Angeles, Calif., and New York, N. Y. These stations are being developed for the purpose of providing information to assist in the safe piloting of ships entering, leaving, or mooring within the harbor. Since the Coast Guard has the responsibility of providing and supervising public aids to marine navigation, the establishment of these private aids is effected only with the concurrence of that agency. Very high frequency maritime radiotelephone systems are being used developmentally by these radar stations to communicate with pilots on board ships to furnish navigational information.

The experimental shore based radar station established in the New York harbor area has been of particular interest since the experiments have involved the use of 3 centimeter radar, 10 centimeter radar, VHF and UHF transmitting equipment as well as special plotting techniques and the use of a method of ship identification on the radar screen. Reflection type plotters permitting direct plotting on the radar indicator including the placing of permanent buoy and other landmark positions have been used. This type of plotter may find a ready application to future and existing shipboard radar installations.

The method of ship identification on the shore based radar involves the use of a special but comparatively simple equipment on board the ship to be identified for tracking purposes. Two manufacturers have developed and tested identification equipment in connection with the experimental radar installation. The equipment involves triggering by the shore based radar and the return of a signal that appears on the radarscope adjacent to the target pip. The experiments have also demonstrated the efficiency of portable VHF FM radiotelephone equipment. A radio frequency power as low as ¼ watt has been used for an effective communication range of about 7 miles.

Eight developmental authorizations were renewed for shore-based radar stations used in connection with the training of merchant marine deck officers in shipboard radar operation on the Great Lakes and on the seaboard.

As of June 30, 1952, there were more than 1,950 United States merchant ships authorized to use radar.

Pursuant to an international agreement, the ship transmitting frequency 375 kilocycles will, after November 1, 1952, no longer be assignable as a direction-finding frequency. The new frequency for this purpose is 410 kilocycles. To permit a transition period for readjustment or modification of ship radiotelegraph transmitting equipment on compulsorily equipped ships, the Commission amended its rules to accept either 375 or 410 kilocycles as the required direction finding frequency until November 1, 1952, and, thereafter 410 kilocycles.

INTERNATIONAL FREQUENCY COORDINATION

The International Telecommunications Conference, Atlantic City, 1947, extensively revised allocations of frequencies for the maritime mobile service in the bands below 27,500 kilocycles. However, it was not until the past year at the Extraordinary Administrative Radio Conference, Geneva, that agreement was reached as to methods and dates for implementation of the Atlantic City allocations. Since this agreement was reached, various studies have been initiated and several affirmative administrative moves have been made with a view to facilitating the movement of maritime radio stations to frequency assignments in accordance with the Geneva agreement.

COAST STATIONS

Coast stations are normally located near the sea, lakes, rivers or other waterways for the purpose of communicating with ships. There are two classes of coast stations authorized by the Commission; namely, public and limited. A public coast station is open to public correspondence whereas a limited coast station is not open to public correspondence but serves the operational and business needs of ships associated with the particular coast station.

During the fiscal year, public radiotelephone facilities operating in the 2 megacycle band were added to station WLO at Mobile, Ala. Public coast stations employing telegraphy at Mackinac Island, Mich. (WHQ), and at Lake Charles, La. (WNE), have discontinued operation. The Commission has received an application from Tropical Radio Telegraph Company for the discontinuance of public coast telegraph station, WBF, at Hingham, Mass. Station WBF has indicated a decline in telegraphic traffic due largely to coastwise vessels shifting to the use of radiotelephone.

There were 35 coast stations licensed to use telegraphy in the United States at the end of the fiscal year. In addition 53 coast stations were using telephony for regional service (2 to 3 megacycle band) exclusive of Alaska. There are five coast stations in the United States employing telephony on high frequencies for long-distance public service with oceangoing vessels.

In the very high frequency band, a number of coast stations employing telephony have been authorized in the regular service which were formerly authorized as class 2 experimental stations. The Commission's records indicate that 12 limited coast stations, 2 public coast stations, and 1 receiver test station are authorized to use VHF on a regular basis. There are 66 limited coast stations, 18 public coast stations and 5 marine receiver test stations operating experimentally which are required to be licensed on a regular basis by November 1, 1952, if operation of these stations is to be continued.

During the past year the Commission was able to bring about adjustments in frequency allocations which permit uniformity of frequency assignments to all public coast stations using VHF telephony. Previously, the frequency assignments available for such stations in the Chicago area differed from those which were common to all other areas. This change in frequency assignments relieved operational and ship station equipment problems which had resulted from the previous lack of uniformity.

VOLUNTARY USE OF RADIO TELEPHONY

There are approximately 30,350 vessels of United States registry with licensed radiotelephone stations for operation on frequencies in the 2000–3000 kilocycle band. These vessels may communicate with shore stations or with other vessels for public correspondence, navigational and safety purposes. Since the frequencies in this band are relatively congested, the Commission is constantly endeavoring to control and regulate their use in order that they may more effectively serve their intended purposes. The Extraordinary Administrative Radio Conference (Geneva, 1951) has provided a list of frequency allocations for marine radiotelephone use in the 2000–3000 kilocycle band which, when cleared for use, will make further frequencies available for this rapidly growing radiotelephone service.

One of the ways in which it is anticipated that congestion in the band 2000–3000 kilocycles may be relieved is by increasing use of the very high frequencies in the 152–162 megacycle band. Experience with the marine communications system now established in the VHF band indicates that there is available a highly satisfactory communication service for many comparatively short-distance purposes. The quality of the circuits is excellent, interference being at a minimum. For many there is provided a much needed expansion of channels for public correspondence, safety, business and operational purposes. A feature in the use of maritime mobile frequencies was recently introduced by the Commission in permitting communication on maritime mobile very high frequencies between land stations and mobile stations on land when the latter stations are required to expedite ship construction or repair activities in commerce. These stations will be authorized for secondary communication as a "shipyard base station" and "shipyard mobile station" to licensees of limited coast stations.

Since many ships travel on international voyages, it has been a traditional purpose in marine radio to achieve world-wide standardization. However, a serious obstacle to such standardization in VHF telephony has arisen because of a divergence in types of modulation used. In region 2, which includes North and South America, frequency modulation is required by international agreement. Although

international regulations recommend, but do not prescribe, the use of frequency modulation in Regions 1 and 3, information received indicates a trend by European nations toward use of amplitude modulation. Commissioner Edward M. Webster is now in Europe conferring with British authorities in this regard.

An important development in the field of voluntary radiotelephony during the past year was the adoption by the Commission of a group of rules (docket 9797) which look toward the use of a calling-working method of operation in the medium and very high frequency bands. These provisions require, after certain effective dates, ship stations and public coast stations to be equipped to transmit and receive on the safety (distress) and calling frequencies 2182 kilocycles and 156.8 megacycles respectively—dependent upon whether the station operates in the medium or very high frequency bands. Further, the rules create certain watch requirements and provide for initial ship-to-ship calling and answering on the designated frequency. It is believed that the adoption of a calling-working frequency method of operation in the bands involved will mean more efficient use of frequencies at the same time serving maritime safety purposes.

MARITIME FIXED SERVICES

In this service the Commission has licensed 62 marine fixed stations. These stations use ship radiotelephone frequencies as they are normally located in waters adjacent to the coast and are authorized to communicate with nearby public coast stations primarily for safety purposes. This class of station is intended to meet the communication needs of the petroleum industry in off-shore, oil-well drilling operations.

The Commission has licensed one marine control station. This class of station provides for the remote control of transmitters by radio where this is necessary in lieu of land wires. Operation of these stations are in the 72–76 megacycle band.

FIXED PUBLIC SERVICE AND MARITIME MOBILE SERVICE IN ALASKA

Due to the scarcity of wire facilities in Alaska, radio communication between communities is carried on to a large extent by radiotelephone and radiotelegraph. Special frequencies are allocated for communication between communities in Alaska, with the Alaska Communications System, and between coast stations and ship stations in Alaskan waters. The main intra-Alaska communications routes are operated by the Alaska Communication System (ACS) under the Department of National Defense. The Alaska Communication System routes message traffic to all parts of the world. The Commission maintains liaison with the ACS in coordinating communications facilities in Alaska to serve the public interest.

The Commission has under study the revision of Part 14 of the Rules Governing Radio Stations in Alaska dealing with the fixed public and coastal services. Several administrative problems exist because of the obsoleteness of the present rules, an increasing need of frequencies for public communication by non-Government and Government stations in Alaska, and the possibility of a growing duplication of radio facilities as between the Alaska Communication System and the non-Government stations at certain locations. The necessary corrective action has been delayed because the limited Commission staff must give priority to more pressing work.

At the close of the fiscal year, there were, exclusive of Government stations, 484 point-to-point telephone stations and 84 point-to-point telegraph stations operating in the fixed public service, a total of 568 stations. In addition, 367 public coast stations employing telephony and 12 public coast stations employing telegraphy are authorized, a total of 379 stations; making a grand total of 947 stations licensed by the Commission serving the Territory of Alaska.

RULES GOVERNING STATIONS IN THE MARITIME MOBILE SERVICE

On July 23, 1951, the Commission made effective an extensive revision of Part 7 of the Rules Governing Stations on Land in the Maritime Mobile Service and Part 8, Rules Governing Stations on Shipboard in the Maritime Mobile Service. Because of certain questions raised by comments on the proposed rules (docket 9797), the Commission held oral argument on these controversial sections and on April 23, 1952 issued a Second Report and Order further revising the rules. With that issuance, the Commission completed an overall revision of the rules regulating the maritime services which was first initiated in 1950.

RADIO TECHNICAL COMMISSION FOR MARINE SERVICES

The Radio Technical Commission for Marine Services (RTCM), which is a cooperative association of the United States Government-industry marine telecommunication agencies, continued to be closely associated with the Commission's marine activities. The Commission is furnishing an electronics engineer who is devoting full time as Executive Secretary to that organization.

Seven Government agencies which include the Department of State, Department of the Treasury (Coast Guard), Department of the Army, Department of the Navy, Department of Commerce, Federal Communications Commission, and the Maritime Administration, work by committees in the RTCM with representatives from 130 marine telecommunication industry groups.

The RTCM operates, in part, by establishing special committees composed of technical experts to study problems. It would be im-

possible for individual organizations to purchase the talent which the RTCM provides for technical studies. The various agencies, Government and non-governmental, which have responsibilities for regulating or for implementing marine electronic services, work together in a review of the problems from every viewpoint involved. The special committees produce a report which normally will contain their recommendations. This report, after approval by the RTCM Executive Committee, is circulated to the entire membership and other interested agencies.

On March 18, 1952, the RTCM completed a "Review of Existing United States Policy with Respect to Medium Distance Navigational Aids". The special committee making the study was under the chairmanship of Captain R. M. Cross, Coast Guard.

On April 22, 1952, the RTCM completed a study of the portable radio lifeboat equipment required by the Safety of Life at Sea Convention (1948). The special committee making the study was under the chairmanship of R. E. Simonds of the Radiomarine Corporation of America and the study was made at the request of the Federal Communications Commission.

On May 27, 1952, the RTCM completed the study on the timing tolerance of the 500 kilocycle auto alarm with a recommendation for the interpretation of Regulations of the Safety of Life at Sea Convention (1948) to meet the international requirements. This study was made at the request of the Federal Communications Commission and William N. Krebs, Chief of the Commission's Marine Division, was chairman of the special committee.

Other RTCM special committees were established during the past year to study: (1) The Marine Identification Problem, whereby one ship equipped with a radar, may be able to identify a particular ship and be able to communicate with the other vessel. This special committee is under the chairmanship of E. F. Phillips of the National Federation of American Shipping; and (2) the standardization of marine radiotelephone channels. A special committee is presently working on selective signaling and ringing devices for marine radiotelephony.

3. AERONAUTICAL RADIO SERVICES

Radio communication facilities are essential in connection with the operation of aircraft under all weather conditions, both from the standpoint of safety of life and property as well as for efficient, expeditious, and economical operation of aircraft in general.

Under the Commission's jurisdiction and supervision, the Aeronautical Radio Services provide these facilities through Aircraft radio stations, aeronautical Land and Aeronautical Fixed stations,

Airdrome Control stations, Aeronautical Mobile Utility stations, Aeronautical Advisory stations, Flying School stations, Flight Test stations, Aeronautical Public Service stations, Civil Air Patrol stations, and Navigational Aid stations which includes radio beacons, ranges, radar devices, direction-finding systems, approach and instrument landing systems, and distance measuring devices.

The use of aviation radio has expanded rapidly. At the close of the fiscal year 1946 there were 6,205 aeronautical stations of all kinds. At the close of the fiscal year 1952 there were 32,239 authorized aircraft and ground radio stations.

AVIATION ORGANIZATIONS AND CONFERENCES

Flight safety and regularity require a well-planned communication service for air transportation. This factor coupled with need for realizing maximum utility of the frequency spectrum available to the aeronautical services makes it essential for the Commission to devote considerable time to and actively participate in the work of those committees and international organizations concerned with aeronautical telecommunication problems. The more prominent domestic committees are the Air Coordinating Committee and the Radio Technical Commission for Aeronautics. The international organizations are the International Civil Aviation Organization and the International Telecommunications Conference (ITU).

The Radio Technical Commission for Aeronautics (RTCA) is a cooperative association of the United States Government—Industry Aeronautical Telecommunications Agency. It conducts studies of aeronautical telecommunication problems and related matters for the purpose of providing guidance to, and coordinating the efforts of, the organizations concerned. One of the major and continuing activities of the Commission involves participation in the Executive Committee, and special technical committees of the the RTCA. During the past year the RTCA has studied and is making recommendations on matters such as:

(1) Implementation of the very high frequency (VHF) utilization plan and review of transition period communication requirements.

(2) High altitude grid plan for VHF omnidirectional radio range and distances measuring equipment (VOR/DME) frequency pairing.

(3) Minimum performance requirements for airborne electronic equipment for the transition period common system.

(4) Amended program for implementation of the common system of air navigation traffic control, and

(5) Evaluation of the necessity for VOR test signals.

The ITU is an international organization of states formed in order to improve the efficiency of telecommunication services and provide a means for effecting collaboration in the allocation, allotment and assignment of frequencies. The final acts of the ITU and Radio Conferences, Atlantic City, 1947, allocated exclusive frequency bands to the aeronautical service.

The International Administrative Aeronautical Radio Conference (IAARC) Geneva, 1948–49, developed a frequency allotment plan for the aeronautical mobile service. This plan was adopted by the Extraordinary Administrative Radio Conference (EARC) Geneva, 1951, and a program was evolved for bringing the exclusive aeronautical mobile bands into force. The Commission participated in the preparation of a United States position for the EARC and nominated a representative to assist the chairman of the United States delegation on aeronautical telecommunications problems. Based on the final agreements of this conference, voluminous work has already been accomplished by the Commission in collaboration with special committees and other Federal agencies to plan for an orderly implementation of the program adopted by the EARC to bring into force the Atlantic City table of frequency allocations below 27,500 kilocycles.

The Air Coordinating Committee is a Federal interdepartmental committee with responsibility for coordinating United States policy in the field of aviation. The committee was primarily established to examine aviation problems affecting more than one participating agency and to make recommendations directed toward resolving these problems. The Air Coordinating Committee is composed of standing committees, panels, subcommittees, ad hoc committees, and working groups. Since many of the problems submitted to the ACC relate to aeronautical telecommunications, the Commission finds it necessary to participate as a member in the following committees and subcommittees:

Technical Division:

Air Traffic Control and Navigation Panel.
Airmen Qualification.
Airspace—Rules of the Air and Air Traffic Control.
Aeronautical Communications & Electronic Aids.
Search and Rescue.

Some of the major activities of the Air Coordinating Committee in which the Commission participated are as follows:

(1) Continuing the implementation of the common system all-weather traffic control program.

(2) Conducting aeronautical study of applications for antenna towers which may become a hazard to air navigation.

(3) Formulating policy for the guidance of the United States representatives to the ICAO on particular international aeronautical telecommunication problems.

(4) Review and study of the over-all domestic aeronautical telecommunications policy.

(5) Study of the United States policy and program for long distance aids to air navigation.

(6) Preparation of United States position to regional meetings of the ICAO.

The International Civil Aviation Organization (ICAO) was established by the Convention on International Civil Aviation for the purpose of developing standards and recommended practices for international civil aviation in order to insure a safe, regular and efficient air transportation system. There are 57 contracting states in the ICAO. The organization consists of an Assembly, a Council of 21 contracting states (including the United States), the Air Navigation Commission, the Air Transport Committee, the Finance Committee, the Committee on Joint Support, and the Legal Committee. The administrative functions of the organizations are under the Secretary General. Technical conferences, regional and special meetings are convened as necessary and with participation by interested contracting states.

The Commission has taken an active part in the preparation of a United States position on communication matters for two ICAO regional meetings during the fiscal year and furnished an adviser to each delegation. These meetings were: The South American–South Atlantic Regional Air Navigation meeting, Buenos Aires, October 1951, and the Third European–Mediterranean Regional Air Navigation meeting, Paris, February 1952.

AIRCRAFT RADIO STATIONS

At the close of the fiscal year there were 29,599 authorized aircraft radio stations, which was about the same number as in 1951. Of this figure 27,678 were private aircraft.

During the year many aircraft authorizations were modified to permit communication with aeronautical advisory stations regarding the condition of runways, type of fuel available, wind conditions, weather, and other information necessary for aircraft operation. Further, aircraft authorizations, in increasing numbers, have been modified to permit operation in the very high frequencies (VHF) which have been made available for assignment to aircraft.

AERONAUTICAL LAND AND AERONAUTICAL FIXED RADIO STATIONS

These facilities, of which there are 1,183 authorized for operation, provide the necessary communication for the safe expeditious, and

economical operation of aircraft. Aeronautical land stations are used for communicating with aircraft whereas aeronautical fixed stations are used for point-to-point communications.

In the United States, aeronautical fixed stations are used primarily as "back-up" circuits for land-line facilities; however, in international operations, aeronautical fixed stations provide the primary service. Civil Air Regulations require domestic air carriers to maintain radiotelephone communication facilities at terminal and at such other points as may be deemed necessary by the Government to insure a satisfactory two-way ground-air communication service over the entire aircraft route.

CIVIL AIR PATROL RADIO STATIONS

These stations are used in connection with the Civil Air Patrol activities and emergencies pertaining to the protection of life and property. The stations, operating on frequencies made available by the United States Air Force, are also used by members of the Civil Air Patrol in connection with air shows, missing aircraft search missions, training missions, and communication systems at encampments, bases, and official meetings. There are now 798 Civil Air Patrol ground radio stations and over 10,000 associated mobile units.

AIRDROME CONTROL RADIO STATIONS

Airdrome control radio stations, for the most part, are operated by the Civil Aeronautics Administration. These stations are used for communicating necessary control instructions to aircraft arriving at and departing from airports. Such control is mandatory in directing such aircraft so as to maintain safe separation of aircraft to prevent collisions and to provide an efficient flow of air traffic into and out of airports. These stations may also communicate with aeronautical mobile utility stations installed aboard vehicles essential to the operation of an airport. There are now 59 stations of this type licensed by the Commission.

AERONAUTICAL MOBILE UTILITY STATIONS

This facility is installed aboard ground vehicles which are essential to the operation of an airport and provide communication between such vehicles and the airdrome control tower and aircraft on the ground. The airdrome control tower radio operator maintains direct contact and control over these stations at all times. This service is used by many municipalities and individuals concerned with the care and upkeep of airports. There are 105 aeronautical mobile utility stations authorized for operation.

AERONAUTICAL NAVIGATIONAL AID RADIO STATIONS

These stations involve the transmission of special radio signals intended solely to assist in the determination of aircraft position, including that relative to collision hazards. The navigational aid stations include radio beacons, radio direction-finders, radio ranges, localizers, glide path, marker beacons, ground control approach, instrument landing, radar, and distance measuring stations. Air navigation aid facilities are usually operated by the Civil Aeronautics Administration. However, the frequencies which these facilities employ are available for licensing by the Commission at those locations where an applicant justifies the need for such service and the Government is not prepared to render this service. At the close of the fiscal year, 166 aeronautical navigational aid type facilities had been authorized.

FLYING SCHOOL RADIO STATIONS

Aircraft and ground flying school radio stations are used for communication pertaining to instruction to students or pilots while actually operating aircraft. There were 20 such stations authorized for operation.

FLIGHT TEST STATIONS

Aircraft and ground flight test stations are used for the transmission of essential communications in connection with the tests of aircraft or major components of aircraft. This operation involved 100 stations.

AERONAUTICAL PUBLIC SERVICE RADIO STATIONS

Aircraft public service radio stations are used for private telephonic communications between individuals aboard aircraft in flight and persons on the ground using land-line facilities. The aeronautical public service station connects with the nation-wide land-line telephone system through the facilities of public coast stations.

4. PUBLIC SAFETY RADIO SERVICES

POLICE RADIO SERVICE

The Police Radio Service, the oldest of the Public Safety Radio Services, is intended primarily to provide for the radiocommunication needs of police departments; however, the Commission, realizing that there are instances where a police radio system serving the smaller communities may also be used advantageously to provide for the needs of other departments, has extended the scope of service to include the transmission on a secondary basis of messages essential to other official activities of the licensee pertaining to the public safety.

Constantly expanding, the Police Radio Service now serves virtually every square mile of the country. There were 7,008 stations

authorized at the end of the fiscal year. To simplify the work related to the licensing of these systems, the Commission has adopted the practice of issuing one station license for each base station and all associated mobile stations. Therefore, to estimate the number of transmitters actually used in the police service it is necessary to reappraise the number of stations given above. Experience gained in making statistical surveys in the past indicates that on an average there are 12 mobile stations for each base station. So it may be presumed that the 7,000 licensed stations cover the operation of 85,000 mobile stations.

The successful completion of an intensive search for a complement of frequencies with suitable propagation characteristics to enable the Territory of Alaska to establish and intercommunicate between police radio stations located throughout the entire Territory was completed when the Commission on November 14, 1951, allocated the frequency 5135 kilocycles for use by fixed police radio stations in Alaska with radiotelephone emission.

The relatively long distances between population centers, the very meager landwire facilities and extreme weather conditions posed a communication problem which differs quite radically from the usual situation in the United States where the service area of a station normally extends over distances of a few miles and networks of these stations can be connected by teletype circuits or radio stations using medium high radio frequencies of the order of 2 megacycles. At the very outset it was clear that all frequencies with suitable propagation characteristics were already in use throughout the Territory and the United States. Only after a frequency-by-frequency study of all radio stations—both military and non-Government—and by shifting a number of military stations to other frequencies was it possible to clear the use of the frequency 5135 kilocycles in Alaska. This frequency along with 2442 kilocycles and 7480 kilocycles which were previously cleared for the police service of the Territory of Alaska are used to maintain communication between 11 fixed stations scattered throughout the Territory and mobile stations patroling the highways connecting its cities.

Heretofore intercommunication between Federal Government stations and stations in the Public Safety Radio Services has been possible only when each party installed receivers tuned to the other's frequency, or, alternatively, the Federal Government installed under the authority of a general regulation appearing in an Executive Order of the President a transmitter tuned to the frequency of the Public Safety Radio Station.

In order to provide means for even closer coordination between Public Safety stations and Government stations, the Commission,

after consulting with other Federal agencies through the Interdepartment Radio Advisory Committee, amended Part 10 of its rules, effective May 15, 1952, to permit assignment of frequencies to Public Safety stations which are assigned under Executive Order of the President to Federal Government stations upon an appropriate showing that such assignment is necessary for intercommunication with Government stations or required for coordination with Federal activities.

By permitting the shared use of frequencies by Federal Government stations and Public Safety stations, the agencies involved have greater latitude in the preparation of their plans to cope with any particular problem that may arise.

Many police systems have during the year installed auxiliary equipments at dispersed locations in connection with their civil defense preparation. Such installations increase the assurance that these vital communications will perform satisfactorily in the event of a widespread emergency and enhance the ability of police departments to accomplish the greatly expanded job which will result from such an emergency and the full activation of the civil defense activity.

FIRE RADIO SERVICE

The Fire Radio Service may be used by all governmental agencies except the Federal Government. Other organizations such as volunteer fire departments and commercial companies established to provide a fire-fighting service may also obtain license upon proof of their responsibility for fire protection in a particular area.

This service is primarily designed to provide communication from fire headquarters to mobile units of fire apparatus on call and between such mobile units on the fire scene including hand carried transmitters and receivers used by firemen frequently inside of a burning structure. Increasing use, however, is being made of several secondary provisions of the service, the more important being one way transmissions from headquarters to receivers in the homes and places of business of volunteer firemen giving the address and details of a fire call so that they may proceed directly to the fire as well as intercommunication between various fire headquarters for mutual aid and civil defense preparedness.

This service continues to grow steadily. For the second consecutive year the number of stations has increased over 50 percent. At the end of the fiscal year 764 fire stations were authorized to operate an estimated 12,000 radio transmitters.

FORESTRY-CONSERVATION RADIO SERVICE

Forestry-Conservation radio stations are used primarily by State governmental departments for fire protection of forest areas and

other conservation activities. A small number of municipalities and counties have obtained licenses to cover stations used to communicate with State-operated forestry stations so that in time of emergency the fire fighting facilities of the cities may be used to supplement the State-owned equipment. This form of coordinated operation occurs primarily in the New England and West Coast States where forest areas and population centers are interwoven.

This service provides an extremely rapid, flexible, and reliable means of communication that cannot be obtained in any other way. In practice, fire wardens stationed in the fire towers detect and locate the exact position of the fire by triangulation methods. Upon receipt of a report of the existence of a fire, field crews with radio equipped mobile vehicles and fire fighting apparatus are rushed to the scene of the fire. Here men carrying small, lightweight transceivers approach the actual fire and make an on-the-spot appraisal of what is needed to extinguish the fire. Their report is usually relayed by the nearby mobile stations to headquarters where it can receive immediate attention.

Prompt action in extinguishing fires is an absolute must. So important is time that many States use aircraft to drop men and equipment by parachute at the scene of the fire. By such methods it oftentimes is possible to put the fire out without additional aid. If more men and equipment are needed, the man on the ground uses his radio to report his needs to the aircraft or nearby base station.

During the fiscal year ending June 30, 1952, the number of stations grew to 2,070, operating an estimated 16,000 radio transmitters.

HIGHWAY MAINTENANCE RADIO SERVICE

The Highway Maintenance Radio Service is restricted to States, Territories, possessions, and other governmental subdivisions including counties, cities, towns, and similar governmental entities.

The use of radio by highway departments has proved to be so effective that the prompt location and dispatching of road-clearing equipment to clear road obstructions such as wrecked automobiles, fallen rocks, road and bridge washouts has proved to be an inestimable service to the motoring public. By equipping the mobile highway vehicles with radio it is possible to direct their operation very closely to obtain the maximum service. Through the use of radio, many licensees have been able to demonstrate that the total cost of such installations is recovered in 1 to 2 years through improved supervision and utilization of the road construction equipment and personnel.

The Highway Maintenance Radio Service—established in 1949—reached a total of 555 stations at the end of the fiscal year 1952.

SPECIAL EMERGENCY RADIO SERVICE

The Public Safety Services described previously are intended primarily to provide radio communication for governmental agencies to aid them to discharge their official duties. On the other hand, the Special Emergency Radio Service is intended to provide emergency communication for individuals and companies who provide an emergency service such as beach patrols, public ambulance companies, and physicians normally practicing or operating in remote areas where other communication facilities are not available. Other classes of eligibles are persons operating in remote locations where other communication facilities are not available, organizations established for relief purposes in emergencies and which have a disaster communication plan, school bus operators, and communication common carriers.

Physicians and ambulance services received the greater part of the licenses issued; however, a more significant and undoubtedly equally important increase has occurred in the group of organizations which are setting up disaster relief systems in their civil defense plans in the Special Emergency Radio Service. Many municipalities are engaged in organizing radio communication networks using special emergency stations to provide intercommunication with the regularly established public safety stations and to connect designated civil defense locations where supplies and assistance will be available. At the close of the fiscal year 670 stations were authorized.

The Commission on April 18, 1952, issued a notice of proposed rule-making involving a major revision to the rules governing the Special Emergency Radio Service. Experience gained while administering the present rules showed a need for clarification and a broadening of the eligibility provisions. A study of the comments and recommendations filed by interested parties is under way and final action is expected in the near future.

STATE GUARD RADIO SERVICE

State Guard Radio Service may be used only by State military organizations under State directions. These stations are used primarily for the transmission of emergency communication relating to the public safety and the protection of life and property. In addition, these stations may be employed during drill and training period to develop proficiency in the use of the equipment and more efficient organization. Seventy-six State Guard stations had been licensed by the close of the fiscal year.

During the year the Commission maintained close liaison with licensee groups in the Public Safety Services through representation at a number of national meetings of the services involved as well as through attendance at Government called meetings in Washington.

The importance of these services such as Police, Fire, and Forestry has placed this activity of the Commission in the very middle of civil defense planning in every area of the country. The increasing volume of work in connection with the expansion and integration of Public Safety Radio Systems into the civil defense picture is reaching proportions which cannot be satisfactorily handled with the available personnel.

5. AMATEUR RADIO SERVICE

The Amateur Radio Service is the area in the field of radio development and operation reserved as a training ground for future radio experts and technicians and for persons who desire to engage in radio operation as a hobby. It is one of the oldest radio services and many authorities on radio can attribute present success in various communication fields to an earlier interest in amateur or "ham" radio operation.

Eligibility in this service is based upon United States citizenship and ability to pass prescribed amateur operator examinations in International Morse Code, radio theory, operation and laws, treaties and regulations to the extent that they relate to amateur radio operation. Existing rules provide six graduated classes of amateur operator licenses for which examinations are progressively more difficult. Eligibility for the two higher grade licenses requires certain experience under one or more of the lower grade licenses.

The Amateur Radio Service is open to any United States citizen regardless of age, race, or sex. Communications may be local, or long distance, including communication with amateurs in various foreign countries. Many persons participating in this service develop outstanding ability in one or more of the various phases of the art of radio communication. Through the exercise of their respective skills in designing, developing, constructing, and experimenting with radio equipment, developing communication techniques, and by providing scientific observation, as well as the handling of third party messages, the radio amateurs have continued, through the past year, to demonstrate that the privileges they have been granted are well justified.

As of June 30, 1952, there were some 113,092 amateur radio station licenses and 110,968 amateur operator licenses in effect, an increase of approximately 22,500 and 22,200, respectively, during the year. The number of amateur stations remains slightly higher than the number of amateur operators as a result of many of the latter being licensees of more than one amateur station, either as trustee-licensees of stations used by amateur radio clubs, or by military units, or as owners of personal stations at more than one address. The number of these additional stations is balanced somewhat by a corresponding number of amateur operators who do not have amateur station licenses due,

principally, to being in the armed forces or otherwise unable to locate an amateur station at a permanent address.

The popularity of the new Novice Class license, issuance of which commenced July 17, 1951, is reflected by the fact that 12,827 such licenses were issued in somewhat less than 1 year. A total of 3,615 new Technician Class licenses were issued during the same period. The number of Extra Class licenses at the close of business on June 30, 1952, was over 900. This class of license first became available on January 1, 1952.

Despite the enviable record of self-policing on the part of amateur licensees, it was necessary for the Commission to issue a number of citations in cases of frequency deviation or other infractions of its rules. The Commission also suspended the licenses of 11 amateurs involved in more serious violations of rules, and revoked four licenses. In addition to the licenses revoked, it was necessary to designate three applications for hearing. In the first of these cases (docket 9955), the applicant filed a petition asking that his application for renewal of license be considered on the basis of information already in the Commission's files. The petition was denied. In the second case (docket 10114), a hearing was held beginning June 17, 1952, and the case is now pending decision. A third application, for a new Novice Class license, is scheduled for hearing.

Several important changes were made in the amateur rules during the past year. By far the most important change was the adoption on June 26, 1952, of new rules to govern the use of amateur radio stations and operators in providing civil defense communications. This new service is known as the Radio Amateur Civil Emergency Service (RACES). These rules, which will become effective August 15, 1952, divide Part 12 into two subparts of which the first includes all present rules governing amateur radio service and the second comprises new rules prescribing requirements for the use, under a separate or additional authorization, of amateur radio stations for civil defense communications. The rules are limited in their force and effect to the period of the present national emergency as proclaimed by the President on December 16, 1950.

Persons now holding amateur radio licenses can apply for this additional authorization but must furnish proof that the operation proposed would be under and in accordance with approved civil defense plans. A station in this service may be comprised of one or several transmitters. Stations are to operate together in so-called networks which will be under the direction of a civil defense official called the Civil Defense Radio Officer. A communications plan, approved by the State civil defense organization having jurisdiction of the particular area to be served and by the Federal Civil Defense Administration,

is essential to the establishment of a network. Stations in this service may intercommunicate or may exchange messages with stations in other services, including stations operated by the United States Government. Communications may relate to any phase of civil defense work whether it be practice tests and drills or communications directly concerning safety of life, preservation of property, maintenance of law and order, or related emergencies. Unless the present national emergency intensifies to the extent that normal amateur communication must be suspended, operation of stations in this service must be upon a shared basis with normal amateur operation on the same or adjacent frequencies.

Other changes in the amateur rules during the year include the provision of a procedure whereby persons who held an amateur license on or before April 1917, may qualify for the Extra Class operator license without additional examination; exemption in the case of persons holding the Conditional Class license from the requirement of reporting for reexamination upon change of residence and station to a new site within an area where regular examinations are held, and elimination of the requirement for the filing of an application for modification of license in the case of persons residing, temporarily, at a location other than that specified in the station license.

Several changes were made in respect to frequencies available for use of amateur radio stations and emissions which may be used with such frequencies. These changes provided additional space in the frequency bands 3500–4000 kilocycles and 14,000–14,350 kilocycles for operation with narrow-band frequency and phase modulation for radiotelephony and deletion of the frequency band 14,350–14,400 kilocycles from those available for use of amateurs in order to conform with the Table of Frequency Allocations set forth in the International Telecommunications Convention (Atlantic City, 1947). At the same time, and in accordance with the same Table of Frequency Allocations, the Commission opened up a new frequency band: 21,000–21,450 kilocycles for use of amateurs. However, in making the new frequencies available for such operation the only emission provided was A1, or radiotelegraph, and rule-making concerning classes of amateur operators, emission, bandwidth, and other particulars of operation in the new band is now pending.

In addition to the foregoing rule amendments, the Commission extended for another year the provisions under which an amateur serving overseas in the armed forces of the United States is exempt from the showing that he actually operated an amateur radio station during the last year of the license period in order that a renewal of his license may be granted.

During the year, the Commission received somewhat conflicting petitions in respect to providing for frequency-shift (Type F–1 emis-

sion) for radioprinter (teletype) operation on frequencies in the band 7000–7300 kilocycles. Also a petition was received for amendment of rules to provide for frequency-shift keying (Type F–1 emission) on all amateur frequencies below 27 megacycles for radioteleprinter and other similar operation. Rule-making was instituted in which it is proposed to provide more frequency space for frequency-shift keying; permit some radiotelephone communication in the frequency band 7000–7300 kilocycles; provide more frequency space for Novice Class operators; revise rules relating to station identification; and prescribe standards to be observed in radioteleprinter operation. The extent to which these proposals are adopted will depend largely upon the comments made by interested amateurs.

The Commission also proposes to eliminate certain restrictions in respect to operation in the amateur frequency bands 3800–4000 kilocycles and 14,200–14,300 kilocycles to the extent that holders of Conditional or General Class licenses at present are not permitted to operate in those bands with radiotelephony. If adopted, this amendment would open up additional frequency space, formerly reserved for holders of the Advanced and Extra Classes of licenses, to persons holding General and Conditional licenses. At the time the Commission initiated this proceeding, it denied a petition from the American Radio Relay League requesting that the Commission continue to issue new Advanced Class licenses after December 31, 1952, which is the cut-off date for issuing such new licenses.

Interference to the reception of television broadcasting continues to be a matter of concern to the Commission and to amateurs throughout the United States. The Commission is continuing to conduct studies with a view to clarifying individual responsibilities in cases where the operation of amateur stations causes interference to TV reception; however, definite standards have not yet been adopted for this purpose.

The Commission's field engineers, individual amateurs, and amateur committees have accomplished outstanding results in clearing many interference cases. Upon investigation, a great number of cases attributed to amateur operation have been found to be due to other causes. In a majority of cases where the interference was due to an amateur station, the inherent sensitivity of TV receivers to frequencies outside the TV channels has been the fault. Usually, simple filtering and shielding applied to the TV receiver has eliminated the interference. In most cases where the radiation of spurious and harmonic emissions by an amateur transmitter in the TV channels has caused interference, the amateurs have been able to satisfactorily eliminate such interference.

More widespread international communication was made possible for American amateurs during the past year by the fact that the Neth-

erlands Antilles, which formerly prohibited amateur radio stations, revived amateur operation and notified interested administrations that the exchange, internationally, of amateur communications between its amateurs and those in foreign countries is no longer prohibited. Also, the exchange of third party amateur communications with persons residing in the Republic of Cuba was approved in a formal agreement concluded between the United States and that country.

Radio amateurs, traditionally, have contributed generously of their time and equipment in any emergency or disaster, and it appears that the contributions made by them in this respect may have been greater in the last fiscal year than in any previous year. Most notable was the work done by amateurs following tornadoes in the States of Arkansas, Tennessee, and Kentucky during the period March 21 to 23, 1952. In Arkansas, which was hardest hit, the towns of Dierks, England, Georgetown, Searcy, and Bald Knob were badly damaged and the town of Judsonia was completely swept away by the storm. Wire lines were down or inoperative and radio amateurs worked heroically for several days and nights furnishing communications in the stricken area. Their work consisted of handling messages on behalf of the American Red Cross, United States Post Office, National Guard, Weather Bureau, Salvation Army, the Governor, and many individuals. It is reported that town officials set up a routine priority system for the handling of these amateur messages and persons wishing to send communications were required to file them at desks set up for that purpose. Medical and Red Cross communications received priority. In all, several hundred amateurs participated in this emergency, both in the disaster area itself and in supporting roles in adjacent areas.

On November 25, 1951, six mobile amateur radio stations of the Birmingham, Ala., Amateur Radio Club assisted at the wreck of two crack passenger trains on the Southern Railroad near Woodstock, Ala. Other stations of the Alabama Emergency Net acted as control and contact points for the purpose of arranging hospital accommodations, notifying relatives of victims of the crash, and handling inquiries about persons on the train.

Amateur radio is said to have been the only communication out of Pierre, S. Dak., during a sleet and snow storm which completely isolated that city and surrounding area during the period December 6 to 9, 1951. Local amateurs handled train information, dispatched telephone crews, called doctors, relayed weather reports between Civil Aeronautics stations, sent news dispatches, and relayed many personal inquiries and messages.

The value of amateur radio to physically handicapped persons cannot be overestimated. The Commission receives many reports of its therapeutical and morale-building influence on the lame and infirm.

Blind persons find amateur radio a satisfying diversion, and the Commission has licensed a considerable number of such amateurs. Amateurs confined to beds or wheel chairs are able to converse with other amateurs all over the world, handle messages for third parties, and even participate in amateur civil-defense activities.

6. DISASTER COMMUNICATIONS SERVICE

The Disaster Communications Service is a relatively new radio service, still in the developmental stage. This service is designed to provide essential communications in connection with disasters or other incidents which involve loss of normally available communication facilities or which require temporary establishment of communication facilities in addition to those normally available. The frequency band allocated to this service, 1750 to 1800 kilocycles, was set aside for disaster communications pursuant to a proposal made in the Commission's Report of Proposed Frequency Allocations Below 25,000 kilocycles of May 21, 1945, although the service was not actually established until March 21, 1951.

Any person eligible, under the provisions of the Communications Act, to hold a radio station license is eligible for a license in the Disaster Communications Service, provided it is shown that the station will constitute an element of a bona fide communications network organized, or to be organized, and operated in accordance with a locally or regionally coordinated disaster communications plan. Stations of the United States Government may also operate in this service if authorized to do so by their controlling agencies.

When there is no impending or actual disaster, stations in this service may communicate only with respect to drills and practice sessions and conduct necessary equipment tests. When there is an emergency or disaster they may be used for all communication necessary or essential to relief work, including the transmission of communications concerning personal matters in the case of individuals directly affected by the disaster.

Emphasis during the past year has been on civil defense matters, and, for the most part, applications submitted and disaster communications plans filed related to use of the stations for civil defense purposes. On June 30, 1952, 71 Disaster Communications station licenses were outstanding. These licenses covered 123 portable and 212 mobile transmitters. These were held by only 15 licensees of which one, the Civil Defense Council of Winnebago County, Ill., had 32 different stations throughout the county. The State of Connecticut holds licenses for 12 separate stations operated at strategic locations within that State. About a dozen applications for licenses in this service

were returned without action, chiefly because the communications plans submitted were incomplete or inappropriate.

Several amendments of the Disaster Communications Service rules were adopted during the year. For the most part, these amendments were made necessary by the Commission's action in Docket 9233 wherein provision was made for establishment of a new Radiolocation Service which, together with certain other frequencies specified in the Commission's order in that proceeding, would be permitted to use the frequencies allocated to Disaster Communications Service upon a time-sharing basis under which stations in the Radiolocation Service would have priority during daytime hours and Disaster Communications stations would have priority during nighttime. Operation of either service on these frequencies at times other than those specified would have to be by special arrangement among the licensees, except that stations in the Disaster Communications Service have priority on any of these frequencies when needed for an actual or imminent disaster. The new rules require that liaison be maintained among licensees of these two classes of stations in order to insure orderly use of the frequencies to be shared.

7. INDUSTRIAL RADIO SERVICES

As the result of a hearing held in June 1951, a new radio service—the Industrial Radiolocation Service—was added to the Industrial Radio group effective February 1, 1952. This brings the total number of radio services in this group to eight; namely, the Power, Petroleum, Forest Products, Motion Picture, Relay Press, Special Industrial, Low-Power Industrial, and Industrial Radiolocation Services. In these services, radio facilities are made available to various industrial enterprises which for safety purposes or other necessity, require radio communication in order to function efficiently.

The number of persons licensed in this group continued to grow steadily throughout the year and the problem of administering an expanding service without a corresponding increase in Commission personnel is becoming serious. As in the past, industry advisory committees functioning in the power, petroleum, and forest products groups have continued to render substantial aid to the Commission in the matter of frequency assignments by supplying applicants with information relative to selection of frequencies.

One important rule amendment, effective September 24, 1951, provided for a new class of station designed to receive communications from one mobile station and automatically retransmit them to other mobile stations. Termed a "mobile relay station," it is used in radio systems which require mobile-to-mobile communications over extended

distances. As the result of a hearing held May 24, 1952, the Commission has determined that persons who establish eligibility for mobile relay stations should be permitted to use their vehicular frequency for control stations to actuate the relay from fixed points. However, it was decided that the basis for mobile relay station eligibility, as established September 24, 1951, should not be extended to include situations where the relay would be used solely for extending the range from a fixed point to mobile units.

A major problem of increasing importance as these services expand is that of providing sufficient frequency space in an already crowded spectrum. One of the means by which this congestion may be relieved is the possibility of "channel-splitting," which the Commission is currently considering. By increasing the number of frequency channels in this manner interference would be alleviated. Some of the congestion may also be relieved by developments in the 450-megacycle band in which operations are expected to increase as equipment becomes available.

Of increasing importance is the group of frequencies above 890 megacycles more commonly known as the microwave portion of the spectrum available for communication between fixed points. All operations on these frequencies are on a developmental basis at this time; however, the Commission is making preparations for permanent rules to govern the use of these frequencies. In this connection, the pending theater television hearing which involves a request for a portion of the industrial microwave spectrum for a nation-wide competitive theater television service is of interest.

POWER RADIO SERVICE

Established to provide communication facilities for persons engaged in generating, transmitting, collecting, purifying, storing, or distributing by means of wire or pipeline, electrical energy, or natural gas, water, or steam for use by the public, the Power Radio Service has continued to grow at a rapid rate.

As in past years, the principal use of radio in this service is by utility companies in connection with the restoration of service after interruption due to fire, storm, flood, accident, or other mishap, and for routine maintenance activities necessary in the efficient operation of the industry.

Radio systems for communication between fixed points have been increasing in number in this service. These are used primarily for multichannel radio circuits for central control of load dispatching. In the past these systems have been operated in the 72–76 megacycle band in localities where interference would not be caused to television reception. An expanding TV service, however, is making it more

difficult to find areas where interference-free operations can be had. This has led to increasing interest in the use of frequencies above 900 megacycles for these purposes. Fixed point-to-point systems in this service are often integrated with mobile service systems and are used to control mobile operations.

PETROLEUM RADIO SERVICE

Established to provide communication facilities for persons engaged in locating, producing, collecting, refining, or transporting by means of pipelines, petroleum or petroleum products including natural gas, the Petroleum Radio Service has expanded at a phenomenal rate.

Petroleum is usually found in remote areas, far removed from communication facilities where the installation of wire lines would be impractical and economically infeasible. In such areas radio is necessary to maintain communications between well site, field headquarters, and mobile units during drilling operations. This provides close supervision of an extremely hazardous and costly operation. Other uses are in connection with studies of subsurface structures in geophysical exploration and mobile radio systems to maintain or restore pipeline service.

In the production and pipeline phases, the industry is relying more heavily than ever before upon their radio facilities which are used to control the flow in pipelines and for pipeline maintenance. For this use the industry is looking more and more to frequencies in the microwave regions which are available for point-to-point use. Several microwave systems, each more than 1,000 miles in length are in operation with others under construction or being planned. Generally, such fixed point-to-point systems are of the multichannel type and provide voice, as well as signaling and telemetering circuits. Many of these systems are integrated with mobile service systems and place-load dispatching and maintenance control in centralized locations for the most efficient operation.

FOREST PRODUCTS RADIO SERVICE

Established to provide communication facilities for those persons engaged in actual woods operations such as tree logging, tree farming, or related woods operation, the Forest Products Radio Service has experienced a slow but steady growth from the two experimental systems operating in 1947, to the more than 25,000 transmitters presently authorized in a total of 123 forestry operations. The greatest usage of this service continues to be located in the Pacific Northwest where approximately 77 percent of the total radio operations are located; approximately 18 percent being located in the southern United States.

Radio is used in connection with fire detection, prevention and suppression, and to promote safer, more efficient and more economical logging operations.

MOTION PICTURE RADIO SERVICE

Established to provide communication facilities for persons engaged in the production or filming of motion pictures intended for public showing, use of the Motion Picture Radio Service has not increased materially the past year. Radio is used to coordinate and expedite the shipment of supplies to remote locations, and to coordinate the filming of action scenes taking place on outdoor sets.

RELAY PRESS RADIO SERVICE

Established to provide communication facilities for persons engaged in the publication of a newspaper or in the operation of an established press association, the Relay Press Radio Service is used principally by the metropolitan dailies. The chief use of this service is in the dispatching of reporters and photographers to the scene of a newsworthy event. At least one large newspaper is considering the installation of facsimile and teletype equipment to facilitate the filing of copy and photographs from the scene of a news event.

SPECIAL INDUSTRIAL RADIO SERVICE

Established to provide communication facilities for persons engaged in an industrial activity primarily devoted to production, construction, fabrication, manufacturing, or similar processes, the Special Industrial Radio Service is available to a great variety of users.

Since the demand for facilities, especially in urban areas, has been so great that there are not enough frequencies to provide service for everyone desiring it, an applicant must show that: (1) the activity for which radio is desired is being conducted in a remote and sparsely settled region; or (2) the operation is a construction project of a public character; or (3) the use of radio is required within the yard area of a single plant. Upon showing that operation outside the yard area is required to maintain plant security in the interest of the national defense, operation may be authorized outside the physical limits of a plant.

Typical operations include directing the movement of rail cars and trucks within steel mill yards and within large manufacturing plants; large ranching and farming operations; fruit and vegetable processing plants; mining operations, including pospecting; and contractors engaged in public construction, such as highways, bridges, tunnels, and dredging operations.

LOW-POWER INDUSTRIAL RADIO SERVICE

Established to provide communication facilities for any person engaged in a commercial enterprise or industrial activity, the Low-

Power Industrial Radio Service is available to all business organizations whenever they have a need for short-distance mobile-to-mobile communication to promote more efficient and safe conduct of their operations. This service provides for the operation of any desired number of units, which are limited to very low power with restrictions on the design of the antenna in order to restrict the range to short distances and thereby allow a large number of transmitters to operate on the same frequencies. All stations authorized in this service are classified as mobile stations.

INDUSTRIAL RADIOLOCATION SERVICE

Designed to be used in connection with geological or geophysical activities, the new Industrial Radiolocation Service is available to persons engaged in a commercial or industrial enterprise who have a substantial need in connection therewith to establish a position, distance, or direction by means of radiolocation devices for purposes other than navigation. Since, at this time, there does not appear to be any single system of radiolocation which is satisfactory in all respects, all operation is authorized on a developmental basis to encourage the development of radiolocation techniques.

As a result of a hearing held June 4, 1951, the frequency band 1750–1800 kilocycles was made available on a shared basis with the Disaster Communications Service for use within 150 miles of the shoreline of the Gulf of Mexico for radio-location purposes in connection with the offshore exploration for petroleum only. Since radio-location activities will be predominantly a daytime operation and drills in the Disaster Communication Service will take place chiefly at night, it is anticipated that interference can be controlled by a time-sharing arrangement. There are two radio-location systems presently authorized in the Gulf of Mexico area and applications for eight additional systems have been received.

In addition to the frequency band 1750–1800 kilocycles, several bands of frequencies in the UHF and SHF portions of the spectrum are also available for radio-location purposes.

8. LAND TRANSPORTATION RADIO SERVICES

The Land Transportation Radio Services provide radio communication facilities for the Nation's land transportation carriers. Included in this group are the Railroad, Urban Transit, Taxicab, Intercity Bus, Highway Truck, and Automobile Emergency Radio Services.

The year marked a continuation of the expansion in radio facilities authorized for these transportation services. The rate of expansion was not, however, as great as that which followed the finalization of the Land Transportation Radio Service Rules in 1949.

The major problem in these services, as they continue to expand, is that of providing sufficient frequency space in an already crowded spectrum. All frequencies available are shared with other users and in many of the more crowded urban areas, where the greatest use of these frequencies occurs, several licensees may share a single channel. It is anticipated that at least a temporary relief of this congestion will occur with the opening up of the 450-megacycle mobile band. As equipment for operation in this band becomes more readily available and as the results of operations now in progress are made known, it is expected that a considerable number of new users will look to this band for their radio facilities. As in other services, the Commission is also considering "channel-splitting" as a means of increasing the number of radio channels without adding additional spectrum space.

RAILROAD RADIO SERVICE

The Railroad Radio Service provides communication facilities for persons regularly engaged in offering to the public a passenger or freight transportation service by railroad common carrier. The use of radio by the Nation's railroads has continued to progress on a sound, conservative, carefully planned basis. Radio is continuing to provide these carriers with an economical and dependable means of end-to-end train, of train-to-wayside station, and wayside-to-wayside station communication. It has improved the efficiency and safety of yard and terminal operations under conditions of unfavorable weather, and has been of substantial aid in preventing accidents and reducing repair time.

The use of radio in railroad communication continues to be centered on main-line operations. This has resulted in increased interest being shown in the portion of the spectrum above 890 megacycles known as the microwave region where several frequency bands are available for fixed point-to-point systems. Microwave radio links are beginning to come into use by the railroads to replace sections of their wire line communications systems which are particularly susceptible to storm damage, as well as to provide communications in areas where the installation of wire lines is impractical.

URBAN TRANSIT RADIO SERVICE

The Urban Transit Radio Service provides communication facilities for persons regularly engaged in furnishing scheduled common carrier public passenger land transportation service along fixed routes primarily within urban or suburban communities. The use of radio facilities provides efficient dispatching of passenger-carrying vehicles during rush hours and other critical traffic periods; aids in dispatching supervisory cars and repair trucks to reroute lines during fires, traffic jams, and other emergencies.

TAXICAB RADIO SERVICE

The Taxicab Radio Service provides communication facilities for persons regularly engaged in furnishing to the public for hire a non-scheduled passenger land transportation service.

Since the Taxicab Radio Service was established on a regular basis in 1949, it has grown at a phenomenal rate and in the larger cities most of the operating frequencies are shared by two or more companies. For this reason, the coordinated assignment of frequencies is of primary importance if all users are to obtain maximum benefits from the use of radio. As in years past, the Commission has actively encouraged cooperation and coordination of frequency assignments among the various taxicab operators and their frequency coordinating committees.

Of considerable importance is the increased interest shown in the 10 channels available in the region around 452 megacycles. With the availability of equipment to operate on these frequencies, several new developmental operations have been authorized in four large cities. Use of these frequencies appears to offer this service a chance to continue its growth.

INTERCITY BUS RADIO SERVICE

The Intercity Bus Radio Service provides communication facilities for persons regularly offering to the public a scheduled common carrier passenger service over public highways and primarily between established city terminals. Municipal bus and street-car companies generally operate in the Urban Transit Radio Service.

Radio communication systems of the type required by the larger bus operators necessitate detailed coordinated planning and, due to the extensive nature of the operations and the extensive areas of coverage, are necessarily quite costly. For this reason, bus operators are proceeding slowly in the installation of radio systems and the service has experienced a rather slow growth.

HIGHWAY TRUCK RADIO SERVICE

The Highway Truck Radio Service communication facilities are for persons regularly engaged in the operation of trucks on a route basis outside of metropolitan areas. This service may not be used by persons operating truck routes or offering a distribution service within a single metropolitan area. The chief purpose of this service is to provide for trucks operating in more remote areas where other means of communication are not available.

AUTOMOBILE EMERGENCY RADIO SERVICE

The Automobile Emergency Radio Service provides communication facilities for associations of owners of private automobiles which give emergency road service and for private garages operating emergency

road service vehicles. This service is intended to be used in dispatching cars and trucks to assist stalled or disabled automobiles. The use of radio has proven effective in controlling emergency vehicles which keep the masses of automobiles moving on crowded highways and contribute toward public safety. The greatest use of this service occurs in large cities where the single 35 megacycle frequency is heavily loaded. Two additional frequencies are available in the region around 453 megacycles; however, the limited availability of suitable equipment has prevented extensive use of these frequencies. It is anticipated that widespread use will be made of these higher frequencies as equipment becomes available.

9. CITIZENS RADIO SERVICE

Established to provide a radiocommunication service in the frequency band 460–470 megacycles for the individual citizen who is not eligible for any of the other established radio services, the Citizens Radio Service is available to any citizen of the United States who is at least 18 years of age.

One important rule amendment during the year added a new frequency in the 27 megacycle region to this service and provides for a new class of station which may be used to control objects such as model planes, model boats, and garage doors by radio. Another amendment clarified the rules with respect to eligibility to provide for duly authorized state and local civil defense activities in this service.

As in past years, the absence of readily available low-cost radiotelephone equipment designed to operate in the 460–470 megacycle region has been the chief handicap to the expansion of this service, although the number of authorizations increased 150 percent in the past year. Use of the new 27 megacycle frequency is increasing at a rapid rate, and it is anticipated that operation in the 460–470 megacycle band will be extended in the near future since operating equipment now appears to be commercially available.

10. ENFORCEMENT UNIT

This was the second year of operation of a separate Enforcement Unit in which is centralized all enforcement and compliance activities of the Safety and Special Radio Services Bureau. In addition to this activity, the unit is assigned another important function, which is not indicated by its title, namely, that of legal adviser to the Chief of the Bureau. It become apparent during the year that the time of the staff of this unit must be about equally divided between enforcement matters and the special legal, policy, and legislative problems which require attention in the office of the Chief of the Bureau. In this connection, the attorneys of the unit are also

available for consultation with attorneys of the Bureau's divisions and for legal advice to the chiefs of these divisions on important problems arising in their offices.

During fiscal 1951, the processing of routine violation reports referred to the unit had been standardized to a large degree, and procedures were adopted appropriate to the handling of a large number of recurring cases. In the past year, however, it was found necessary to put in effect additional standards for screening violation matters before they are referred to this unit. The very small staff available for actual enforcement proceedings, plus the volume of irregularities resulting from a rapid increase in the number of outstanding licenses, indicated that the public interest would best be served by a more selective approach and the application of more severe penalty measures in individual cases.

An important segment of such enforcement activities concerned the imposition of monetary forfeitures under title III, part II, of the Communications Act. Vessels and their masters who violate the compulsory radio provisions of title III, part II, by reason of the navigation of the ship in the open sea contrary to these provisions incur forfeiture liabilities prescribed by the act. The Commission is empowered to remit or mitigate the forfeitures so incurred. In the course of the year, notifications of forfeiture liability were made against 20 ships and their masters. This figure exceeded the total number of forfeiture cases previously handled in the years since the forfeiture provision was enacted into the law in 1937. Ten of these cases were disposed of and closed during the year and 10 are still pending. A total of $9,975 was collected. There are indications that the prompt application of these penalties, even though many were mitigated for nominal sums, has been effective in improving the general level of compliance.

The changing economic and technical factors affecting the variety of safety and special radio services necessitates a constant scrutiny and reappraisal of the policies and regulations under which these services are administered. The unit was required to devote a considerable portion of its time during the year to a study of proposed changes in policy or regulation with the purpose of advising the Chief of the Bureau as to their legal adequacy and their effect in regard to consistency of administration within the Bureau and throughout the Commission.

11. STATISTICS

Number of Stations in Safety and Special Radio Services

Stations in the Safety and Special Radio Services (exclusive of experimental, which are treated in a separate chapter) exceeded 212,000 at the close of the fiscal year. This represents a net increase

of almost 35,000 during the year, as compared to a net increase of about 23,000 during fiscal 1951. The number of authorized stations in the various services are shown in the following table:

Class of station	June 30, 1951	June 30, 1952	Increase or (decrease)
Aeronautical Services:			
Carrier aircraft [1]	2,173	1,921	(252)
Private aircraft [1]	28,113	27,678	(435)
Public service aircraft [1]	546	364	(182)
Aeronautical land and fixed [2]	1,310	1,183	(127)
Civil air patrol [2]	1,483	798	(685)
Airdrome control	56	59	3
Aeronautical navigational	155	166	11
Flight test	86	100	14
Flying school	18	20	2
Aeronautical utility mobile	88	105	17
Aeronautical advisory	33	209	176
Total	34,061	32,603	(1,458)
Marine Services:			
Ship	26,681	32,229	5,548
Ship radar	1,625	1,958	333
Coast	116	107	(9)
Alaskan coastal	344	379	35
Alaskan fixed public	517	568	51
Maritime radiolocation [3]	----------	22	22
Maritime fixed [3]	----------	64	64
Other	261	173	(88)
Total	29,544	35,500	5,956
Public Safety Services:			
Police	6,198	7,008	810
Fire	432	764	332
Forestry-Conservation	1,728	2,070	342
Highway maintenance	408	555	147
Special emergency	313	670	357
State guard	50	76	26
Total	9,129	11,143	2,014
Land Transportation Services:			
Railroad	604	757	153
Urban transit	111	110	(1)
Intercity bus	31	34	3
Taxicab	3,152	3,639	487
Highway truck	270	341	71
Automobile emergency	85	146	61
Citizens	560	1,401	841
Total	4,813	6,428	1,615
Industrial Services:			
Power	5,016	6,065	1,049
Petroleum	2,416	3,787	1,371
Forest products	453	685	232
Special industrial	1,451	2,760	1,309
Low power industrial	150	259	109
Relay press	35	51	16
Motion picture	21	23	2
Agriculture	9	9	0
Radiolocation land	0	41	41
Total	9,551	13,680	4,129
Amateur and Disaster Services:			
Amateur	90,585	113,092	22,507
Disaster communications	2	71	69
Total	90,587	113,163	22,576
Grand total	177,685	212,517	34,832

[1] The apparent decrease in the number of aircraft stations resulted from the deletion of approximately 9,141 expired licenses from the files. There were actually 7,970 new aircraft licenses issued during fiscal 1952.

[2] The apparent decrease in the number of aeronautical and Civil Air Patrol stations resulted from reclassifying certain aeronautical as CAP stations, and continuing the consolidation of CAP-station licenses into single-system licenses for an entire CAP wing. There were actually 332 new CAP-system licenses issued during fiscal 1952.

[3] These classes were grouped with "other" in the seventeenth annual report.

NOTE.—A station is defined as a separate license or construction-permit authorization. For example, 65 mobile units operating on 1 license are counted as 1 station.

Applications Received in Safety and Special Radio Services

More than 141,000 applications for stations in the Safety and Special Radio Services were received during 1952. This represents an increase of more than 34,000 applications compared with the previous year, an increase of almost 32 percent. The number of applications received in each service is shown in the following table:

Class of station	Received 1951	Received 1952	Increase or (decrease)
Aeronautical Services:			
Aircraft [1]	19,602	18,252	(1,350)
Ground	2,830	3,761	931
Total	22,432	22,013	(419)
Marine Services:			
Ship [2]	18,757	16,893	(1,864)
Ship radar	1,196	1,084	(112)
Coast [3]	177	113	(64)
Alaskan coastal [3]	503	255	(248)
Alaskan fixed public [3]	647	318	(329)
Maritime radiolocation [4]	----------	26	26
Maritime fixed [4]	----------	161	161
Other	307	165	(142)
Total	21,587	19,015	(2,572)
Public Safety Services:			
Police	6,104	6,823	719
Fire	801	881	80
Forestry-Conservation	1,337	1,548	211
Highway maintenance	555	571	16
Special emergency	447	910	463
State guard	90	140	50
Total	9,334	10,873	1,539
Land Transportation Services:			
Railroad	550	870	320
Urban Transit	78	105	27
Intercity bus	11	70	59
Taxicab	3,602	4,414	812
Highway truck	416	591	175
Automobile emergency	125	220	95
Citizens	192	246	54
Total	4,974	6,516	1,542
Industrial Services:			
Power	4,467	4,786	319
Petroleum	2,661	3,671	1,010
Forest products	656	800	144
Special industrial	2,378	4,039	1,661
Low power industrial	160	383	223
Relay press	37	54	17
Motion picture	29	14	(15)
Agriculture	14	19	5
Radiolocation land	0	105	105
Total	10,402	13,871	3,469
Amateur and Disaster Services:			
Amateur	38,469	69,175	30,706
Disaster Communications	11	90	79
Total	38,480	69,265	30,785
Grand total	107,209	141,553	34,344

[1] A campaign by the Commission's Field Engineering and Monitoring Division in 1951, against unlicensed operation abnormally increased aircraft applications during 1951, resulting in an apparent decrease in 1952.

[2] The decrease in ship applications for 1952 may be attributed to increasing the license term from 3 to 4 years in 1948, granting modified licenses for full term instead of unexpired term, and use of one license to cover both east and west coasts.

[3] The licenses for these classes of stations are renewable in odd-numbered years, decreasing the number in 1952.

[4] These classes were grouped with "other" in the seventeenth annual report.

Number of Transmitters in Safety and Special Radio Services

More than 537,000 transmitters are authorized to operate in the Safety and Special Radio Services. Of this total over 137,000 were land or fixed stations and 400,000 were portable or mobile units. These figures were compiled on the basis of records as of January 1, 1952.

The breakdown follows:

Class of station	Land or fixed station transmitters	Mobile station transmitters	Total transmitters
Aeronautical Services:			
Aircraft [1]		39,307	39,307
Ground [1]	2,716		2,716
Total	2,716	39,307	42,023
Marine Services:			
Ship		32,229	32,229
Ship radar		1,958	1,958
Coast	141		141
Alaskan coastal	376		376
Alaskan fixed public	450		450
Other	135		135
Total	1,102	34,187	35,289
Public Safety Services:			
Police	4,878	76,231	81,109
Fire	511	10,461	10,972
Forestry-Conservation	1,489	12,588	14,077
Highway maintenance	414	3,845	4,259
Special emergency	387	1,347	1,934
State guard	53	87	140
Total	7,732	104,559	112,291
Land Transportation Services:			
Railroad	534	8,640	9,174
Urban transit	70	1,669	1,739
Intercity bus	28	387	415
Taxicab	3,317	122,037	125,354
Highway truck	237	2,984	3,221
Automobile emergency	116	1,439	1,555
Citizens [2]		3,000	3,000
Total	4,302	140,156	144,458
Industrial Services:			
Power	4,186	46,946	51,132
Petroleum	2,787	12,406	15,193
Forest Products	414	4,781	5,195
Special industrial	1,245	14,370	15,615
Low-power industrial		2,305	2,305
Relay press	21	428	449
Motion picture	11	173	184
Agriculture	10		10
Radiolocation	2	9	11
Total	8,676	81,418	90,094
Amateur and Disaster Services:			
Amateur [3]	113,092		113,092
Disaster Communications [3]	67	335	402
Total	113,159	335	113,494
Grand total	137,687	399,962	537,649

[1] This count includes an estimated 750 land and 9,000 mobile Civil Air Patrol stations.
[2] Estimated.
[3] As of June 30, 1952.

CHAPTER V—RADIO BROADCAST SERVICES

1. TELEVISION (TV) BROADCAST SERVICE

TELEVISION "FREEZE" LIFTED

The Commission on April 11, 1952, brought to a conclusion its television rule-making proceedings (dockets 8736 et al.) by adoption of the Sixth Report and Order amending the Commission's rules and regulations and engineering standards concerning the Television Broadcast Service.

Chronology of TV Proceedings.—These proceedings were instituted on May 6, 1948, by a "Notice of Proposed Rule Making" designed to amend the table of television channel assignments for the United States, set out in Section 3.606 of the Commission's rules and regulations. During the hearing held pursuant to this notice, evidence was introduced which indicated the necessity for a revision of the rules, regulations, and standards with respect to the technical phases of the TV broadcast service.

On September 30, 1948, the Commission issued a report and order, commonly referred to as the "freeze order." In general, this order provided that no new or pending applications for the construction of new TV broadcast stations would be acted upon; and that new and pending applications for modification of existing authorizations would be considered on a case-to-case basis with action thereon depending on the extent to which the requested modification affected the issues in the proceeding. In adopting the "freeze order," the Commission pointed out that a national TV assignment plan and the rules, regulations and standards must be based upon, and must reflect, the best available engineering information. The Commission noted that it could not continue to make assignments under the existing table since

the evidence presented at the hearing raised serious questions concerning the validity of the bases upon which the table was constructed. Also, the granting of additional TV authorizations would make more difficult any revisions in the table made necessary by subsequent changes in the rules and standards.

The general phase of the TV proceeding was initiated on July 11, 1949, by the issuance of a "Notice of Further Proposed Rule Making." Attached to this notice were four appendixes: Appendix A set forth the Commission's proposals to amend its TV rules, regulations, and engineering standards; Appendix B set forth the methods and assumptions upon which the Commission's figures and values specified in Appendix A were based; Appendix C contained the Commission's proposed revision of its table of TV channel assignments throughout the United States and the Territories; and Appendix D contained illustrative assignments for Canada, Mexico, and Cuba indicating the manner in which it might be necessary to take into account the use of channels by these countries.

In September 1949, the Commission began its hearings on the color TV issues in this proceeding and its first and second color reports were issued on September 1, 1950, and October 11, 1950, respectively.

Subsequently, on October 16, 1950, the Commission began hearing the testimony of interested parties who had filed comments concerning the general issues set forth in Appendixes A and B of the notice of July 11, 1949. These extensive hearings continued until January 31, 1951, when the Commission recessed in order to study the record and determine whether it should proceed with the hearings on Appendixes C and D in the light of the evidence adduced on the general issues.

On March 22, 1951, the Commission issued its "Third Notice of Further Proposed Rule Making." In Appendixes A and B of the Third Notice, the Commission set forth its conclusions based on the hearing record developed with respect to the general issues. The Commission at the same time afforded interested parties the opportunity to object to the conclusions in Appendixes A and B by filing statements of objections.

Appendixes C and D of the third notice contained a new proposed table of TV channel assignments for the United States and the Territories and new illustrative assignments for Canada and Mexico. Pursuant to paragraph 12 of this notice, parties were permitted to file comments and oppositions to such comments as might be filed by other persons with respect to the proposals in Appendixes C and D.

On June 21, 1951, the "Third Report" was adopted in the proceedings. In this report, the Commission decided that it could not, at that time, take action to effect a partial lifting of the "freeze." On July 12, 1951, the Commission issued its "Fourth Report and Order" which allocated to TV broadcasting the frequency band 470–

500 megacycles. On July 25, 1951, the Commission adopted its "Fifth Report and Order" amending its "freeze order" to permit consideration on a case-to-case basis of applications by existing licensees and permittees for special temporary authority to increase power within certain defined limits.

On July 25, 1951, the Commission issued an order cancelling the oral hearings which were scheduled to take place pursuant to the third notice. This order provided all parties with an opportunity to file sworn statements or exhibits fully setting out their position in support of the pleadings they had filed. In addition, parties were permitted to submit sworn statements or exhibits directed against statements or exhibits offered by other parties and to file briefs with respect to any matter of fact or law raised by the evidence. The Commission also provided for oral presentations in addition to the submission of sworn statements or exhibits with respect to any issue which in the Commission's judgment could not be satisfactorily considered and disposed of without oral presentation.

More than 1,500 comments, sworn statements and briefs were filed and considered in this portion of the proceedings.

Final TV Report.—The Sixth Report and Order lifted the "freeze" on the authorization and construction of new TV stations, assigned 70 UHF channels (between 470–890 megacycles) in addition to the 12 VHF channels (between 54–216 megacycles) which were in use, promulgated a new nation-wide table of TV frequency assignments making available 2,053 assignments in 1,291 communities throughout the United States, its Territories and possessions, and provided for a change of frequency for 30 of the then existing 108 VHF stations. The new combined VHF-UHF assignment table supplants the old VHF assignment table which made available about 400 assignments in 140 metropolitan areas.

In establishing the assignment table, consideration has been given to the fact that TV signals do not respect international boundaries. The channel assignments were accordingly worked out in negotiations with Canada and Mexico with respect to communities in the border areas. The conferences and negotiations with Canada and Mexico have been carried on over a period of years. Such conferences and negotiations were conducted under the auspices of the Department of State with the continued technical advice and assistance of the Commission.

The report and order establishes a new class of TV stations—noncommercial educational television stations—and makes channel assignments in 242 communities for use exclusively by these stations. Forty-six channels have been assigned to communities designated as "primarily educational centers." Of the channels assigned for educational use 80 are VHF and 162 are UHF.

The report and order further amended and recodified the rules governing television broadcast stations. These rules implement the decisions adopted in the Commission's report and order. The amended rules provide that TV stations will operate in accordance with new tables of minimum and maximum power. Power can, however, vary with antenna height. Maximum effective radiated power on VHF Channels 2–6 is fixed at 100 kilowatts, on VHF Channels 7–13 at 316 kilowatts, and on UHF Channels 14–83 at 1000 kilowatts.

Three geographic zones were established with channels assigned in accordance with minimum mileage separations designated for each zone. Cochannel assignment separations of 170 miles for VHF channels, and 155 miles for UHF channels, have been established for Zone I which encompasses the entire States of Massachusetts, Rhode Island, Connecticut, New Jersey, Maryland, Pennsylvania, Delaware, District of Columbia, Ohio, Indiana, Illinois, and parts of Maine, New Hampshire, Vermont, New York, Virginia, West Virginia, Michigan, and Wisconsin.

Minimum cochannel assignment separations of 190 miles for VHF channels, and 175 miles for UHF channels, have been established in Zone II, which includes the Territories and possessions, and the entire States of Kentucky, Tennessee, North Carolina, South Carolina, Missouri, Iowa, Minnesota, Arkansas, Kansas, Nebraska, Oklahoma, North Dakota, South Dakota, Utah, Idaho, Arizona, New Mexico, Montana, Wyoming, Nevada, Colorado, Oregon, Washington, and California, and parts of Maine, New Hampshire, Vermont, New York, Virginia, West Virginia, Georgia, Alabama, Mississippi, Louisiana, Michigan, Wisconsin, and Texas.

Minimum cochannel assignment separations of 220 miles for VHF channels, and 205 miles for UHF channels, have been established in Zone III, which includes Florida and parts of Georgia, Alabama, Louisiana, Mississippi, and Texas.

The report and order fixed July 1, 1952, as the date for beginning the processing of applications for new TV stations and established temporary procedures which determine the order of processing.

Temporary TV Processing Procedure.—Basically, this procedure is designed to bring their first TV service to the greatest number of people in the shortest time, and to provide for a local TV station first in those places now without one. To achieve this end, two processing groups have been established.

Group A includes all cities situated 40 or more miles from the nearest television station in operation as of April 14, 1952. Cities are arranged in the order of their 1950 population, with the cities having the larger population being processed first. Group A also includes applications from those presently operating stations that are required to change frequency pursuant to the Sixth Report and Order.

Group B is somewhat more complicated and seeks to achieve two aims. The first is, as stated above, to provide for a local station in those places now without such a station, and the second is designed to stimulate the growth of TV broadcasting in the UHF band. To accomplish these ends, first priority in Group B is given to cities within 40 miles of a single existing TV station but with no local station and with only UHF channels assigned for use in those cities. The cities in this category and in the following categories are arranged in the order of their 1950 populations. Second priority is given to cities having one or more local TV stations, but in which only UHF channels remain open for assignment to new stations. Third priority is given to cities in which there are no local TV stations operating but which are within 40 miles of only one operating TV station, and in which both VHF and UHF channels are available for assignment. Fourth priority is given to cities in which there is a single operating local TV station but which are located 40 or more miles from any other operating TV station, and fifth priority is given to cities located less than 40 miles from two or more operating TV stations arranged in an order determined first by the number of operating TV stations within 40 miles and within each such group by population.

Lowest priority is given to applications from existing TV stations to make changes in existing facilities (other than those stations required to change frequency by the Sixth Report) and to applications for license to cover a post-freeze construction permit.

Under the temporary processing procedure, applications for new TV stations in the Territories and possessions and for new educational television stations are processed as received.

The distance of 40 miles used in establishing the above procedure is not a determination of the service area of all TV stations but is considered to be a reasonable figure for this purpose. It is planned to have the processing of applications in Groups A and B progress simultaneously as far as is practicable.

OTHER TELEVISION DEVELOPMENTS

The past year witnessed an awakening on the part of the viewing public that TV is not only a medium of entertainment and information but that it gives people an opportunity to observe their Government in action. The several hearings and investigations that were conducted before TV cameras and the widespread use of this medium by political aspirants demonstrated the impact of video broadcasting on the national scene. Millions of people saw televised for the first time an actual explosion of an atomic bomb, a large Chicago fire, the aftermath of aircraft and railroad disasters, and other big news events. Elaborate plans were made for TV coverage of the national political conventions.

During the year a number of TV stations obtained authority pursuant to the Commission's Fifth Report and Order to increase power and elevate their antennas, thereby bringing new or improved service to millions of people. With the lifting of the "freeze" and the prospect of a resumption of application processing after July 1, 1952, applicants and prospective applicants reviewed their proposals and began the preparation of new applications and amendments. Of particular significance was the sudden surge of interest in UHF television. Manufacturers of transmitters announced that suitable equipment would be available and receiver manufacturers demonstrated that they had solved the problems of UHF reception.

EXPERIMENTAL TELEVISION SERVICE

Experimental TV stations are authorized on showing that a program of research and experimentation will be conducted which promises substantial contribution to the advancement of video broadcasting. Such experimental licenses are held by several manufacturers of TV equipment and are used for the development and testing of improved transmitters, antennas, etc.

Authorizations have also been issued to applicants desiring to collect engineering data with respect to the propagation characteristics of radio signals in the TV bands and as a source of signal in connection with the development and testing of receivers, particularly UHF receivers and color receivers. Several of the existing TV broadcast stations have been authorized to transmit color signals on an experimental basis employing the so-called compatible color system being developed by the NTSC (National Television System Committee).

Experimentation has continued with various scrambled or subscription types of TV transmission including "Phonevision", "Skiatron Subscribervision" and a new system know as "Telemeter" which employs a coin-operated device to unscramble the picture. In addition, authorizations have been issued to permit limited experimentation with various systems of "satellite" and "booster" operation intended to improve TV reception in areas beyond the normal range, and for the operation of equipment by prospective applicants to test the suitability of various sites for their proposed stations.

TELEVISION BROADCAST AUXILIARY SERVICE

The Television Broadcast Auxiliary Service includes three classes of stations: (1) Television pickup stations which are portable or mobile and are used to relay program material for on-the-spot broadcasts of special events, parades, sporting contests, fairs, conventions, and important news happenings, and are also employed to provide temporary circuits from the scenes of recurring events such as weekly religious services, regularly scheduled sporting events, con-

certs, etc.; (2) television STL (studio-transmitter link) stations are fixed installations used to provide a suitable circuit for the relaying of program material between the studios and the transmitter of TV stations; (3) television intercity relay stations are also fixed installations and are used to interconnect TV broadcast stations for network operation in places where suitable common carrier coaxial or microwave relay facilities are not available.

During the past year this service has grown steadily, not only in the number of authorizations but in more frequent and varied use. Perhaps the most elaborate use of TV pickup facilities was planned in connection with the national political conventions and the ensuing campaigns. TV pickup facilities were used during the year to bring to the nation-wide public newsworthy events, as well as innumerable events of local interest to local audiences. TV broadcasters are coming to rely more and more heavily on this service for greater diversity in programing.

2. STANDARD (AM) BROADCAST SERVICE

While the increase in the number of AM authorizations was not as great as during the year previous, the use of the standard broadcast band continued to grow. At the close of the fiscal year, the number of anthorized AM stations totaled 2,420, which was a net increase of 45 for the year. Of this number 2,333 held licenses.

Fewer AM authorizations were canceled during fiscal 1952 than during either of the previous 2 years. The number of applications received for new AM stations or major changes in the facilities of existing stations, while on the down grade, still kept around the 300 mark.

In spite of a decrease of about 40 percent in number of applications for new AM stations or changes in facilities filed during the year, the trend of the last several years toward an over-all reduction in the number of such pending applications was reversed this year with about a 6-percent increase in this figure between the beginning and end of the year. The backlog of AM applications "awaiting processing" (i. e., nonhearing status) increased over 100 percent. This was intimately related to the 22-percent reduction in force suffered by the Anral Facilities Division.

On June 18, 1952, the Commission proposed to add the channel 540 kilocycles to the standard broadcast band. This is in conformity with international agreement which specifies the AM broadcast band for use in the United States at 535 to 1605 kilocycles instead of the present 550 to 1600 kilocycles.

CLEAR CHANNELS

No action was taken during the year on the so-called Clear Channel Hearing (docket 6741) and Daytime Skywave Hearing (docket 8333),

because of the pendency of the new North American Regional Broadcasting Agreement (mentioned hereafter).

These hearings, the records of which have been closed for several years, are directed primarily to the question as to how to make best use of the clear channels of the standard broadcast band assigned by international agreement for use by the United States. The clear channels are necessary for AM broadcast service to rural areas since channels which are shared by a multiplicity of stations, the so-called regional and local channels, are bound to be cluttered with interference, particularly during nighttime propagation conditions, to such an extent that each station can serve only out to a relatively short distance where its signals are strong enough to override the interference. Rural areas beyond these distances thus receive no service on such channels and must rely on the 10 kilowatt to 50 kilowatt clear channel stations.

At present the Commission's rules provide a maximum of 50 kilowatts power for these and, on 25 clear channels which are assigned for use by "Class 1–A" stations, they prohibit the nighttime operation of a second station. An improvement in the extent and technical quality of rural reception on these channels may be accomplished by permitting higher power, by permitting one or two additional stations, or by some combination of these.

NORTH AMERICAN REGIONAL BROADCASTING AGREEMENT

This treaty, which is intended to regulate the assignment and operation of standard broadcasting stations in North America in such a manner as to minimize the unavoidable interference between AM stations, was signed on November 14, 1950, by representatives from all countries of the region save Mexico and Haiti.

The new agreement was negotiated to replace an interim agreement, which extended and modified the provisions of the First North American Regional Broadcasting Agreement. The interim agreement expired on March 29, 1949, after the Government of Cuba refused to agree to its further extension. Subsequently, Cuba made a number of new station assignments and changes in existing assignments which would not have been permitted under the terms of the expired treaty, and which resulted in serious interference to stations in the United States. The other North American countries, by more or less informal agreement, continued to conduct their radio relations in general accordance with the terms of the first NARBA.

The new agreement provides for the adjustment of differences between Cuba and the United States, and upon its entry into force the interference now being caused by Cuban stations should be substantially reduced. Mainly because of the inability of other countries to satisfy Mexico's requirements for additional clear channels, that country refused to sign the new agreement.

To become effective, the NARBA requires ratification by three of its major signatories or adherents. Cuba ratified the agreement in December 1951. In this country the signed document was submitted by the President to the United States Senate in February 1951, where it was referred to the Committee on Foreign Relations. However, through two sessions of the Congress the pressure of other business precluded action by this committee looking toward ratification of the agreement.

As time passed and it appeared that a considerable delay was in prospect before the NARBA might enter into force, it became necessary to take steps to insure the Commission actions in the AM broadcast field would not result in situations making difficult or even impossible the bringing into force of the new NARBA. This was particularly important in that the unratified agreement was the only one which Cuba would recognize, and embodied provisions and priorities in some cases differing sharply from previous agreements. It furthermore contains a stipulation that actions taken by any participant prior to entry into force of the agreement which are not consonant with its provisions are subject to objection by another participant at such time as the agreement becomes operative.

Because of such considerations, the Commission, on October 26, 1951, issued a public statement of policy to be followed by it with respect to the new NARBA, accompanied by orders providing for appropriate changes in its rules to implement this policy. In essence, these rule changes provide that, pending action with respect to ratification and entry into force of the 1950 NARBA, no application would be granted for new or changed facilities when such facilities, in their effect on stations in signatory countries, are inconsistent with the terms of the new NARBA. With respect to nonsignatory countries, it was provided that, on an interim basis and so long as each such country continues to provide protection for assignments in the United States, no assignments would be made in this country which would result in objectionable interference to stations in a nonsignatory country (i. e., Mexico and Haiti). The criteria in such cases would be in general the standards applying at the expiration of the interim agreement.

With respect to the future relations with Mexico in the standard broadcast field it should be noted that during the past year preliminary negotiations have taken place looking toward the conclusion of a bilateral agreement with that country.

3. FREQUENCY MODULATION (FM) BROADCAST SERVICE

During the year 21 new commercial FM broadcast stations were authorized. All of these grants were to licensees of standard broadcast stations, 11 of which operate with daytime only AM facilities.

The desire to obtain nightime coverage prompts daytime-only standard broadcast operators to request FM facilities. A number of licensees of AM broadcast stations operating unlimited time have found that nighttime coverage is severly limited by interference from other stations and nighttime FM coverage is far superior. Of the 21 new FM stations authorized this past year, 13 were to Southern States. FM's static-free reception has made it especially attractive in that area where static, particularly in the summer months, makes satisfactory AM reception in many places either difficult or impossible.

At the end of the 1952 fiscal year 648 commercial FM broadcast station authorizations were outstanding, whereas at the end of the 1951 fiscal year there were 659 authorizations outstanding. This decrease of only 11 authorizations contrasts rather sharply with decreases of 73, 133, and 155 for the 1951, 1950, and 1949 fiscal years respectively.

Extensive FM promotional campaigns were carried out by the National Association of Radio and Television Broadcasters and the Radio-Television Manufacturers Association during the year in North Carolina, Wisconsin, and Washington, D. C., and similar campaigns are planned for other parts of the country. The increase in FM receiver ownership, the FM promotional campaigns, and the recognition of the superior reception characteristics of FM apparently all have a part in slowing down the rate of decrease in FM authorizations.

Another factor which has undoubtedly been responsible for a number of FM licensees keeping their stations on the air has been the granting of special experimental authorizations for remote control of the FM transmitting equipment. Authorizations have been granted to 22 FM stations for such operation, 14 of which are presently operating by remote control and the remainder making such installations. It is required that the operator on duty at the remote control position have complete control over the transmitter and that meter indications of its operation be available to him. Three of the 22 authorizations are for remote control by radio circuits; the remainder use wire lines for complete operations. The distances between the transmitting equipment and the remote control positions vary from different floors in the same building to approximately 80 miles. In the cases of radio control, multiplexing on the radio circuit carrying programs to the remotely controlled transmitter provides for transmitter control while multiplexing on the controlled transmitter provides a means for sending metering information to the remote control position.

A petition submitted by the National Association of Radio and Television Broadcasters occasioned the Commission's issuance of a

notice of proposed rule making concerning reduction of the operator requirements at AM and FM broadcast stations employing nondirectional antennas and operating with powers of 10 kilowatts or less, and remote control of such stations.

Although an FM station, for microphone to transmitter output, must be capable of transmitting a band of frequencies from 50 to 15,000 cycles, network programs are transmitted over lines having considerably less than this range and transcriptions used at the stations do not provide this frequency coverage. The ordinary FM receivers available to the public cannot receive transmissions covering this frequency range. A considerable number of FM listeners have had custom high-fidelity installations made in their homes to realize the full frequency range capabilities of FM broadcasting. A number of FM broadcast stations throughout the country program a considerable amount of classical music primarily for these listeners and others who prefer this type of music. Indications are that the audience of FM listeners who prefer classical music broadcasts is quite large.

4. NONCOMMERCIAL EDUCATIONAL FM BROADCAST SERVICE

In contrast to the decrease in the number of authorizations for commercial FM broadcast stations during the past few years, noncommercial educational FM broadcast service is continually expanding. During the past year 10 new authorizations were granted. One station which had been in operation ceased operations and its authorization was deleted. This is the first case of an operating station in this service going off the air. At the close of the fiscal year 104 authorizations were outstanding.

Forty-two stations in the noncommercial educational FM broadcast service operate with transmitters rated at 10 watts or less. This provides satisfactory coverage within a few miles of the station and is quite suitable for coverage of a college campus and the small towns in which many are located. One manufacturer of FM transmitting equipment who apparently had a surplus of 250-watt FM transmitters on hand modified them for 10 watt operation for use in the educational FM service.

Due to the close proximity of the FM educational band (88 to 92 megacycles) to TV channel 6 (82–88 megacycles), it has been found necessary to change the frequencies of some educational FM stations to the high end of the band in order to eliminate interference they caused in their vicinities to reception of distant television stations operating on channel 6. Although the interference was primarily due to a lack of selectivity in the TV receivers and the weakness of

the TV signals available and could be eliminated in many cases by installation of suitable wave traps, frequencies were changed in order to maintain good public relations for the stations. One station, WFIU in Bloomington, Ind., operating with an effective radiated power of 33 kilowatts, caused so much interference and had so many objections raised locally to its operation that it was granted authority to operate on a frequency in the higher portion of the commercial FM band (92 to 108 megacycles).

The Wisconsin State Radio Council has received authorizations for two additional educational FM stations to complete its eight-station network. This network will provide coverage to substantially the entire state. A number of plans for proposed State-wide networks of educational stations were submitted to the Commission; however, except in the case of Wisconsin, none of these plans has been carried beyond construction of one station. The University of Michigan, which operates educational FM station WUOM in Ann Arbor, Mich., was given the equipment of an FM station which ceased operations in Flint, Mich. The equipment was modified to operate on a frequency in the educational FM band and the station is now rebroadcasting the programs of WUOM in Flint.

5. FACSIMILE BROADCAST SERVICE

FM broadcast stations may transmit facsimile either on a simplex or a multiplex basis. (Simplex facsimile can only be transmitted when no aural program is being broadcast; multiplex facsimile can be transmitted at the same time an aural program is being broadcast.) Licensees of FM broadcast stations have shown very little interest in facsimile. At the present time only six FM broadcast stations hold authorizations for transmission of multiplex facsimile, five of which stations operate in the Rural Radio Network, New York State.

6. BROADCAST AUXILIARY SERVICES

In addition to the Television Broadcast Auxiliary Service previously mentioned, there are three other types of broadcast auxiliary services.

REMOTE PICKUP BROADCAST SERVICE

Remote Pickup Broadcast stations are operated by broadcast station licensees for on-the-spot coverage of events that occur outside a regular studio such as parades, sporting events, conventions, religious services, concerts, and various news events. Portable or mobile equipment is employed ranging from a fraction of a watt "handi-talkie", that can be carried in one hand, to transmitters installed in

automotive vehicles, boats, or aircraft and capable of transmitting signals over relatively long distances. Most of this equipment is self-powered and can be used to provide emergency communication facilities in the event of disruption of normal circuits resulting from floods, storms, or other disasters. Elaborate use of remote pickup facilities was planned in connection with the national political conventions and the ensuing campaigns.

This service continues to grow steadily and broadcasters are using it more and more to provide a diversity of programing that would not be possible through the use of less flexible wire-line circuits.

BROADCAST STL SERVICE

Broadcast STL (Studio-transmitter link) stations provide a means whereby licensees may locate their broadcast transmitters at favorable sites which may be inaccessible to ordinary wire lines. They are used to provide a radio circuit for the transmission of program material from the studio to the transmitter of standard and FM broadcast stations. During the past year this service has continued to meet the special needs of standard and FM broadcast stations.

DEVELOPMENTAL BROADCAST SERVICE

Developmental Broadcast stations are licensed experimentally to conduct research and experimentation looking toward the advancement of the broadcast art, primarily in radiotelephony. This service is the aural broadcasting counterpart of the Experimental Television Broadcast Service. The service is used extensively by manufacturers of aural broadcasting equipment for the development and testing of improved equipment and antennas. Operation is also authorized from time-to-time for the purpose of collecting engineering data with respect to propagation characteristics of radio signals in various portions of the radio spectrum used for broadcast or auxiliary broadcast purposes. During the past year this service continued to meet the needs of the radio industry in this respect.

7. BROADCAST RULE CHANGES

In addition to the significant revision of the rules affecting television reported at the beginning of this chapter, there were other rule changes, of which the following examples may be mentioned:

The Commission amended its rules relating to the consideration of AM applications in the light of the North American Regional Broadcasting Agreement (NARBA), Washington, 1950, and the existing relationship in the field of standard broadcasting between the United States and other North American countries. Its policy in this respect is outlined in previous reference to the NARBA in this chapter.

230960—52——9

The Commission amended its rules for AM, FM, and TV stations with respect to rebroadcasts. In so doing, it held that the Communications Act of 1934, as amended, does not sanction arbitrary refusal by a broadcast station of consent for rebroadcast of its programs by other stations, and that a refusal to permit a rebroadcast when based upon no reasons at all, or upon unreasonable grounds, may well constitute conduct going to the qualifications of a licensee to operate in the public interest. The amended rules require of each broadcast licensee an explanatory statement for each refusal of consent to a rebroadcast of its programs by another station. Upon petitions for reconsideration filed by National Broadcasting Company, Inc., Columbia Broadcasting System, Inc., and the National Association of Radio and Television Broadcasters, the Commission on June 30, 1952, stayed the effective date of the amended rules.

The Commission denied a petition of the Radio Commission of the Southern Baptist Convention and the Executive Board of the Baptist General Convention of Texas requesting the establishment of a new class of FM broadcast service for tax-exempt nonprofit organizations on the ground that no demand for such a service had been shown.

A section on political broadcasts was added to the rules for noncommercial educational FM broadcast stations to reflect provisions similar to those already in effect for other broadcast services.

The Commission made further announcements with respect to censorship by broadcasters of speeches by political candidates. In its Port Huron decision issued on June 28, 1948, the Commission ruled that under section 315 of the act a broadcaster has no authority to censor a broadcast by a political candidate, whether on the ground that the broadcast contains libelous and defamatory matter or for any other reason. The decision gave rise to uncertainty in the minds of some licensees as to the relationship between State libel laws and the prohibition against censorship in section 315 of the act. Inasmuch as more than 3 years have elapsed since the Port Huron decision and no action to clarify the matter has been taken by Congress or in the courts, the Commission announced that it would no longer accept the plea of doubt and uncertainty in the State of the law and licensees will hereafter be held strictly to account for compliance with section 315 of the act.

Authorization was given to the Engineers in Charge of District Headquarter Field Engineering offices to act upon broadcast licensees' requests for extension of authority for temporary operation without a modulation monitor, frequency monitor, or certain electrical meters, when such authority has been granted by the Chief of the Broadcast Bureau.

The rules concerning the filing of the "Annual Financial Report of Networks and Licensees of Broadcast Stations" (FCC Form 324) were modified to permit the filing of a single copy, instead of the former requirement for filing in duplicate, of this report. At the end of the year further modifications of the report form, looking to the simplification of preparation of the reports by the respondents, were in progress.

8. STATISTICS

BROADCAST AUTHORIZATIONS

As of June 30, 1952, there were more than 4,700 broadcasting authorizations outstanding. This was nearly 200 more than the year previous. A breakdown according to the different types of broadcast services follows:

Class of broadcast station	June 30, 1951	June 30, 1952	Increase or (decrease)
Standard (AM)	2,385	2,420	35
Frequency modulation (FM) [1]	659	648	(−11)
Television (TV)	109	108	(−1)
Television experimental and auxiliary	213	221	8
Noncommercial educational FM	95	104	9
International	40	40	
Remote pickup	1,043	1,175	132
Studio transmitter	42	44	2
Developmental	6	2	(−4)
Total	4,592	4,762	170

[1] Commercial facsimile broadcasting is now authorized over FM facilities.

GROWTH OF BROADCASTING

The growth of AM, FM, and TV broadcast services during the past 10 years is indicated in the following table showing the number of authorized and licensed stations at the close of each fiscal year:

	AM		FM		TV		Total	
	Authorized	Licensed	Authorized	Licensed	Authorized	Licensed	Authorized	Licensed
1943	912	911	48	37	6	6	966	954
1944	924	912	32	45	9	6	985	963
1945	955	931	53	46	25	6	1,033	983
1946	1,215	961	456	48	30	6	1,701	1,015
1947	1,795	1,298	918	48	66	6	2,779	1,352
1948	2,034	1,693	1,020	142	109	7	3,163	1,842
1949	2,179	1,963	865	377	117	13	3,161	2,353
1950	2,303	2,118	732	493	109	47	3,144	2,658
1951	2,385	2,248	659	534	109	81	3,153	2,863
1952	2,420	2,333	648	582	108	96	3,176	3,011

BROADCAST APPLICATIONS

	Pending June 30, 1951	Received	Disposed	Pending June 30, 1952
AM				
New stations	270	174	121	323
Change in facilities	235	128	149	214
Renewals	268	1,038	1,025	281
License	74	274	300	48
Transfers	77	484	489	72
Miscellaneous	76	574	591	59
Total	1,000	2,672	2,675	997
FM [1]				
New stations	12	37	38	11
Change in facilities	38	90	98	30
Renewals	70	312	294	88
License	75	110	124	24
Transfers	12	109	103	18
Miscellaneous	16	150	151	15
Total	186	808	808	186
TV				
New stations	415	337	35	717
Change in facilities	30	100	57	73
Renewals	4	136	100	40
License	15	7	15	7
Transfers	7	18	13	12
Miscellaneous	3	35	32	6
Total	474	633	252	855
All other				
New stations	33	276	243	66
Change in facilities	10	102	64	48
Renewals	99	678	584	193
License	47	250	226	71
Transfers	39	173	145	67
Miscellaneous	2	92	87	7
Total	230	1,571	1,349	452
Grand total	1,890	5,684	5,084	2,490

[1] Includes noncommercial educational FM stations.

BROADCAST AUTHORIZATION DELETIONS

The number of broadcast authorizations deleted in fiscal 1952 was less than half the number for the previous fiscal year. Of the 72 deletions in 1952, 35 were AM, 36 FM, and 1 TV. This contrasts with 161 deletions—70 AM and 91 FM—the year previous. Monthly figures for 1952 were:

Month	AM	FM	TV	Monthly total
1951				
July	2	5	0	7
August	3	3	1	7
September	1	4	0	5
October	1	2	0	3
November	1	7	0	8
December	3	0	0	3
1952				
January	5	3	0	8
February	6	0	0	6
March	3	3	0	6
April	2	5	0	7
May	6	2	0	8
June	2	2	0	4
Year's total	35	36	1	72

BROADCAST RECEIVING SETS

Sets for the exclusive use of broadcast reception are not licensed or otherwise regulated by the Commission. At the close of the fiscal year industry estimated that more than 105,000,000 broadcast receivers were in use. Of this number, more than 18,000,000 were capable of TV reception and approximately 9,000,000 could receive FM broadcast. Many sets offer combination reception. The 1950 census reported 40,970,000 homes with radio sets, or 95.6 percent of all dwellings. Industry further estimates that 27,500,000 passenger cars are equipped with broadcast receivers.

BROADCAST INDUSTRY FINANCIAL DATA

In the calendar year 1951, the grand total revenues of the broadcasting industry (radio and television) reached nearly $700 million, the highest on record. Total revenues, which comprise revenues derived from the sale of time, talent, and program materials to advertisers, were reported at $686.1 million. Radio revenues increased from $444.5 million in 1950 to $450.4 million in 1951, while aggregate TV revenues of $235.7 million in 1951 were more than double the $105.9 million for 1950.

Broadcasting profits of $99.1 million in 1951 were two-thirds greater than those of 1950. The industry reported a profit from television broadcast operations for the first time in 1951, earning $41.6 million compared to a loss of $9.2 million in 1950. Earnings from radio broadcast operations dropped by 16 percent from $68.2 million in 1950 to $57.5 million in 1951. The decrease in earnings from radio operations was the result of a reported drop of almost 50 percent in the earnings of the networks coupled with a slight decline of about 4 percent in the earnings of individual radio stations. All profit figures are before payment of Federal income tax.

The following tables show the comparative calendar year 1950–51 radio and television financial data for the radio and television broadcast industries:

All networks and stations,[1] 1950–51

Item	1950	1951	Increase or (decrease)
	Millions	*Millions*	*Percent*
Total broadcast revenues	$550.4	$686.1	24.7
Radio	444.5	450.4	1.3
Television	105.9	235.7	122.6
Total broadcast expenses	491.4	587.0	19.5
Radio	376.3	392.9	4.4
Television	115.1	194.1	68.6
Broadcast income (before Federal income tax)	59.0	99.1	68.0
Radio[2]	68.2	57.5	(15.7)
Television [2]	(9.2)	41.6	

Footnotes on page 124.

Nation-wide networks only,[1] 1950–51

[Including owned and operated stations]

Item	1950	1951
	Millions	*Millions*
Revenues:		
Radio	$106.0	$99.0
Television	55.5	128.4
Total	161.5	227.4
Expenses:		
Radio	87.3	89.5
Television	65.5	117.4
Total	152.8	206.9
Income (before Federal income tax):		
Radio [2]	18.7	9.5
Television [2]	(10.0)	11.0
Total	8.7	20.5

( ) Denotes loss.

[1] Radio includes AM and FM broadcasting.

[2] Networks engaging in joint radio-TV operations have indicated that certain overhead expenses not readily allocable between radio and television, have been charged to radio. To the extent that this occurred, the above figures may understate radio income and overstate television income.

NOTE.—The 4 Nation-wide radio networks (ABC, CBS, MBS, and NBC) owned and operated a total of 18 stations in 1950 and 1951 and the 4 TV networks (ABC, CBS, DuMont, and NBC) owned and operated a total of 14 stations in 1950 and 15 stations in 1951.

FM broadcast revenues, income and investment, 1950–51

Item	1950		1951	
	Number of stations	Amount	Number of stations	Amount
FM broadcast revenues				
FM stations operated by:				
AM licensees:		*Millions*		*Millions*
Reporting no FM revenues [1]	420		381	
Reporting FM revenues	163	$1.4	179	$1.8
Non-AM licensees	86	1.4	66	1.2
Total FM stations	669	2.8	626	3.0
FM broadcast expenses				
FM stations operated by:				
Non-AM licensees	86	4.0	66	3.0
Industry total		(1)		(1)
Total FM broadcast income (before Federal income tax)				
FM stations operated by:				
Non-AM licensees	86	(2.6)	66	(1.8)
Industry total		(1)		(1)

( ) Denotes loss.

[1] In view of the difficulty in a joint AM–FM operation in allocating FM operation expense separately from AM station operation expense, licensees of such stations were not required to report FM station expense separately. As a result, FM industry totals for expense and income are not available. AM–FM licensees, however, were requested to report separately the revenues, if any, attributable to FM station operation if such data were readily available. In only a few instances did AM–FM licensees state they were unable to segregate the FM revenues.

TV broadcast revenues, income and investment, 1951

[In thousands]

Item	4 networks and their 15 owned and operated stations	93 other stations	Industry total
Revenues from network time sales	$72,871	$24,687	$97,558
Revenues from sale of time to national and regional advertisers and sponsors	17,513	42,220	59,733
Revenues from sale of time to local advertisers and sponsors	11,638	39,666	51,304
Total revenues from time sales	102,022	106,573	208,595
Commissions paid to representatives, etc	18,881	14,457	33,338
Incidental broadcast revenues:			
Revenues from sale of talent, etc	27,543	5,473	33,016
Furnishing material or service	8,368	6,624	14,992
Other incidental revenues	9,330	3,089	12,419
Total broadcast revenues	128,382	107,302	235,684
Total broadcast expenses	117,401	76,685	194,086
Total broadcast income	10,981	30,617	41,598
Investment in tangible broadcast property:			
Original cost	37,902	55,080	92,982
Depreciation to date	11,094	18,738	29,832
Depreciated cost	26,808	36,342	63,150

Radio [1] broadcast revenues, income and investment, 1950–51

[Income before Federal income tax, in thousands]

Item	4 Nation-wide networks and their 18 stations		3 regional networks and their 7 stations [2]		All other stations [3]		Industry total	
	1950	1951	1950	1951	1950	1951	1950	1951
Revenues from network time sales	$83,955	$75,593	$2,099	$2,893	$45,476	$43,548	$131,530	$122,034
Revenues from sale of time to national and regional advertisers and sponsors	17,598	15,273	1,383	1,115	99,844	103,170	118,824	119,559
Revenues from sale of time to local advertisers and sponsors	6,122	6,205	1,560	1,404	195,529	206,910	203,211	214,519
Total revenues from time sales	107,675	97,071	5,042	5,412	340,849	353,628	453,565	456,112
Commissions paid to representatives, etc	22,394	20,338	1,020	978	29,062	30,244	52,476	51,561
Incidental broadcast revenues:								
Revenues from sale of talent, etc	13,072	13,922	268	363	11,862	12,604	25,203	26,889
Furnishing material or service	4,039	4,495	2	16	5,851	6,534	9,893	11,045
Other incidental revenues	3,645	3,895	149	170	3,079	2,675	6,873	6,741
Total broadcast revenues	106,037	99,045	4,441	4,983	332,579	345,197	443,058	449,226
Total broadcast expenses	87,375	89,517	4,120	4,417	280,820	296,041	372,315	389,975
Total broadcast income	18,662	9,528	321	566	51,759	49,156	70,743	59,251
Investment in tangible broadcast property:								
Original cost	28,431	29,533	1,663	1,097	[4] 214,321	[4] 224,100	244,415	254,731
Depreciation to date	16,062	16,446	1,201	984	76,119	87,504	93,382	104,934
Depreciated cost	12,369	13,087	462	113	138,202	136,596	151,033	149,797

[1] Excludes independently operated FM stations, 86 in 1950 and 66 in 1951.
[2] Regional networks operated 8 stations in 1950.
[3] Includes 2,117 stations in 1950 and 2,175 stations in 1951.
[4] Data available from 2,113 stations in 1950 and 2,161 stations in 1951.

NOTE.—Figures may not add to totals due to rounding.

CHAPTER VI—FIELD ENGINEERING AND MONITORING

1. GENERAL

On March 2, 1952, the Commission announced the establishment of the Field Engineering and Monitoring Bureau, formed from the nucleus of the Field Engineering and Monitoring Division, the Commercial Operator Branch, the Experimental and Miscellaneous Branch and the Antenna Survey Branch which previously operated under the Office of the Chief Engineer. The new bureau comprises four divisions—the Field Operating Division and staff divisions for Monitoring, Engineering, and Inspection and Examination. The chief of the bureau was further provided with an administrative assistant and an attorney adviser.

The field engineers inspect radio stations of all types and serve notices for discovered discrepancies, conduct radio operator examinations and issue operator licenses to those found qualified; monitor the radio spectrum to assure that stations operate on their assigned frequencies with prescribed power; locate and close unauthorized transmitters; investigate complaints of interference to various radio services; obtain and correlate technical data for Commission use; furnish fixes and directional information to aircraft which are lost; and provide bearings and fixes on ships in distress. The bureau additionally processes data concerning proposed new or modified antenna construction to insure that no hazard to air navigation will result, and administers parts 15 and 18 of the Commission's rules and regulations pertaining, respectively, to Restricted Radiation Devices and Industrial, Scientific, and Medical Equipment. These activities are outlined in the ensuing sections of this chapter.

2. MONITORING

During the fiscal year the monitoring system operated with 19 monitoring stations consisting of 11 primary and 8 secondary stations. Sixteen of these are located in the continental United States, one in Hawaii, and two in Alaska. All stations are equipped with radio direction finders. Monitoring stations continued to "police" the ether but economy makes fewer engineers available for "around the clock" service.

Due to budget limitations, the Bay St. Louis, Miss., secondary station was reduced to only two engineers during most of the year, and at the year's end only one engineer operated the station in practically a "caretaker" status pending its closing.

3. DIRECTION FINDING

Direction finding continued to play an important part in monitoring activities. Long-range direction finder bearings are necessary for locating illegal or clandestine transmitters and sources of radio interference of an otherwise unidentifiable nature, such as spurious radiations and unmodulated carriers. The latter are usually unintentional, but constitute a serious interference problem nevertheless. Monitoring stations obtained a total of 83,196 bearings, which was a slight increase over the previous year's total of 81,919.

Direction-finder bearings were also obtained and "fixes" furnished in emergency situations involving lost or otherwise disabled ships and aircraft under the Commission's participation in the Air Sea Search and Rescue program. During the year, 138 requests were received in this category compared with 168 requests received in 1951. Instances of long-range bearing service ranged from bearings taken on lost balloons, sometimes mistaken for "flying saucers" and a menace to the airlanes, to bearings taken on a sheriff's patrol car lost high in the Sierras.

4. MONITORING SURVEYS

Monitoring stations engaged in numerous frequency surveys for occupancy data at the request of other agencies and other units of the Commission. The great bulk of this work related to the implementation plan of the Extraordinary Administrative Radio Conference (EARC), whereby 21 entire bands and 455 individual frequencies were monitored to the extent of over 9,000 kilocycles of survey coverage. It is estimated that approximately 1,000 mand-days were devoted to this work during the year.

In addition to the coverage obtained by specific monitoring surveys, much information was obtained and compiled from the bureau's active-station files which are maintained on a continuous basis from moni-

toring data submitted daily by monitoring stations as a product of their surveillance of the radio spectrum. Such monitoring surveys, although time consuming and exacting, are considered of such importance that they have been accomplished at the expense of other work. Due to the magnitude of the job of moving the frequency of hundreds of stations to conform with the Atlantic City Conference Frequency Tables, it is expected that this type of monitoring work will continue during the coming year.

An example of an extensive monitoring and direction finding project performed during the year at the request of a military agency was one where several thousand observations and over 60 direction finder "fixes" were furnished the agency.

5. ENFORCEMENT THROUGH MONITORING

Enforcement of the Communications Act and the Commission's rules is an integral part of monitoring operations. As more and more stations are licensed and new technical regulations are added, more enforcement-type monitoring is needed. This requires a systematic checking of each type of radio service in the United States and its possession for adherence to the laws, treaties, and rules, plus notification to foreign countries when infractions causing interference to domestic services are noted.

Though burdened with increasing interference complaints, surveys, and other work items, the monitoring system observed a mounting number of violations. A total of 10,139 violation notices were issued, representing an increase of 1,360 over the previous year. Additionally, monitoring watches noted hundreds of cases of potential interference and brought them to the attention of operating agencies, thus performing preventive type of monitoring service.

For example, one of the monitoring stations detected a strong rough carrier swinging through several frequencies used by aeronautical stations and obviously a source of interference. Bearings when evaluated showed the source of the signal as being in the Johnstown, Pa., area. Knowing that an industrial heater used for glue drying in a manufacturing plant at Johnstown had caused interference to the Civil Aeronautics Administration and the Coast Guard several years ago, a telephone call was placed there. In less than 5 minutes it was definitely established that this plant was the source of the current interference. The owner agreed to eliminate the excessive radiation immediately.

6. INTERFERENCE AND GENERAL MONITORING

During fiscal 1952 an all-time high since the end of World War II was reached in the number of interference and general monitoring

cases received and processed. A total of 2,745 major monitoring cases were handled, which was 266 more than in 1951.

Operating agencies, both commercial and military, have come to depend upon the Commission's monitoring service for aid in all types of interference problems. Some of these are extremely difficult to solve while others may need only a frequency measurement or bandwidth observation, with the Commission's monitoring engineers serving as arbiters in many cases.

The Commission's coordinated monitoring network is the only one of its kind in this country and functions on a 24-hour basis, being linked together by land-line teletype and radio. This enables the net to either function as an entire group or be divided so that only two or three stations work on a problem.

Field Engineering and Monitoring Bureau has been designated as the centralizing office of the United States for international monitoring for the purposes set forth in Article 18 of the Atlantic City Radio Regulations. In this connection, many requests for monitoring were received from foreign countries. These requests related for the most part to instances of unidentified interference to their nationals which the Commission's monitoring network generally identified satisfactorily.

Monitoring observations played a vital role in enabling the Field Engineering and Monitoring Bureau to detect and locate 114 illegal stations. In the course of regular monitoring, items of interest to defense and security agencies were intercepted and turned over to such agencies as the Department of State, Armed Forces Security Agency, Central Intelligence Agency, and the Federal Bureau of Investigation.

The following table represents a breakdown of monitoring-type interference complaints received from Government and commercial agencies:

U. S. Army	124
U. S. Air Force	292
U. S. Navy	112
U. S. Coast Guard	88
C. A. A.	188
Other Government agencies	99
Law enforcement agencies	37
Commercial airlines	519
Commercial concerns	458
Total	1,917

7. INVESTIGATIONS

During fiscal 1952, the number of interference complaints requiring investigation was 10,124, an increase of 471 over the number received

in 1951. Of these, 6,817 related to television, as compared with 6,002 in 1951. The number of complaints of interference to standard broadcast reception decreased from 2,639 in 1951 to 2,275 in 1952.

Investigations covered a wide range as to types of cases. Although complaints of interference to broadcast reception accounted for a large number of investigations, many cases of interference to aviation and to other communications services, both commercial and military, were investigated. Elimination of interference to such services as aviation is of considerable importance to safety of life and property. The number of complaints of interference to the aviation service rose from 94 in 1951 to 134 in 1952. In some instances the interference was from nearby sources, but frequently the source had to be first localized by the long-range direction finding network and then tracked down by means of mobile direction finding units.

The fact that even a small amount of accidentally radiated energy can result in serious interference is illustrated by an instance at Bloutville, Tenn., where "hillbilly" music was causing serious interference to aviation communications. A mobile unit traced the source to be a small homemade phonograph record player using only two ordinary radio receiving tubes—yet it was causing serious interference 15 miles away and was disturbing as far as 500 miles.

In another case, interference from an ordinary heating pad involved serious disruption to aviation radio. Radiating television receivers continued to cause interference to other TV receivers and to aural broadcast reception.

The increasing use of industrial, scientific, and medical equipment utilizing radio frequency energy continued to pose a problem of interference to safety services as well as to TV and other radio services. Complaints of interference from such equipment totaled 641 during 1952 as compared with 593 in 1951. The extent of interference from radio frequency industrial heating equipment used in manufacturing processes, and from diathermy equipment, would undoubtedly have been very much greater but for the fact that the Commission several years ago promulgated rules requiring that equipment manufactured after June 30, 1947, meet certain standards with respect to reduction of interference-causing radiation. Nonconforming devices sometimes cause interference more than 1,000 miles away.

During the year, five cases of illegal radio operation were referred to the Department of Justice for prosecution and nine persons were convicted. Fines ranged from $500 to $3,500. Although not all cases of unauthorized transmissions are prosecuted, particularly if the offense is committed by minors, the tracking down of unlicensed stations and of unidentified and suspicious transmissions is vigorously pursued.

During 1952, a total of 114 illegal stations were located and closed down as compared to 101 in 1951.

Some of these cases involved persons utilizing radio for transmission of race results for the purpose of "beating the bookies." A complaint of interference to the State Highway patrol station at Grand Island, Nebr., resulted in the apprehension of the operator of an unlicensed mobile transmitter, operating on a police frequency, avowedly for the purpose of gaining technical experience in order to obtain employment as a police radio technician.

Another case involved a station signing a Nicaraguan amateur call and claiming to be located in Nicaragua. Bearings by the Commission's monitoring net revealed that the station's location changed daily, indicating it was aboard a vessel proceeding along the Pacific Coast. The vessel was boarded when it arrived at a United States port, and action was taken to suspend the commercial radio-operator licenses and revoke the amateur license of the ship radio operator who made the false transmissions.

In view of the limited investigative staff available, it was necessary to defer many investigations for months in cases in which safety of life and property was not involved, and in many instances only brief attention could be given individual complaints of interference to TV or other broadcast reception.

In November 1951, the Field Engineering and Monitoring Bureau through its regional managers began organizing interference committees outside the Commission. The step was undertaken because of retrenchment of investigative work performed by Commission engineers, and because most amateur TV interference (TVI) problems can be resolved by TV set owners, service men, distributors, and amateurs working together as local committees.

The program was publicized in the daily press and in radio periodicals and talks were given by Commission personnel to amateur groups, radio service people, and other groups concerned with TV interference problems. The American Radio Relay League cooperated through its members and associated groups.

That the program is meeting with success is indicated by the 133 cooperating committees which are established and functioning throughout the country with an additional 32 in the process of being formed.

8. FIELD ENGINEERING

FIELD ENGINEERING FACILITIES

Electronic instruments and other equipment are required at the Commission's field offices and monitoring stations for monitoring and direction-finding activities involving location of unlicensed and clan-

destine stations and sources of interference to authorized stations; for precision frequency measurements, for measurements involving determination of technical performance of licensees' transmitting equipment, field intensity, and other measurements involving enforcement of the Commission's Rules and Standards of Good Engineering Practice; for continuous field-intensity recording programs to gather propagation and other engineering data used by the Commission in connection with promulgation of rules and standards; for frequency-allocation studies, and for numerous other activities.

Providing modern electronic equipment to field installations is a continuing problem due to lack of funds and unavailability of many special types of equipment needed for particular applications. However, progress was made during the year by the acceleration of a program of modernizing long-range direction finders and by purchase of modern communication receivers for monitoring stations and of a number of other new pieces of equipment. Development and construction of suitable equipment or modification of existing equipment has also been carried out.

Some of the major programs involving electronic equipment in which the bureau was actively engaged during the year are described as follows:

The program of installation of remote controlled long-range direction finders to permit their operation from the monitoring building was accelerated and, as of June 30, 1952, such direction finders were in operation at four of the monitoring stations and preparations were being made for similar installations at 12 additional stations. This work is considered particularly important since remote operation of the direction finders permits much more rapid bearings to be taken and saves manpower by elimination of trips to and from the direction finders. An indication of the complexity of the remote installations may be gained from the fact that a typical one requires 88,000 feet of copper wire for the power, control, and other circuits.

The program of replacement of the old mobile investigative units with new investigative cars was continued. Of the 39 fully equipped investigative cars operated by the bureau at the close of the year, 25 were 1949 or newer models and modification of five additional new cars which will replace a like number of the old cars was progressing. Improved battery-charging facilities were also installed in four of the investigative cars to provide better maintenance of the electronic equipment.

A new monitoring station was established near Fairbanks, Alaska. This station is now in regular operation with a long-range direction finder and other appurtenances of a modern monitoring station. With minor exceptions, the entire installation, including construction of the adcock direction finder, was performed by Commission personnel.

ENGINEERING ENFORCEMENT PROJECTS

During the fiscal year, 59 new engineering projects were assigned to the field offices and monitoring stations as a result of requests from the various units of the Commission, from other Government agencies, or originated by this bureau as the need developed. In addition, 102 projects were carried over from the previous year. The total of 161 active engineering projects was equal to the number of active projects during the 1951 fiscal year, although there was a reduction of about 25 percent in the number of man-days spent on projects because of personnel shortages. The field engineers spent approximately 6,000 man-days during the year on engineering studies, investigations, measurements, equipment design, and construction and other projects.

Examples of engineering project assignments are here listed:

The program of continuous VHF and UHF field-intensity recording performed in cooperation with the Central Radio Propagation Laboratory was continued at nine stations and one district office, and the long-range standard broadcast and atmospheric noise-recording program was continued at four stations. In addition, a special program of HF field-intensity recording in cooperation with the Department of State, for the "Voice of America", was carried out at three stations. As of June 30, 1952, 42 field-intensity recorders were in operation, including 28 in the VHF and UHF ranges. Information obtained from these recorders is used in connection with allocation studies and in determining range of coverage to be expected from the various classes of stations. Special mobile field-intensity recording assignments were also completed at seven offices using the test cars to obtain information and data which could not be obtained at fixed locations.

A detailed field-intensity survey was made of a TV broadcast station involving several hundred field-intensity measurements to determine whether the radiation pattern along the ground of its directional antenna system was in compliance with the terms of its authorization. The directional patterns of approximately 100 different standard broadcast stations were also checked and measurements were made of the emissions of nine broadcast stations to determine the degree to which they radiated harmonic and other spurious emissions.

RESTRICTED RADIATION DEVICES AND INDUSTRIAL, SCIENTIFIC, AND MEDICAL SERVICE

The administration of Part 15, Rules Governing Restricted Radiation Devices, and Part 18, Rules and Regulations Relating to Industrial, Scientific and Medical Service, was transferred from the Office of the Chief Engineer to the Field Engineering and Monitoring Bureau in March 1952. This afforded closer coordination between the administration of the rules and the operational enforcement activities.

From March to the end of the fiscal year, the RRD and ISM Section of the bureau handled approximately 800 letters and telegrams and many long-distance telephone calls from the general public and other Government agencies. Through these contacts, a general picture of the effectiveness of parts 15 and 18 of the rules was obtained.

There was a marked increase in interest on the part of operators of diathermy and industrial heating equipment to comply with part 18. Physicians, in general, bought type-approved diathermy machines rather than attempting to remodel their older machines. Remodeling, testing, and certifying old diathermy machines is largely unsatisfactory. In some instances which came to the attention of the Commission, the work of remodeling was performed by engineers who were not fully trained and experienced in the work. Operators of industrial heating equipment encountered some problems in effecting compliance with part 18 because of difficulty in obtaining critical materials necessary for shielding equipment and for filtering electrical circuits.

Many college campus carrier "broadcast" systems were found to be not operating strictly as carrier current systems and their radiation, in some instances, was in excess of the limitations prescribed in part 15 of the rules. The RRD and ISM Section, in an attempt to provide an answer to the problem, has been urging the operators of such systems to change to licensed low-power noncommercial FM broadcasting in accordance with the provisions of sections 3.503 and 3.504 of the Rules Governing Broadcast Services.

ANTENNA OBSTRUCTION MARKINGS

Pursuant to the Communications Act stipulation that the Commission require painting and/or illumination of radio towers if and when in its judgment such towers constitute, or there is a reasonable possibility that they may constitute a menance to air navigation, the Commission promulgated Part 17, Rules Concerning the Construction, Marking, and Lighting of Antenna Towers and their Supporting Structures.

The Antenna Survey Branch was established to administer part 17, which became effective February 15, 1951. The primary functions of this branch are to determine the extent of aeronautical hazard created by proposed new or modified antenna structures, to refer all proposals which violate the criteria of part 17 to appropriate Regional Airspace Subcommittees (ASP) of the Air Coordinating Committee for special study by aviation interests outside the Commission, to approve antennas that do not violate the criteria, and to prescribe, when necessary, obstruction markings for antenna towers in order to minimize their potential hazard to air navigation.

230960—52——10

Prior to the adoption of part 17, the question of the degree of hazard created by a proposed antenna was referred to the Civil Aeronautics Administration for that agency's recommendations. All applications proposing the construction of antennas over 150 feet, or located within 3 miles of an airport, were previously being referred to the CAA at the rate of about 175 per month. Since the adoption of part 17 and the Commission's definite study of antenna hazards, the number of antenna proposals requiring referral to the ASP for special aeronautical study has dropped to approximately 25 per month and is 5 percent of the total antenna proposals processed by the Antenna Survey Branch.

Authorization of construction permits for new television stations has created new interest in the antenna hazard problem. High antenna towers, which are essential for good coverage of TV stations, are a matter of great concern to the aviation industry. Currently, a Government-industry conference is considering the problem of determining a method of achieving uniform treatment by all Regional Airspace Subcommittees of antenna towers over 500 feet high located off presently existing airways, and also standards of obstruction markings for towers up to 1,500 feet in height and their associated guy wires.

Many TV applications filed with the Commission subsequent to the lifting of the "freeze" are reflecting a considerable increase in the number of antenna proposals referred to Regional Airspace Subcommittees for study. The quantity of these referrals is lessened somewhat by a procedure mutually acceptable to the Commission and the ASP, whereby an applicant may request a Regional Subcommittee to make a preliminary study of an antenna proposal prior to the filing of the application, and receive a preliminary recommendation of which the Commission takes official cognizance.

ANTENNA STATISTICS

Statistics of antenna construction proposals processed by the Antenna Survey Branch for the fiscal year follow:

Services	Pending June 30, 1951	Received in ASB	Cleared by ASB	Not cleared by ASB—referred to ASP for special study	Pending June 30, 1952
Broadcasting:					
AM	9	200	153	54	2
FM	5	30	32	1	2
TV	1	265	99	102	65
Experimental	0	18	15	2	1
Common Carrier	4	332	313	23	0
Special Services	804	5,849	5,880	114	659
Total	823	6,694	6,492	296	729

9. COMMERCIAL RADIO OPERATORS

In general, all radio stations licensed by the Commission are required by law to be operated by radio operators also licensed by the Commission. Operators of stations other than amateur are classified for convenience as commercial radio operators. There are now approximately 679,000 commercial operator authorizations of which approximately 179,000 were issued during the past year. The number of commercial operators continues to grow although in a number of rapidly growing radio services the Commission has waived the normal requirement of a licensed operator for certain phases of station operation.

The Commission establishes various classes of operator licenses and prescribes the qualifications necessary for obtaining them. There are nine basic classes of commercial radio operator licenses graded to meet the operating requirements of the various categories of radio stations. There is a wide variation in the required qualifications between the lowest and highest grade licenses, some being based on certain minimum requirements set forth in the International Radio Regulations. Operator licenses are issued by the Commission only to qualified citizens of the United States.

During the year the Commission proposed to amend its rules so as to lower the licensed operator requirement for certain types of coast stations. The proposal would affect all coast stations employing radiotelephony on frequencies above 30 megacycles in the "limited" class, and all such stations in the public classification which utilize a simple type of operating procedure not requiring the use of a special frequency for "calling". Stations affected would be permitted to be operated in normal service by the holder of a restricted radiotelephone operator permit rather than by a third-class radiotelephone operator as previously required. At the end of the year the proposal was still pending.

The shortage of radiotelegraph operators qualified to serve on board ocean-going ships became more acute during the past year and the Commission made certain changes in its requirements designed to increase the supply of marine operators. These changes consisted of an amendment to Part 13 of the Commission's Rules Governing Commercial Radio Operators relaxing the requirements with respect to eligibility for the Temporary Limited Radiotelegraph Second-Class License, a special class of license for ship radio operators created during the previous year.

The temporary waiver with respect to the showing of service or examination normally required for renewal of commercial operator licenses, which was ordered by the Commission in April 1951, continued in force throughout fiscal 1952.

The National Association of Radio and Television Broadcasters petitioned the Commission to amend the license requirements for operators of transmitters of certain broadcast stations employing nondirectional antennas and operating with powers of 10 kilowatts or less, and to provide for remote control of such stations. Except for certain noncommercial educational FM stations, the Commission normally requires that one or more radiotelephone first-class operators be on duty at the place where the transmitting apparatus of each broadcast station is located and in actual charge of it while it is being operated. There is no provision in the Commission's rules for remote control of commercial broadcasting transmitters. The proposal would allow a person holding a restricted radiotelephone operator permit to stand a watch at the transmitting apparatus or at an authorized control point at a distance from the transmitting apparatus.

The Commission decided that the information contained in the petition raised questions of sufficient importance to warrant the institution of rule-making proceedings looking to the possible adoption of amendments to the Commission's rules of the nature proposed. A notice of rule-making was then published in which certain questions were posed and interested persons were afforded an opportunity to respond. The questions were designed to develop detailed information with respect to various aspects of the matter, including the duties of operators standing transmitter watches; the extent to which transmitter failures can be corrected by holders of low-grade operator licenses; the advantages or disadvantages of permitting remote control of broadcast stations and the degree of such control necessary in order to provide satisfactory operation. This proceeding was pending at the end of the year.

A basic statutory provision has prevented foreigners from operating radio stations in this country. In a number of instances a similar limitation in foreign countries has prevented Americans from operating foreign radio stations.

Difficulties arising from these limitations have been most apparent in the case of a United States citizen piloting a Canadian aircraft and vice versa. In both cases pilots have been prevented from using aircraft radio transmitting equipment even for safety purposes. However, during the past year the Governments of Canada and the United States gave final approval to a treaty which provides for certain reciprocal radio operating privileges and should furnish a solution to this and certain other difficulties. Pertinent provisions thereof with respect to aircraft operators are as follows:

With respect to radio equipment installed on civil aircraft of either country and properly licensed by the country of registry for the primary purpose of navigation and safe operation of the aircraft, a United States citizen holding a pilot license and, in addition, a radio operator license issued by the United States

of America, may operate such radio equipment on an aircraft registered in Canada and operated in either country, and a Canadian citizen holding a pilot license and, in addition, a radio operator certificate issued by Canada, may operate such radio equipment on an aircraft registered in the United States of America and operated in either country; provided, that the operation of such radio equipment shall be in accordance with local law and regulation and complementary to his functions or duties as a pilot; provided, also, that either country may require, for security purposes or to assure familiarity with domestic radio operating regulations and procedures, the registration or examination of citizens of the other country and the issuance of a permit for the privileges set forth herein.

The shortage of radiotelephone first-class operators—the class normally required for commercial broadcast stations—continued to be felt during the year. The Commission continued its policy of granting temporary permission to utilize lower-class operators for the normal operation of such stations under the supervision of one or more fully qualified operators, where it is shown that the station concerned has made reasonable efforts to employ first-class operators and has been unable to do so. However, the Commission found that the maximum period of 30 days for which this relaxation was being granted was impracticable in many cases because it resulted in stations having to make a showing of need for temporary relief more frequently than was warranted. Instead of 30-day periods the Commission, by amendment of its rules, provided for a maximum period of 120 days with a showing at the end of 60 days with respect to continuing efforts being made to secure a first-class operator.

OPERATOR EXAMINATIONS AND AUTHORIZATIONS

Examinations for radio operator licenses are given regularly at engineering field offices of the Commission, including Washington, D. C., and at various points in the United States, its Territories and possessions. In addition, examinations are given annually, semiannually, or quarterly at points outside the district offices as the needs of the locality indicate. The places and times of these examinations are made known by publication, semiannually, of an official examination schedule which may be obtained by writing to any of the district engineering field offices listed in the appendix hereto.

Owing, in part, to the establishment of several new classes of amateur licenses there was substantial increase in the number of amateur radio operator examinations given during the past year. A total of 35,389 such examinations were given compared with 11,882 amateur examinations in 1951. (See section of chapter on Safety and Special Radio Services which deals with amateurs.)

Commercial operator licenses and authorizations totaling 179,928 were issued during 1952 as compared to 139,732 in 1951. This represents an increase of about 29 percent. Commercial operator licenses

outstanding of all classes reached a total of approximately 679,000 at the close of the year which was a net increase of about 11 percent above the previous year. Comparative figures according to grades of licenses follow:

Class of license	June 30, 1951	June 30, 1952	Increase or (decrease)
Radiotelegraph:			
First class	4,432	5,244	812
Second class	7,667	9,248	1,581
Third class [1]	1,155	1,694	539
Temporary limited:			
Second class	141	617	476
Radiotelephone:			
First class	39,000	44,537	5,537
Second class	18,400	27,672	9,272
Third class	4,400	8,953	4,553
Restricted Radiotelephone permit	398,960	463,607	64,647
Aircraft Radiotelephone authorization	137,988	117,564	(20,424)
Total	612,143	679,136	66,993

[1] Includes restricted radiotelegraph operator permits.

10. INSPECTIONS

BROADCAST STATION INSPECTIONS

As a part of their duties, Commission field engineers inspect the equipment of stations of all classes in the broadcast services. During these inspections the technical operation of the stations is observed and records of past technical operation are reviewed to determine whether the stations comply with applicable rules, regulations, standards, and the terms of their operating authorizations. These inspections serve to assure that the stations render an adequate service, technically, to the listening and viewing public; that the stations have proper technical supervision, and that they do not create a hazard to aircraft because of improperly marked antenna towers nor cause undue interference as a result of technical misadjustments.

Following is a tabulation of broadcast stations of the three principal classes inspected in 1951 and 1952:

Broadcast Stations Inspected	1951	1952
AM	1,242	444
FM	204	65
TV	44	23
Total	1,490	532

The above decrease in broadcast-station inspections was due to budgetary travel limitations which drastically reduced inspectional trips in 1952.

Discrepancies observed in broadcast-station operation as a result of inspection totaled 232 in 1952, compared with 885 during 1951. Comparable ratios of violations to inspections were observed during both years.

SHIP STATION INSPECTIONS

Constant availability for use in an emergency involving the safety of life or property at sea is of prime importance in the case of ship radio station equipment. Periodic inspections are made by the Commission's engineers to assure that radio equipment required by law for safety purposes is adequately installed, protected, and maintained in a proper state of effectiveness and readiness. Inspection is made to determine also that operators having the prescribed qualifications are in charge of the radio installations. Inspections were made during the past 2 years as follows:

Number of ship inspections	1951	1952
United States ships	7,897	7,901
Foreign ships	2,939	2,706
Total	10,836	10,607

In the course of inspection of ship radio stations formal action was taken looking to correction of defects and irregularities as follows:

Number of deficiency notices served	1951	1952
United States ships	4,393	5,778
Foreign ships	1,431	1,032
Total	5,824	6,810

Numerous deficiencies discovered during inspections were corrected immediately by the station licensee or his representatives and a formal notice therefore was not served. The number of such deficiencies is shown below:

Violations cleared during inspections	1951	1952
United States ships	3,355	3,531
Foreign ships	540	495
Total	3,895	4,026

INSPECTION OF OTHER RADIO STATIONS

Inspections made of stations other than broadcast and ship totaled 8,926 in 1952, and 13,507 in 1951. Discrepancies of a technical nature totaling 3,742 were disclosed in 1951, while 2,393 were revealed in 1952.

During the past year a new procedure was initiated by the bureau designed to provide a degree of self-inspection in the case of certain classes of stations. A special form containing a checklist of requirements frequently overlooked is furnished with the construction per-

mit and the permittee uses this form in notifying the Commission of completion of construction, at the same time certifying thereon that proper attention has been given to the matters listed.

The variety of uses for radio and the extent to which radio is used continues to grow, and public dependence upon radio for both routine communication and safety purposes is becoming more widespread. The enforcement responsibilities and obligations of the bureau increase apace with the rapid expansion, yearly, in these new developments and applications in the electronic sciences.

During the past year, the bureau began a program of inspection of Western Union Telegraph offices to assist the Common Carrier Bureau in its enforcement work. The purpose of the inspection is to determine the speed and quality of service. (See "Common Carrier" chapter.) This work is conducted as an adjunct to the inspection duties performed by the engineers on travel status during the normally scheduled inspection trips.

CHAPTER VII—RESEARCH AND LABORATORY ACTIVITIES

1. TECHNICAL RESEARCH DIVISION

GENERAL FUNCTIONS

The Technical Research Division serves as an operational research group for the purpose of resolving problems relating to wave propagation, technical standards and various allied subjects. In this connection it organizes research projects for the collection of technical data by the Field Engineering and Monitoring Bureau, the Laboratory Division, and other organizations including certain groups in the radio industry. Where quantitative field data are not available, the division inaugurates theoretical studies. It also participates in technical studies incident to international conferences and treaties and coordinates the radio research work of the Commission with that of other Government agencies and with commercial organizations. It handles problems related to the Standards of Good Engineering Practice and the technical phases and limitations of the various rules of the Commission.

Due to the recent reorganization of the Office of the Chief Engineer, under which the division serves, several new functions have been added to the division. These include administration of (1) the Experimental Radio Service; (2) type approval and type certification work; and (3) the Cartographic Section activities, which are subsequently mentioned.

During the fiscal year, the Technical Research Division continued its long-term radio wave propagation projects at about the same level as during the previous year, but increased its activities in the VHF and UHF parts of the spectrum. Added emphasis was also given to those projects dealing with technical standards and limits. The Ad Hoc Committee on Television under the chairmanship of the Commission's Chief Engineer concluded its 3½ years of work. The technical reports and expert testimony of this committee have received wide acceptance and are expected to have a profound effect upon the future of the TV industry.

The division continued to carry on special studies and to collect and analyze basic data concerning radio wave propagation, as well as other communication problems, and to make the resulting scientific information available to the Commission for guidance in the promulgation of new rules and the determination of technical limitations and practical engineering standards.

A factual knowledge of equipment capabilities and limitations and of radio wave propagation characteristics is fundamental to an intelligent allocation of frequencies. The whole structure of radio regulation depends on the soundness upon which this framework is built.

A judicious allocation of radio frequencies to the various radio services presupposes a knowledge of many highly technical and complicated things, including ionospheric and tropospheric propagation, terrain effects, useful intensities of signal as related to various sources of interference, geographical and frequency separations necessary to alleviate interference in accordance with various service requirements, equipment capabilities and limitations, new developments and their possibilities, etc.

The Commission requires a detailed knowledge of the propagation characteristics of radio signals throughout the spectrum in order that the most economic and practical allocation of facilities may be achieved. The propagation characteristics of the band of frequencies allocated to a particular service must be consistent with the operating requirements. The allocation of stations within a service; i. e., the determination of cochannel and adjacent channel distance separations, service ranges, and power limitations must be founded on a knowledge of wave propagation. Such knowledge is best obtained from deductions arrived at through the study and analysis of long-term field intensity measurements involving the use of carefully calibrated recording equipment and requiring the attention of experienced engineers. It is one of the primary functions of the Technical Research Division to obtain such data and furnish highly reliable solutions to the technical problems involved.

TELEVISION RULES AND STANDARDS

Considerable work was performed by the division in connection with the final formulation of the recently promulgated television (VHF and UHF) rules and standards. This assignment involved constant reference to the Ad Hoc Committee reports and associated publications.

EFFICIENCY AND SERVICE AREA STUDY OF TELEVISION ALLOCATION

This comprehensive study dealt with the efficiency of television allocation as a function of the transmitting antenna heights, frequency of operation, radiated power, station spacing, and grades of service.

SUNSPOT CYCLE RECORDINGS

This work is a continuation of the previously inaugurated project involving the recording of signals from a number of AM broadcast stations as measured at the several monitoring installations of the Commission. The purpose of this project is to ascertain the relationship between received field strength and solar activity. During the year, field intensity recordings of some 17 stations, representing about 170 accumulated station-years of data, were analyzed by the staff and made ready for the final phase of appropriate statistical treatment which is expected to reveal the dependence of received signals upon the frequency, transmission path latitude, angle of incidence upon the ionosphere, and sunspot numbers. This final phase, however, has been delayed by other assignments of higher priority.

TECHNICAL CONSULTATION AND ADVICE

An all-increasing factor in the activities of the Theoretical Propagation Branch is the technical consultation service rendered to the Commission and its staff on a variety of radio wave propagation phenomena, antenna performance, and other allied problems in the communications field. Much of this work is performed on an informal basis and is not reflected in the normal list of active projects.

SPECIAL VHF PROPAGATION STUDIES

One of the current assignments of the Theoretical Propagation Branch is the study of VHF propagation via ionized atmosphere, the possibility of which has been suggested by recent experimentation. The effect of these transmissions would not only account for long-range television and FM reception, but could also complicate interference problems between what are currently considered widely spaced TV and FM stations. Indications are that this problem in UHF propagation will become increasingly important as more experimental data becomes available.

AD HOC COMMITTEE

Several members of the division participated in the Ad Hoc Committee evaluation of radio propagation factors concerning the TV and FM broadcasting services in the frequency range between 50 and 250 megacycles. This committee was formed in October 1948, and functioned through April 1952, in connection with the Commission's hearings on TV and FM allocations. The committee was headed by the Commission's Chief Engineer and consisted of propagation experts from industry and Government. Much time was spent by various division members on the subcommittee responsible for preparing the Ad Hoc Committee reports.

DATA ANALYSIS

The division continued to analyze data accumulated at various monitoring stations, and numerous technical reports were prepared concerning these measurements. They included information concerning UHF propagation as applied to broadcasting purposes resulting from measurements made on frequencies ranging from 540 kilocycles to 500 megacycles.

OTHER STUDIES

In preparation for the television allocation hearing, numerous studies were made of the effect upon TV broadcast service areas of the different parameters, such as transmitting antenna height, acceptance radio; i. e., ratio of desired to undesired signals required to give satisfactory service, multiple interference, etc. These service studies were made for both the VHF and UHF bands and under propagation conditions typical of different parts of the country.

Extensive studies were made of available data to evaluate the variation of field intensity for the UHF band. They included both long-distance tropospheric propagation and line-of-sight propagation over irregular terrain. These studies enabled intelligent estimates to be made of the service available in the UHF band.

FIELD MEASUREMENTS OF VHF AND UHF PROPAGATION

Activity on VHF and UHF propagation research was centered on the project in which field strengths of more than 20 TV and FM stations were measured continuously during the year. Information derived from such measurements is of vital importance in determining engineering standards for the allocation of frequency channels for TV and FM broadcasting and other radio services, as well as in the verification of theoretical studies of radio wave propagation.

At the beginning of the year, the VHF and UHF propagation project, supported by the Central Radio Propagation Laboratory of the National Bureau of Standards, was in full operation and was continued throughout the year. The data accumulated was processed and the resulting tabulations were delivered to CRPL. This same data is being analyzed by the Technical Research Division in order to extend the general knowledge concerning VHF and UHF propagation and to supply the Commission's special needs for answers to highly technical questions relative to wave propagation and technical standards in this part of the frequency spectrum.

EXPERIMENTAL RADIO SERVICE

Pursuant to the requirement of the Communications Act that the Commission "study new uses for radio, provide for the experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest," the Commission has provided

for the operation of experimental radio stations. Part 5 of its Rules and Regulations Governing Experimental Radio Services became effective October 1, 1939, and has been modified from time to time as the demands of the experimental service required.

These rules are designed to encourage and promote all types of experimentation relating to the radio art. They provide for three classes of experimental stations, namely, class 1, class 2, and class 3. Class 1 stations are for the use of persons engaged in fundamental or general research, experimentation and development of the radio art, or for the development, testing, or calibration of radio equipment. Class 2 stations are for the development of a new radio service or the expansion of an established service. Class 3 authorizations are available to individuals interested in conducting experimental programs on their own behalf for a limited period of time.

There are two subclasses of class 1 experimental stations. These subclasses are contract developmental and export developmental stations. The former classification includes experimental stations licensed for the purpose of developing equipment or techniques to be used by stations operated by the United States Government. The latter classification is for the development of equipment intended for export purposes and for eventual ownership and operation by stations under the jurisdiction of foreign governments.

The majority of class 1 stations are operated by manufacturers of equipment and by research and development organizations. These stations are engaged in development of new equipment and the improvement of existing equipment, the development of new techniques in the electronic art and in connection with fundamental studies involving radio propagation. Development work is being continued on narrow-band communication equipment which will effect a more efficient use of the radio spectrum. New and improved radio aids to navigation are being developed while other development work includes radiolocation equipment, and microwave communication equipment.

Continued experimental work is being done in ionospheric investigations and propagation studies on various frequency bands throughout the spectrum, particularly in the upper range of the spectrum where the presently available information is meager.

The table of frequency allocations contained in part 2 of the rules provides for the experimental use of frequencies throughout the spectrum subject to the condition that harmful interference is not caused to the service or stations to which the frequencies are regularly assigned.

Class 1 stations are used extensively by manufacturers and sales engineers for the purpose of making field-intensity or coverage surveys in areas where it is proposed to establish radio communication

systems. The results of these surveys provide useful information for choosing the operating frequency, power, emission, and antenna location for optimum performance.

Applications for class 2 experimental stations include proposals for types of operation which are not recognized in the present rules. Since the establishment of the land mobile services on a regular basis, the number of class 2 stations has decreased.

Because of the limited scope of experimentation permitted under a class 3 authorization, the Commission receives few requests for that class of station license. The types of experimentation permitted under a class 3 authorization may also be conducted under a class 1 authorization or, for qualified persons, under the Rules Governing Amateur Radio Service.

Statistics covering the experimental radio services for fiscal 1952 follow:

Number of experimental radio stations

Class of station	June 30, 1951	June 30, 1952	Decrease
Class 1	348	322	26
Class 2	56	47	9
Total	404	369	35

Mobile and nonmobile transmitters

Class of station	Nonmobile units	Mobile units	Total transmitters
Class 1	237	1,154	1,391
Class 2	15	131	146
Total	252	1,285	1,537

Experimental applications

Class of station	Received 1951	Received 1952	Increase or (decrease)
Class 1	839	835	(4)
Class 2	51	80	29
Total	890	915	25

RESTRICTED AND INCIDENTAL RADIATION DEVICES

In 1938 the Commission recognized the need for establishing standards of radiation which would obviate the licensing of equipment the radiations from which did not exceed a specified field intensity. Studies were undertaken and the rules are now codified as Part 15, Rules Governing Restricted Radiation Devices. These rules do not place a limitation on the permissible power, but do specify the maximum permissible field intensity at definite distances from the radiating devices.

Considerable use has been made of equipment designed to operate within the provisions of part 15. Typical of these uses are "college campus" broacast stations, which employ carrier current techniques for the distribution of programs essentially broadcast in nature; industrial signaling and communications systems using carrier current techniques; and space radiation devices such as phono-oscillators, garage door openers, remote control devices, etc.

Since the operation of transmitting devices under part 15 does not involve licensing for either equipment or operators, this mode of operation has been adopted by many persons. It has been found, however, that much of the equipment intended to operate under part 15 is not capable of compliance with the field-intensity limitations.

Campus carrier broadcasting and other types of carrier current operation have grown to such proportions that a study of the problems attendant to the operation of carrier current systems has been undertaken. Field-intensity measurements have been made and Government-industry committees are continuing studies of the data obtained.

The problem of receiver radiation continues to command attention, and the Commission is endeavoring to obtain better receiver design both in the matter of more effective radiation suppression methods and, particularly in the case of TV receivers, in the choice of IF amplifier frequency. It is believed that these efforts will effectively help to reduce interference created as the result of incidental radiation from receiver oscillators.

Incidental radiations from electric razors, heating pads, fluorescent lights, automobile ignition systems, and other electrical devices are the source of interference to radio reception. Considerable time has been devoted to the study of such radiations with a view of determining the most troublesome sources and to find effective remedies.

Rule making has been proposed for amending part 15 in this respect. However, it is expected that considerable additional information will be necessary before a satisfactory solution to all the problems concerning restricted and incidental radiation devices can be found.

COORDINATION OF TECHNICAL RULES

The desirability of maintaining uniformity of the technical phases of the rules throughout all parts and services has never been questioned. But the processes for the accomplishment of such uniformity have not been easy to inaugurate. However, progress is being made, and it is hoped that within a reasonable period practically all parts of the rules will embody the desired uniformity.

INDUSTRIAL, SCIENTIFIC, AND MEDICAL EQUIPMENT

One of the limiting factors in the use of radio transmitting and receiving equipment is the existence of electrical interference which

tends to prevent the satisfactory reception of radio signals. Such interference may be in the form of atmospheric background noise, or it may be the result of spurious and harmonic emissions from various types of electrical- and radio-frequency generating equipment. Equipment generating radio frequency energy, but not designed for communication purposes, is known to contribute a substantial portion of the interference to authorized radio services, and the operation of such equipment has often resulted in destructive interference to radio communication systems. Such interference occurs not only to broadcast services, but frequently interrupts those services concerned with the safety of life and property.

To minimize the probability of interference from particular kinds of noncommunication equipment generating radio-frequency energy, the Commission adopted, effective June 30, 1947, part 18 of its rules, which relates to the Industrial, Scientific, and Medical Service. The operation of medical diathermy, industrial heating, and miscellaneous equipment is governed by part 18.

Medical diathermy equipment includes any apparatus (other than surgical diathermy apparatus designed for intermittent operation with low power) which generates radio frequency energy for therapeutic purposes. Industrial heating equipment includes apparatus using radio frequency energy for heating operations in manufacturing or production processes. Miscellaneous equipment includes apparatus, other than medical diathermy or industrial equipment, in which the action of the radio-frequency energy generated is applied directly to the workload and does not involve the use of associated receiving apparatus.

Specific frequency bands have been allocated for the operation of industrial, scientific, and medical equipment, and part 18 of the rules sets forth the conditions under which such equipment may be operated without a license. The suppression of spurious and harmonic radiations on frequencies outside the allocated bands is required by the rules.

Interference problems arising from the operation of equipment governed by part 18 of the rules have been administered, first, on a request-for-cooperation basis, and, in those cases where cooperation has not been satisfactorily accomplished, by the use of the enforcement provisions available to the Commission. In the administration of part 18, the Commission has been guided by a desire to provide interference-free communication and, at the same time, permit the necessary use of medical diathermy, industrial heating, and miscellaneous equipment. The Commission's efforts to eliminate interference by the cooperative efforts of the complainant and the equipment user have, in general, been well received.

The imminent expansion of television facilities, and the further congestion of the frequency spectrum by other services, is expected to result in an increase in the number of interference cases reported. Thus far, the procedure set up for processing complaints of interference to radio reception has been satisfactory; however, the expected growth of broadcasting, communication, and safety services may lead to an increase in the number of difficult situations which may be resolved only by the use of stronger measures available under the Communications Act.

In addition to its regulatory duties, the Commission has held conferences with representatives of industry engaged in the manufacture and sale of equipment regulated by part 18. These conferences have been helpful to both industry and the Commission in the solution of problems relative to equipment included in part 18. Type approval certificates have been issued covering 73 diathermy machines and 11 types of miscellaneous equipment.

Through rule-making procedure the Commission has issued orders successively postponing the effective date of part 18 as it concerns arc welding equipment which uses radio-frequency energy, until January 31, 1954. Part 18 has also been amended to extend the effective date applied to medical diathermy and industrial heating equipment manufactured prior to July 1, 1947, until June 30, 1953. The shielding requirements for medical diathermy and miscellaneous equipment operated on fundamental frequencies outside the allocated bands have also been modified through rule-making procedure. The sections of the rules relating to certification of industrial heating equipment have been amended to permit the certification of groups of industrial heaters as a single unit.

The Commission and interested representatives of industry are continuing studies toward the formulation of suitable technical standards to be applied to arc welding equipment using radio-frequency energy. Continued studies of new industrial and medical applications of radio-frequency energy are being made in an effort to keep the rules governing such devices abreast of the development of equipment and the needs of the users of such devices.

TYPE APPROVAL AND TYPE ACCEPTANCE WORK

Among the equipments which have for a long time been "type approved" by the Commission are marine radio equipment, diathermy equipment, and industrial heating equipment. Most of the transmitting and frequency monitoring equipment used by broadcast stations are also "approved." In addition certain equipments are "certified" as acceptable for licensing.

In the past, the responsibility for such approval work was divided largely among the various Commission divisions which administered the services concerned. Now, however, the major responsibility has been placed in the Technical Research Division, and attendant functions are being absorbed as rapidly as possible. However, during the transition period some of the work is still being performed by other divisions and bureaus.

The work is separated into three main divisions: (1) applications for type acceptance: (2) applications for type approval; and (3) the filing of detailed technical specifications of equipment. An unusually heavy burden is associated with the filing of technical specifications for a wide variety of transmitters, frequency monitors, etc. It is expected that the centralization of the equipment files in the Technical Research Division will expedite the handling of applications.

The following tabulation indicates the approximate number of applications handled and the number of equipment specifications filed during the last half of the fiscal year:

	Type acceptance	Type approval (including ISM)	Specifications filed
Received	37	96	149
Issued	32	90	88
Pending	5	6	61

In order that the type approval and type acceptance work may be established on a sound basis, it is anticipated that a certain amount of rule-making procedures will be necessary. The basic work for such rule making has already been started. After the rules have been made complete, it is presumed that column 3 in the tabulation above will be reduced to a minimum, while columns 1 and 2 will be proportionately larger.

CARTOGRAPHIC AND DRAFTING SERVICE

The facilities and personnel of the Cartographic and Drafting Section were transferred to the Technical Research Division in order to provide a more efficient means of presenting the division's technical studies in graphic form, and of preparing the generally involved and complex drawings required for exhibits and for publication in technical reports and standards. These include graphs and curves resulting from practically all phases of the division's research and scientific investigations, and various engineering drawings prepared expressly for use in graphical computations.

In addition, this service was made available to other offices of the Commission requiring a higher order of engineering drafting in con-

nection with their respective fields of work, which included special purpose maps and charts of communications engineering, and certain administrative and informative charts related to the functions of the Commission.

Some 350 drawings of all classes were produced by the Cartographic and Drafting Section during the year, with approximately 65 percent of the total prepared in connection with technical activities.

GOVERNMENT-INDUSTRY COMMITTEES

The Commission is represented by its Technical Research Division on a number of important standing committees of Government and industry. Among those are executive groups of the Central Radio Propagation Laboratory, the URSI (International Radio Scientific Union) and CCIR (International Radio Consultative Committee), committees of the Institute of Radio Engineers and the Radio-Television Manufacturers Association, and panels of the Committee on Electronics of the Research and Development Board. The chief of the division continued to serve on many of these committees.

TECHNICAL CONSULTING SERVICE

In addition to furnishing technical advice to the Commission, the division is called upon to answer technical questions of other Government agencies, industry, and private engineers. During the past year demands of this nature increased far beyond those of any previous period, and as a result, backlogs in routine work developed.

2. LABORATORY DIVISION

GENERAL FUNCTIONS

The Commission maintains a Laboratory Division near Laurel, Md. This division makes technical measurements and engineering investigations to aid the Commission in allocating frequency bands, establishing and revising engineering standards and regulations for new as well as existing services, and drafting regulations covering noncommunications type of equipment employing radio-frequency energy which may interfere with the radio-communication services.

The Laboratory Division's activities include:

1. Investigation of various methods of transmission and reception to determine which method permits the most efficient utilization of the spectrum and to ascertain the interference factors which limit the various methods.

2. Tests of transmitters to determine whether interference signals are emitted on frequencies other than the assigned channel.

3. Tests of receivers to determine how close together the Commission might place stations without the listeners receiving several stations at the same time.

4. Tests of receivers to determine what interference they may produce in other nearby receivers either in the same service or in other services.

5. Tests for reliability of operation of equipment such as apparatus involving safety at sea. This type of equipment is required by the Communications Act or treaty.

6. Tests of the accuracy and reliability of monitoring equipment required to be used by stations, such as frequency and modulation monitors.

7. Investigation of interference produced by noncommunication uses of radio-frequency energy.

8. Development of special monitoring equipment for use of Commission engineers in the field, and maintenance of the accuracy of measuring installations and equipments.

The work of the laboratory generally is directed toward the testing of a type of equipment rather than the testing of individual units. Attempt is made to anticipate interference problems and to have remedial measures taken prior to the manufacture and distribution of a large number of units instead of waiting until the interference occurs in the field and requires numerous individual investigations.

In some instances type tests are required by the rules and regulations, and formal approval is given. In other cases the laboratory makes type tests not specifically required, in order that the Commission may be aware of the existing service and interference problems encountered in practical operation, so that either the allocation structure may be designed to fit the units available or the Commission may take other action leading to improved equipments which will permit more efficient use of the available radio frequencies.

Type testing also is required of certain noncommunications equipment, such as diathermy machines which employ radio frequencies and may cause serious interference unless the frequencies are properly maintained and the harmonic and spurious emissions sufficiently restricted.

Following is a summary of particular laboratory activities engaged in during the year.

BROADCASTING

Most of the Laboratory Division work in the broadcast field concerned tests as to receiver oscillator radiation and the various spurious responses of receivers, with especial emphasis as to impact of these problems on the implementation of the UHF television band. Studies were made of a number of proposed UHF tuners submitted by manufacturers. With regard to receiver oscillator radiation, the laboratory participated in the formation of standards for the measurement of receiver oscillator radiation by the Institute of Radio Engineers. A

permanent new field-intensity range was installed at the laboratory to replace a tentative one used during the establishment of proposed measurement methods.

In order to obtain propagation data for the UHF television band, the laboratory continued the recording of the UHF-TV station at Bridgeport, Conn. Changes have been made in the laboratory's television signal generator equipment to facilitate operations on both color and monochrome. Permanent facilities are being installed to permit examination of interference between several color television signals on the adopted standards, and to permit the examination of new systems or methods for television transmission. Tests are being conducted on several proposed types of color receivers.

SERVICES OTHER THAN BROADCASTING

Measurements were made of the selectivity, intermodulation, and other spurious responses of receivers used in other than broadcast services. Tests also were made of the oscillator radiation of nonbroadcast receivers. Examination was made of the performance of deviation limiting devices now required in many transmitters to reduce interference on channels near the one in use. The foregoing tests have indicated that the state of the art has progressed to the point where, with good equipment, consideration can be given to the implementation of closer channel spacings to provide more communication facilities.

At the present time automatic equipment which responds to distress signals is required only on certain ships which are radiotelegraph equipped. Through international conferences it now has been agreed to extend this general type of protection to radiotelephone-equipped vessels. A number of units operating on the latest proposed type of signal have been designed and constructed at the laboratory, and tests on the new type signal are under way.

CALIBRATION OF INSTALLATIONS AND APPARATUS

In its enforcement and investigation activities, the Field Engineering and Monitoring Bureau uses a large amount of testing and recording equipment. During the year calibrations of the recording equipment were checked at eight of the field-intensity recording installations operated by that division including Laurel, Md., Baltimore, Md., Powder Springs, Ga., Grand Island, Nebr., Houston, Tex., Santa Ana and Livermore, Calif., and Portland, Oreg. Eight field-intensity meters and 13 signal generators were calibrated during the year.

NONCOMMUNICATIONS EQUIPMENT

Industrial heating, medical diathermy, and other miscellaneous uses of radio-frequency energy for purposes other than communication

have expanded to such an extent that the power used by this group exceeds the total transmitter power required for radio communication. Since such noncommunications equipment employs frequencies of the same order as used by the communications industry, severe interference may be expected unless these units are designed and operated properly. Some of these units use power far in excess of the 50-kilowatt maximum permitted AM broadcast stations. Devices in this category are covered by part 18 of the rules and regulations of the Commission.

Medical diathermy apparatus which falls within this classification is type-approved by the laboratory to insure that the frequency is maintained within one of the specified bands and that the harmonic and spurious radiations are within the prescribed limits. During the year 18 submissions of diathermy machines were received for test.

In addition, the Laboratory Division made tests on other devices employing radio-frequency energy and capable of causing interference. During the year seven devices of this type were submitted for test.

The Laboratory Division is represented on the following committees which are working toward reduction of interference from receivers, industrial radio-frequency heating equipment, power lines, etc.: I. R. E. Industrial Electronics Committee, A. I. E. E. Subcommittee on Induction and Dielectric Heating, A. I. E. E. Subcommittee on Radiation Measurements above 300 Megacycles, I. R. E. Oscillator Radiation Subcommittee, A. S. A. Technical Subcommittee No. 1 of Committee C63, and CCIR Committee.

CHAPTER VIII—FREQUENCY ALLOCATION AND TREATY ACTIVITIES

1. GENERAL

Frequency allocation may be defined as the study of the spectrum so that channels can be reserved, widened, and modified to keep pace with developments in radio and to provide a maximum of usefulness consistent with the public need.

Although they range from 10,000 cycles per second to about 30 billion cycles per second, the frequencies in the various portions of the spectrum exhibit different qualities. For example, 1000 kilocycles (1,000,000 cycles or 1 megacycle) is excellent for aural broadcasting but would be practically useless for television broadcasting. Similarly, 415 kilocycles is good for ship navigation by direction finding but would be useless for ship navigation by means of radar.

Because of the differing characteristics of frequencies, certain bands throughout the spectrum have been reserved (allocated) to specific kinds of uses (services). These bands have in many instances been further subdivided to serve more specific purposes. For example, frequencies in the range of 30 to 40 megacycles have been allocated in the United States to the mobile service (use between stations on vehicles or between stations on vehicles and stationary stations). This band has been further subdivided so as to reserve certain portions for particular categories of mobile use such as police, industrial, etc.

Since the energy transmitted by a radio station cannot necessarily be confined to the borders of the transmitting country, the use of the spectrum must be coordinated by all nations so as to minimize interference. The universal use of radio has thus led to the adoption of international treaties governing the allocation and conditions of use of frequencies throughout the spectrum.

Although frequency allocation (reservation) is not the same as frequency assignment (authority to use) one cannot be accomplished without reference to the other. Because of this, an integral part of frequency allocation work is the maintenance of frequency assignment records of the United States and of the world.

2. INTERNATIONAL FREQUENCY ALLOCATION

The most significant accomplishment in the international radio field was the successful culmination of the Extraordinary Administrative Radio Conference of the International Telecommunication Union, held at Geneva, Switzerland, October 16 to December 3, 1951. The purpose of this conference was to find a method by which the allocations of spectrum space to the several radio services agreed to at the Atlantic City Radio Conference of 1947 might be put into force throughout the world.

The task facing this conference was a most difficult one, because a station assignment plan for the fixed service with international acceptance had not been developed by the Provisional Frequency Board even though it had struggled for 2 years with this problem, and a complete high-frequency-broadcasting plan which would provide for time and frequency sharing on an international basis was not available.

Despite these obstacles, the EARC conference did devise a method whereby the fixed and broadcasting stations of the world could gradually adjust their frequency assignments so that they would, in the future, use only those frequencies which are within the bands allocated to those services in the Atlantic City table of frequency allocations.

Moreover, the Geneva agreement provided a method whereby the aeronautical- and maritime-mobile services of the United States can bring their frequency assignments to specific stations into conformity with the frequency lists contained in the Geneva agreement. These lists had been drafted at conferences held for this purpose between 1947 and 1951.

The Geneva agreement further provided that the so-called "regional" frequency-band allocations below 2000 kilocycles would be brought into force on a world-wide basis on specified dates.

Thus, a practical basis is now available for the stabilization of international uses of radio in the bands of frequencies below 27,500 kilocycles. The Atlantic City table of frequency allocations above 27,500 kilocycles came into force internationally on January 1, 1949.

In order that the United States could carry out the terms of the Geneva agreement, much Commission staff time has been devoted to this project. Literally dozens of related rule-making and other regulatory projects are being proposed by the Commission, and many more will be forthcoming.

Substantial progress in frequency allocation was made by the United States and by other countries in the period between December 1951 and July 1952. For example, in March 1952, the United States proposed that the radio spectrum range between 20,000 and 27,500 kilocycles contain frequency assignments to stations in conformity with the Atlantic City allocations of bands of frequencies, and to the station assignments stipulated in the Geneva agreement. This project has been completed and many friendly countries have taken similar action so that this portion of the spectrum is now fairly well stabilized throughout large parts of the world.

Included in the Geneva agreement are provisions relating to the protection of stations in the maritime mobile and aeronautical mobile services from harmful interference which might be caused by other stations during the difficult period of transition from the existing assignment situation to the assignment plans contained in the agreement. In an effort to insure the maximum usefulness of the world-wide high-frequency ship communication bands established by the Cairo Radio Regulations (1938), the Commission has initiated numerous requests that the many broadcasting, fixed, and land stations in these bands cease operations which are contrary to treaty provisions. This has taken intensive effort by the staffs of the Frequency Allocation and Treaty Division and the Field Engineering and Monitoring Bureau. Early reports indicate that this effort is bringing results because, in a number of cases, steps have been taken to close down out-of-band stations or move them into the proper bands. Monitoring work confirms that many countries have taken remedial action. Preventive measures of this type appear vital to early and successful entry into force of the plans formulated at the Geneva conference.

Other projects are under active investigation in cooperation with the Telecommunications Adviser to the President and with Government users of radio. One of these is the introduction of new families of frequencies for the use of United States flag aircraft flying the North Atlantic air routes. The target date for use of these new aeronautical frequencies in March 15, 1953.

Another typical project is the introduction of the new calling bands for ship telegraph stations to become effective June 3, 1953, as provided in the Geneva agreement. Here again, the problem of relocating the stations of other services now occupying these calling bands requires an enormous amount of rule-making and licensing action by the Commission. These, and all other projects related to the Geneva agreement, are being studied cooperatively by the Commission and representatives of the telecommunications industry in an effort to find practical answers to the many difficult operational problems which confront the Commission's licensees.

During June 1952, representatives of the Commission held informal discussions with representatives of the United Kingdom in London concerning the use of frequencies in the VHF spectrum by stations in the maritime-mobile service. One of the principal points in these discussions centered around the use or standardization of frequency modulation on the maritime mobile frequencies in the VHF range. Plans were also made for future discussions between representatives of the two countries on broad problems related to the Geneva agreement.

3. NATIONAL FREQUENCY ALLOCATION

Many of the national frequency allocation projects of the Commission are, of course, related directly to the work being done by the Commission and the United States Government in the international field. For example, the Geneva agreement looks toward a system of priority for the use of a frequency which would be based on the actual use being made of that frequency. In the United States, the Commission, the Telecommunications Adviser to the President, and each Government user of radio have been investigating the problems in connection with the establishment of a record of frequency usage. This has involved the collection and analysis of several thousand reports submitted by both non-Government and Government radio stations over a 1-month period and that study is not yet completed.

In addition, the following frequency allocation changes were made, or were proposed:

1. The allocation of the band 21,000–21,450 kilocycles to the Amateur Service was made final.

2. The band 14,350–14,400 kilocycles was allocated to the Fixed Service and assignments were made to stations in the International Fixed Service.

3. The entire band 20,000–25,000 kilocycles was reallocated so as to conform to the Atlantic City table of frequency allocations and United States station assignments were adjusted so as to bring them into agreement with the international allocation.

4. A study of the requirements of the Radiolocation Service was made, and spectrum space was allocated at 1750–1800 kilocycles to permit the use of radiolocation stations in connection with oil exploration activities in the Gulf of Mexico.

5. Some expanded use of the band 1800–2000 kilocycles by the Amateur Service was proposed.

6. The temporary arrangements concerning the allocation of the bands 220–225 megacycles and 235–240 megacycles to the Amateur Service were deleted, thus making the band 220–225 megacycles available for use in all areas.

7. A complete table of frequency allocations for the band 10–25,000 kilocycles was adopted and incorporated in Part 2 of the rules.

8. Seven additional proposals involving changes in frequency allocations between 2000 and 25,000 kilocycles, all relating to bringing into force the Atlantic City table of frequency allocations, were made the subject of separate proceedings.

9. Theater television was under further study. A proposal was made to expand the subjects to be considered so that non-Government interests in several services would be aware of the possible impact from any allocation to theater television, and so that information concerning allocation problems above 1,000 megacycles could be obtained.

10. The Commission proposed the reallocation of television channels 5 and 6 and the upper half of the FM broadcasting band (98–108 megacycles) to the Common Carrier Fixed Service in the Territory of Hawaii only.

11. Other minor modifications of the Commission's table of frequency allocations were proposed or adopted in order to permit greater utilization of the radio spectrum by the various services.

4. FREQUENCY REGISTRATION AND NOTIFICATION

The Geneva agreement provided that all notifications to the International Telecommunication Union which were to be included in the final edition of the List of Frequencies had to be submitted to the Union no later than February 29, 1952. Consequently, some 4,550 new notifications for non-Government and Government stations were submitted by that date.

Furthermore, the Geneva agreement required each administration to submit data concerning the actual use being made of frequencies between 2,850 and 27,500 kilocycles for which protection from harmful interference was being sought. This data was prepared by the Commission's staff and by individual licensees, and by Government agencies using radio, and the entire usage list was submitted to the ITU prior to the April 1, 1952, deadline.

After supplying the usage data, the Commission resumed notifications to the ITU on a daily basis. Instead of being notified in accordance with the Cairo (1938) General Radio Regulations, new assignments are now reported to the ITU under the terms of the Atlantic City (1947) Radio Regulations, using a special fanfold in the Atlantic City Appendix 6 format.

As of June 30, 1952, the Commission's radio frequency record (consisting of more than 70,000 cards which reflect the historical development of the use of each frequency, and over 90,000 machine punch

cards showing the particulars of the present Commission authorizations) was completely current. In addition, a start had been made in converting the records developed under the Cairo General Radio Regulations to the format set forth in the Atlantic City Radio Regulations.

The Commission's staff also coordinated 10,725 new and modified authorizations to Government stations made by the Interdepartment Radio Advisory Committee, after having examined each to determine if it might cause interference to existing non-Government authorizations.

5. INTERNATIONAL TREATY ACTIVITIES

A major portion of the year's activities in the field of international treaties has been directed toward the accomplishment of the Commission's part in bringing into force the Atlantic City table of frequency allocations in accordance with the decisions of the Extraordinary Administrative Radio Conference.

The number of international interference cases which the Commission has received for resolution is increasing because of the adjustments which are being made to bring out-of-band stations into the proper bands. A total of 670 cases of international interference received the attention of the Commission's staff during the year, of which 445 were resolved. Of the remaining 225 cases, 85 cases are more than 60 days old.

Infractions by foreign stations of the International Telecommunication Convention and Radio Regulations, and of the radio provisions of the International Convention for the Safety of Life at Sea detected by the Commission's monitoring stations and inspection offices were screened and forwarded to the appropriate foreign administrations in accordance with international procedures. During the year a total of 375 cases of treaty infractions were so reported. Most of these involved spurious emissions, harmonic radiations, off-frequency operation, or some other technically improper operation, all of which constituted sources of actual or potential interference to radio communications, or involved the safety of life and property in the air and on the sea.

Coordination between the Commission and the Canadian Department of Transport of proposed VHF and UHF frequency assignments is of continuing importance. The informal procedure announced in 1950 permits an effective and efficient exchange of engineering comments on proposed assignments of both countries in certain portions of the spectrum in border areas, and for the exchange of current frequency-assignment data. Approximately 440 letters of comment were exchanged by the two countries during the year.

The Commission assisted in the United States preparation for, and participated in, a total of 20 international conferences and meetings. These were world-wide, regional, or bilateral in nature, and most of the major conferences were convened under the auspices of the International Telecommunication Union or the International Civil Aviation Organization. Approximately 90 nations of the world participate in the activities of the ITU, and approximately 60 in the activities of the ICAO. The Commission furnished 2 delegation chairmen, 17 delegates or representatives, 4 advisers, and a small number of staff assistants to the following conferences and meetings:

US-Mexico Informal Conference To Discuss Border Assignments for TV.	Mexico City	Feb. 23, 1951.
CCIT International Telegraph Consultative Committee.	Geneva	March 1951.
CCIR—Sixth Meeting	Geneva	June 5, 1951. July 6, 1951.
US-Mexico Informal Conference To Discuss Border Assignments for TV.	Mexico City	June 18, 1951.
US-UK Informal Conference To Discuss Extraordinary Administrative Radio Conference.	London	July 1951.
Discussion with Mexican Telecommunications Authorities re: Application to Export-Import Bank of Washington for Credit for Expansion and Modernization of Mexican Telecommunications Systems.	Mexico City	Oct. 11, 1951.
Extraordinary Administrative Radio Conference of ITU.	Geneva	Aug. 16, 1951. Nov. 16, 1951.
ICAO South American-Atlantic Regional Air Navigation Meeting.	Buenos Aires	Oct. 30, 1951. Nov. 17, 1951.
US-Canada Agreement for Promotion of Safety on Great Lakes by Radio.	Ottawa	Feb. 21, 1952.
Meeting of the Executive Committee of the Technical Policy Steering Committee for US-Canada Implementation of the Extraordinary Administrative Radio Conference.	Ottawa	Feb. 27, 1952.
CCIR Study Group XI	Stockholm	May 20, 1952. May 27, 1952.
European Regional Conference on VHF Broadcast 41 Mc to 216 Mc.	Stockholm	May 28, 1952.
Discussions with British Post Telegraph and Telephone on use of FM vs. AM on VHF Range by Maritime Mobile Service.	Paris and Geneva	June 20, 1952.

In addition, the Commission was involved in preparatory or follow-up work directly connected with the following conferences and meetings:

ICAO Search and Rescue Meeting	Montreal	Sept. 4, 1951.
CCIF Study Groups	Florence	Oct. 1, 1951. Oct. 13, 1951.
CCIT Subcommittee on Maintenance	Florence	Oct. 4, 1951. Oct. 9, 1951.
CCIF Plenary—Sixth Meeting	Florence	Oct. 22, 1951. Oct. 27, 1951.
CCIT Working Group on Signal Correctors.	Paris	Oct. 29, 1951. Nov. 3, 1951.
CCIT Study Group VI on Definitions and Vocabulary.	Paris	Nov. 5, 1951. Nov. 12, 1951.
CCIF Committee for the Revision of the Principles of Protective Interference.	Geneva	March 1952.

The following conferences and meetings are projected for the future and the preparatory work by the Commission's staff has started:

ITU Conference for Revision of Bermuda Telecommunication Agreement of 1945.	London	July 9, 1952.
Inter-American Telecommunication Conference.	Undetermined	Fall 1952.
International Telecommunication Conference.	Buenos Aires	Oct. 1, 1952.
ICAO—Special Meeting	Undetermined	1952.
ICAO—Second Southeast Asia Regional Air Navigation Meeting.	In Region	Oct. 25, 1952.
CCIT Study Group I (General Telegraphy).	Geneva	October 1952.
CCIT Study Group VI (Vocabulary and Definitions).	Geneva	October 1952.
ICAO Search and Rescue Division	Undetermined	1953.
CCIT Plenary Meeting	Holland	1953.
ICAO African-Indian Ocean Second Regional Air Navigation Meeting.	Undetermined	1953.
ICAO—Special Meeting	Undetermined	1953.
ICAO Communications Division	Undetermined	1953.
Tenth International Conference of American States O. A. S.	Caracas	1953.
CCIF—Study Group for Trials Semi-Auto Phone Operations.	Geneva	1953.
CCIF—Study Group on Operating and Tariff.	Geneva	1953.
CCIF—Substudy Group	Stockholm	6–53.
CCIF—Technical Committee	Geneva	10–53.
CCIR—Seventh Plenary	London	1953.
ICAO Third Caribbean Regional Air Navigation Meeting.	Undetermined	1954.

ICAO Middle East Regional Air Navigation Meeting.	Undetermined	1954.
International HF Broadcasting Conference.	Buenos Aires	1954.
International Telegraph and Telephone Conference.	Undetermined	1954.
URSI, Eleventh General Assembly	Undetermined	1954.
ICAO South Atlantic Regional Air Navigation Meeting.	Undetermined	1955.
ICAO South American Regional Air Navigation Meeting.	Undetermined	1955.
ICAO Fourth European Mediterranean Regional Air Navigation Meeting.	Undetermined	1956.

6. INTERDEPARTMENT RADIO ADVISORY COMMITTEE

The Commission does not license United States Government radio stations or assign their frequencies. Such frequency assignments are made by the President upon recommendation of the Interdepartment Radio Advisory Committee (IRAC), composed of 11 Federal agencies. The Commission provides the secretariat of the IRAC.

During the year the IRAC approved 6,727 new and deleted 3,065 regular assignments. In addition, it approved 1,091 changes in assignments, 2,907 temporary assignments, and 574 deletions of temporary assignments.

APPENDIX

1. FIELD OFFICES
2. PUBLICATIONS
3. TREATIES AND OTHER INTERNATIONAL AGREEMENTS

1. FIELD OFFICES

The Commission maintains 64 field installations geographically distributed throughout the United States and its possessions. Fifty-nine of these are engaged in engineering work, comprising 9 regional offices, 24 district offices, 6 suboffices, 3 ship offices, and 18 monitoring stations. There are also four Common Carrier Bureau field offices. The complete list follows:

FIELD ENGINEERING AND MONITORING BUREAU

Regional offices	*Headquarters*
North Atlantic	954 Federal Bldg., New York 14, N. Y.
South Atlantic	411 Federal Annex Atlanta 3 Ga.
Gulf States	332 U. S. Appraisers Bldg., Houston 11, Tex.
South Pacific	323–A Customhouse, San Francisco 26, Calif.
North Pacific	801 Federal Office Bldg., Seattle 4, Wash.
Central States	1300 U. S. Courthouse Bldg., Chicago 4, Ill.
Great Lakes	1029 New Federal Bldg., Detroit 26, Mich.
Hawaiian	P. O. Box 1142, Lanikai, Oahu, T. H.
Alaskan	52 Post Office and Courthouse, Anchorage, Alaska.

District offices	*Address*
1	1600 Customhouse, Boston 9, Mass.
2	748 Federal Bldg., New York 14, N. Y.
3	1005 U. S. Customhouse, Philadelphia 6, Pa.
4	508 Old Town Bank Bldg., Baltimore 2, Md.
5	402 New Post Office Bldg., Norfolk 10, Va.; (ship office) 106 Post Office Bldg., Newport News, Va.
6	411 Federal Annex, Atlanta 3, Ga.; (suboffice) 214 Post Office Bldg., Savannah, Ga.
7	312 Federal Bldg., Miami 1, Fla.; (suboffice) 409–410 Post Office Bldg., Tampa 2, Fla.
8	400 Audubon Bldg., New Orleans 16, La.; (suboffice) 419 U. S. Courthouse and Customhouse, Mobile 10, Ala.
9	324 U. S. Appraisers Bldg., Houston 11, Tex.; (suboffice) 329 Post Office Bldg., Beaumont, Tex.; (ship office) 406 Post Office Bldg., Galveston, Tex.

District offices	*Address*
10	500 U. S. Terminal Annex Bldg., Dallas 2, Tex.
11	539 U. S. Post Office and Courthouse Bldg., Los Angeles 12, Calif.; (suboffice) 15–C U. S. Customhouse, San Diego 1, Calif.; (ship office) 326 U. S. Post Office and Courthouse, San Pedro, Calif.
12	323–A Customhouse, San Francisco 26, Calif.
13	307 Fitzpatrick Bldg., Portland 5, Oreg.
14	801 Federal Office Bldg., Seattle 4, Wash.
15	521 Customhouse, Denver 2, Colo.
16	208 Uptown Post Office and Federal Courts Bldg., St. Paul 2, Minn.
17	3200 Fidelity Bldg., Kansas City 6E, Mo.
18	1300 U. S. Courthouse, Chicago 4, Ill.
19	1029 New Federal Bldg., Detroit 26, Mich.
20	328 Federal Bldg., Buffalo 3, N. Y.
21	502 Federal Bldg., Honolulu 1, T. H.
22	322–323 Federal Bldg., San Juan 13, P. R.
23	7–8 Shattuck Bldg., Juneau, Alaska; (suboffice) 53 U. S. Post Office and Courthouse Bldg., Anchorage, Alaska.
24	22nd & E Streets, N. W., Washington 25, D. C.

PRIMARY MONITORING STATIONS	SECONDARY MONITORING STATIONS
Allegan, Mich.	Searsport, Maine
Grand Island, Nebr.	Spokane, Wash.
Kingsville, Tex.	Twin Falls, Idaho
Millis, Mass.	Fort Lauderdale, Fla.
Santa Ana, Calif.	Lexington, Ky.
Laurel, Md.	Muskogee, Okla.
Livermore, Calif.	Fairbanks, Alaska
Portland, Oreg.	
Powder Springs, Ga.	
Lanikai, Oahu, T. H.	
Anchorage, Alaska.	

COMMON CARRIER BUREAU FIELD OFFICES

Atlanta, Ga., 733 Hurt Bldg.
New York, N. Y., 90 Church Street.
St. Louis, Mo., 815 Olive Street.
San Francisco, Calif., 180 New Montgomery Street.

2. PUBLICATIONS

The Commission is unable to make public distribution of its printed publications but makes them available by purchase from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at the prices indicated in the following list:

Title	*Price*
Communications Act of 1934, with amendments and index, revised to Jan. 1952	$0.25
Public Law 554, Communications Act Amendments, 1952	.05
Federal Communications Commission reports (bound volumes of decisions and orders exclusive of annual reports):	
Volume 3, July 1936 to February 1937	2.00
Volume 4, March 1937 to Nov. 15, 1937	1.50
Volume 5, Nov. 16, 1937, to June 30, 1938	1.50
Volume 6, July 1, 1938, to Feb. 28, 1939	1.50
Volume 7, March 1, 1939, to Feb. 29, 1940	1.50
Volume 8, March 1, 1940, to Aug. 1, 1941	1.50
Volume 10, April 1, 1943, to June 30, 1945	2.00
Volume 11, July 1, 1945, to June 30, 1947	3.75
Volume 12, July 1, 1947, to June 30, 1948	3.50
Annual reports of the Commission:	
Thirteenth Annual Report—Fiscal year 1947	.25
Fourteenth Annual Report—Fiscal year 1948	.30
Fifteenth Annual Report—Fiscal year 1949	.35
Sixteenth Annual Report—Fiscal year 1950	.40
Seventeenth Annual Report—Fiscal year 1951	.40
Eighteenth Annual Report—Fiscal year 1952	(1)
Statistics of the Communications Industry:	
For the year 1939	.25
For the year 1940	.20
For the year 1942	.35
For the year 1943	.30
For the year 1945	.50
For the year 1946	.55
For the year 1947	.75
For the year 1948:	
Secs. A and B	1.00
Sec. B (Broadcast only)	.35
For the year 1949:	
Secs. A and B	1.00
Sec. B (Broadcast only)	.25
For the year 1950:	
Sec. A (Common Carrier only)	.50
Report on Public Service Responsibility of Broadcast Licensees (Blue Book), 1946	.35
The Safety and Special Radio Services—a Public Primer, 1950	.15
Telephone and Telegraph—a Public Primer, 1949	.10
An Economic Study of Standard Broadcasting, 1947	.40
Study Guide and Reference Material for Commercial Radio Operator Examinations, revised to Feb. 1, 1951	.35
Standards of Good Engineering Practice:	
Concerning Standard Broadcast Stations, revised to Oct. 30, 1947	1.25
Sec. 26, Sunrise and Sunset Table	.10
Concerning FM Broadcast Stations, revised to Jan. 18, 1950	.10

[1] In the process of printing—available at Government Printing Office at a later date.

Title	*Price*
Rules and Regulations:	
Part 0, Organization, Delegation of Authority, etc	(2)
Part 1, Practice and Procedure, revised to Dec. 29, 1949	(2)
Part 2, Frequency Allocations and Radio Treaty Matters; General Rules and Regulations, revised to Dec. 20, 1950	$0. 20
Part 3, Radio Broadcast Services, revised to Dec. 13, 1950	.20
Part 4, Experimental and Auxiliary Broadcast Services, revised to Oct. 30, 1950	.15
Part 5, Experimental Radio Services, revised to Jan. 16, 1948	(2)
Part 6, Public Radiocommunication Services, revised to Apr. 27, 1949	.10
Part 7, Stations on Land in the Maritime Services, effective July 23, 1951	.20
Part 8, Stations on Shipboard in the Maritime Services, effective July 23, 1951	.25
Part 9, Aeronautical Services, revised to July 1, 1947	.15
Part 10, Public Safety Radio Services, revised to Apr. 27, 1949	.15
Part 11, Industrial Radio Services, revised to Apr. 27, 1949	.10
Part 12, Amateur Radio Service, revised to June 6, 1951	.10
Part 13, Commercial Radio Operators, revised to June 27, 1950	.05
Part 14, Radio Stations in Alaska (Other than Amateur and Broadcast), revised to Apr. 28, 1948	(2)
Part 15, Restricted Radiation Devices, recodified July 21, 1948	(2)
Part 16, Land Transportation Radio Services, revised to Apr. 27, 1949	.10
Part 17, Construction, Marking and Lighting of Antenna Structures, effective Feb. 15, 1951	.05
Part 18, Industrial, Scientific and Medical Service, revised to Jan. 25, 1950	.05
Part 19, Citizens Radio Service, effective June 1, 1949	.10
Part 20, Disaster Communications Service, effective Mar. 21, 1951	.05
Part 31, Uniform System of Accounts for Class A and Class B Telephone Companies, revised to May 12, 1948	.40
Part 33, Uniform System of Accounts for Class C Telephone Companies, revised to May 12, 1948	.30
Part 34, Uniform System of Accounts for Radiotelegraph Carriers, revised to Oct. 14, 1949	.20
Part 35, Uniform System of Accounts for Wire-telegraph and Ocean-cable Carriers, revised to Oct. 14, 1949	.25
Part 41, Telegraph and Telephone Franks, revised to Dec. 4, 1947	.05
Part 43, Reports of Communication Common Carriers and Their Affiliates, revised to July 21, 1948	.10
Part 45, Preservation of Records of Telephone Carriers, effective Oct. 1, 1950	.10
Part 46, Preservation of Records of Wire-telegraph, Ocean-cable and Radiotelegraph Carriers, effective Oct. 1, 1950	.10
Part 51, Occupational Classification & Compensation of Employees of Class A and Class B Telephone Companies, effective Oct. 10, 1951	.05
Part 52, Classification of Wire-telegraph Employees, effective July 11, 1944	.05

[2] Being revised—not available at present.

[3] Obtainable temporarily from the Federal Communications Commission without charge.

Title	Price
Rules and Regulations—Continued	
Part 61, Tariffs, Rules Governing the Construction, Filing and Posting of Schedules of Charges for Interstate and Foreign Communications Service, revised to Aug. 1, 1946	$0.10
Part 62, Applications under Sec. 212 of the Act to Hold Interlocking Directorates, revised to May 23, 1944	.05
Part 63, Extension of Lines and Discontinuance of Service by Carriers, revised to Dec. 30, 1946	(1)
Part 64, Miscellaneous Rules Relating to Common Carriers, revised to July 16, 1948	.10

[1] Obtainable temporarily from the Federal Communications Commission without charge.

Purchasers of the Commission's Rules and Regulations are furnished a form by the Superintendent of Documents which, when filled out and forwarded to the Commission, entitles the purchaser to receive any future amendments to the part or parts purchased until a complete revision thereof is reprinted. In the event any exception is made in this procedure, rule purchasers will be advised by letter where the amendments may be obtained. AM and FM Standards of Good Engineering Practice and most of the rule parts are printed on 8- by 10½-inch pages and punched to fit standard three-ring binders.

The Commission is not able to supply lists of radio stations but, on request, will furnish a fact sheet about commercial sources of such lists, also one on commercial radio publications and services.

3. TREATIES AND OTHER INTERNATIONAL AGREEMENTS

International treaties, agreements, and arrangements relating to radio and telecommunications which were in force and to which the United States was a party as of September 17, 1952, are listed below. Unless otherwise indicated, copies of these documents may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Date	Series [1]	Subject
1910		Ship Act of 1910 as amended July 23, 1912. (Those provisions relating to required radio communication for ships navigating the Great Lakes.)
1925	T. S. 724–A	Arrangements between the United States of America, Great Britain, Canada, and Newfoundland effected by exchange of notes September and October 1925, providing for the prevention of interference by ships off the coast of these countries with radio broadcasting. (Not available at the Government Printing Office.)
1928 and 1929	T. S. 767–A	Arrangement effected by exchange of notes between the United States of America and Dominion of Canada governing radio communications between Private Experimental Stations. Signed Oct. 2, 1928, Dec. 29, 1928, and Jan. 12, 1929.
1929	T. S. 777–A	Arrangement between the United States of America, Canada, Cuba, and Newfoundland relating to assignment of high frequencies on the North American continent effected by exchange of notes signed at Ottawa Feb. 26 and 28, 1929. (Cuba ceased to be party by virtue of notice to Canadian Government of Oct. 5, 1932, effective Oct. 5, 1933. Arrangement still in force with respect to United States of America, Canada, and Newfoundland.) (Not available at the Government Printing Office.)

[1] T. S.—Treaty Series. E. A. S.—Executive Agreement Series. TIAS.—Treaties and other International Act Series.

Date	Series [1]	Subject
1929	T. S. 910	Safety of Life at Sea Convention with Regulations between the United States of America and Other Powers, signed at London May 31, 1929.
1930	T. S. 921	Amendment to Regulation XIX of Annex 1 to the Safety of Life at Sea Convention, Dec. 31, 1930.
1934		Communications Act of 1934, as amended.
1934	E. A. S. 62	Radio communications between private experimental stations and between amateur stations. Arrangement between the United States of America and the Dominion of Canada (continuing arrangement effected by exchange of notes signed Oct. 2, 1928, Dec. 29, 1928, and Jan. 12, 1929) effected by exchange of notes signed Apr. 23 and May 2 and 4, 1934. Effective May 4, 1934. (Not available at the Government Printing Office.)
1934	E. A. S. 66	Radio communications between amateur stations on behalf of third parties. Arrangement between the United States of America and Peru. Effective May 23, 1934.
1934	E. A. S. 72	Radio communications between amateur stations on behalf of third parties. Arrangement between the United States of America and Chile. Effected by exchange of notes signed Aug. 2 and 17, 1934.
1937	E. A. S. 109	Exchange of information concerning issuance of radio licenses. Agreement between the United States of America and Canada. Effected by exchange of notes signed Mar. 2 and 10, Aug. 17, Sept. 8, and 20, Oct. 9, 1937. This agreement was largely superseded by the notification procedure established in the NARBA (T. S. 777–A, T. S. 962, E. A. S. 227 and TIAS 1553) and under the Inter-American Radio Communications Convention (T. S. 938). (Not available at the Government Printing Office.)
1937	T. S. 962	North American Regional Broadcasting Agreement between the United States of America, Cuba, Dominican Republic, Haiti, and Mexico. Signed at Habana, Dec. 13, 1937. NOTE: See E. A. S. 227 and TIAS 1553 which supplement this agreement. (Not available at the Government Printing Office.)
1937	T. S. 938	Inter-American Radio Communications Convention between the United States of America and other Powers. Signed at Habana, Dec. 13, 1937. (First Inter-American Conference.)
1938	E. A. S. 142	Radio Communications between Alaska and British Columbia. Agreement between the United States of America and Canada effected by exchange of notes June, July, August, September, October, November, December 1938.
1938	T. S. 949	Regional Radio Convention between the United States of America (in behalf of the Canal Zone) and Other Powers. Signed at Guatemala City, Dec. 8, 1938. (Not available at the Government Printing Office.)
1938	E. A. S. 136	Radio Broadcasting Arrangement between the United States of America and Canada. Effected by the exchange of notes signed Oct. 28 and Dec. 10, 1938. (Not available at the Government Printing Office.)
1939	E. A. S. 143	Use of Radio for Civil Aeronautical Services. Arrangement between the United States of America and Canada. Effective Feb. 20, 1939. (Not available at the Government Printing Office.)
1940	E. A. S. 196	Agreement between United States of America and Mexico with regard to broadcasting effected by an exchange of notes signed Aug. 24 and 28, 1940. Effective Mar. 29, 1941. (Not available at the Government Printing Office.)
1941	E. A. S. 227	Supplementary North American Regional Broadcasting Agreement signed at Washington, Jan. 30, 1941. (See T. S 962 and TIAS 1553.)
1944	E. A. S. 400	Agreement with Canada Regarding Construction and Operation of Radio Broadcasting Stations in North Western Canada, effected by exchange of notes signed at Ottawa, Nov. 5 and 25, 1943 and Jan. 17, 1944. This Agreement is to "cease with termination of the war." (Not available at the Government Printing Office.)
1946	TIAS 1553	North American Regional Broadcasting Interim Agreement between the United States of America and Other Governments (Modus Vivendi). Signed at Washington, Feb. 25, 1946. NOTE: See T. S. 962 and E. A. S. 227. Amended by TIAS 1802.
1946	TIAS 1527	Agreement between the United States of America and Union of Soviet Socialist Republics on Organization of Commercial Radio Teletype Communication Channels. Signed at Moscow, May 24, 1946.
1947	TIAS 1726	Agreement between United States of America and Canada providing for frequency modulation broadcasting in channels in the r. f. band 88–108 Mc. Effected by exchange of notes signed at Washington, Jan. 8 and Oct. 15, 1947. (Not available at the Government Printing Office.)
1947	TIAS 1670	Interim Arrangement between the United States of America and Canada with respect to Mobile Radio Transmitting Stations. Effected by Exchange of Notes, signed at Washington June 25 and Aug. 20, 1947.
1947	TIAS 1901	International Telecommunication Convention, Final Protocol and Radio Regulations. Signed at Atlantic City, N. J., Oct. 2, 1947, superseding the International Telecommunication Convention, Madrid, 1932. Radio Regulations effective Jan. 1, 1949, except for Regulations enumerated in Article 47. However, the effective date provisions of Article 47 have been superseded by the provisions of the Agreement signed at the Extraordinary Administrative Radio Conference Geneva, 1951 (see below). (This printing does not contain the Additional Radio Regulations, since the United States is not a party thereto. Copies of the final acts of the Atlantic City conferences which include the Additional Radio Regulations are available only from the International Telecommunication Union, Geneva, Switzerland.)

Date	Series [1]	Subject
1947	TIAS 1652	Telecommunication Standardization of Distance Measuring Equipment Agreement between the United States of America and the United Kingdom of Great Britain and Northern Ireland. Signed at Washington Oct. 13, 1947.
1947	TIAS 1676	Agreement between the United States of America and the United Nations relative to headquarters of the U. N. Signed at Lake Success June 26, 1947; brought into force Nov. 21, 1947, by an exchange of notes between the United States Representative to the United Nations and the Secretary-General of the U. N. (The provisions of this agreement were also made Public Law 357 of the 80th Cong. approved Aug. 4, 1947.)
1948	TIAS 1802	Radio Broadcasting. Engineering Standards Applicable to the Allocation of Standard Broadcasting Stations (540–1600 kc.). Arrangement between the United States of America and Canada. Effective Apr. 1, 1948. (Not available at the Government Printing Office.)
1949		Telecommunications Agreement between the United States of America and certain British Commonwealth Governments. Signed at London, August 12, 1949. Effective February 24, 1950. (Not available as of July 21, 1950, but to be published shortly by Government Printing Office).
1949		Inter-American Radio Agreement between the United States and Canada and other American Republics.[2] (Fourth Inter-American Radio Conference). Signed at Washington, July 9, 1949. Entered into force April 13, 1952, subject to provisions of Article 13. (Not available from Government Printing Office. Available from International Telecommunication Union, Geneva, Switzerland.)
1949		Telegraph Regulations (Paris Revision, 1949) annexed to the International Telecommunication Convention (Atlantic City, 1947) and Final Protocol to the Telegraph Regulations. Signed at Paris, August 5, 1949. Effective July 1, 1950. Instrument of ratification of the United States deposited with the International Telecommunication Union September 26, 1950.
1950	TIAS 2223	Radio communications between amateur stations on behalf of third parties. Arrangement between U. S. A. and Ecuador. Effective March 17, 1950. (Not available as of July 21, 1950, but to be published shortly by Government Printing Office.)
1951		Radio communications between amateur stations on behalf of third parties. Agreement between U. S. A. and Liberia effective January 11, 1951.
1951	TIAS 2366	Agreement between the United States of America and Mexico which assigns television frequency channels to cities within 250 miles of the United States-Mexican border. Effected by exchange of notes dated Aug. 10, 1951, and Sept. 26, 1951.
1951		Agreement signed at the Extraordinary Administrative Radio Conference to bring into force the Table of Frequency Allocations and other provisions of the Radio Regulations (Atlantic City, 1947) not yet in force. Signed at Geneva, Dec. 3, 1951. Entered into force Mar. 1, 1952. (Not available at Government Printing Office. Available from International Telecommunication Union, Geneva, Switzerland.)
1952		Radio communications between amateur stations on behalf of third parties. Agreement between U. S. A. and Cuba effective Apr. 14, 1952. (Not yet available but to be published by Government Printing Office as a TIAS document.)
1952		Treaty with Canada effective May 15, 1952 relating to mutual recognition by the United States and Canada of certain radio station and operator licenses issued by either country. Not available from the Government Printing Office.
1952		Agreement between the United States of America and Canada which assigns television frequency channels to cities within 250 miles of the United States-Canadian border. Effected by exchange of notes dated April 23, 1952 and June 23, 1952. Entered into force June 23, 1952. (Not available at Government Printing Office.)

[1] In addition, certain Resolutions and Recommendations were adopted by a number of countries, member of the International Telecommunication Union Region 2 at Washington, July 9, 1949. (Not available Switzer-Government Printing Office. Available from International Telecommunication Union, Geneva, from land.)

In addition, the United States is bound by certain other treaties and agreements which are generally considered as superseded because certain of the contracting countries other than the United States did not become a party to subsequent treaties and agreements. The United States is, in such instances, bound to the original document with respect to our relations with those particular countries. These include the following:

Date	Series [1]	Subject
1912	T. S. 581	International Radiotelegraph Convention, Final Protocol and Service Regulations. Signed at London, July 5, 1912. (Not available at the Government Printing Office.)
1927	T. S. 767	International Radiotelegraph Convention and General Regulations. Signed at Washington Nov. 25, 1927.
1932	T. S. 867	International Telecommunications Convention; General Radio Regulations annexed to the International Telecommunications Convention, signed at Madrid Dec. 9, 1932. (Not available at the Government Printing Office.)
1937	E. A. S. 200	Inter-American Arrangement concerning Radiocommunications and Annex. Signed at Habana, Dec. 13, 1937. This arrangement was replaced by Inter-American Agreement concerning Radiocommunications, signed at Santiago, Jan. 26, 1940, E. A. S. 231. Countries which approved the 1937 arrangement but which have not yet approved the 1940 arrangement are Dominican Republic, Haiti, Mexico, Panama, and Peru. (Not available at the Government Printing Office.)
1938	T. S. 948	General Radio Regulations (Cairo Revision, 1938) and Final Radio Protocol (Cairo Revision, 1938) annexed to the International Telecommunication Convention of Madrid, 1932. Superseded by Radio Regulations annexed to the International Telecommunication Convention, Atlantic City, 1947.
1940	E. A. S. 231	Inter-American Radio Communications Agreement between the United States, Canada and other American Republics (Second Inter-American Radio Conference), signed at Santiago, Chile, Jan. 26, 1940.

[1] T. S.—Treaty Series. E. A. S.—Executive Agreement Series. TIAS.—Treaties on other International Act Series.

The following treaties, agreements, and arrangements have been signed by the United States and are included for informational purposes because of their importance or the imminence of their effective dates:

Date	Subject
1948	International Convention for the Safety of Life at Sea and annexed Regulations. Signed at London, June 10, 1948. Enters into force Nov. 19, 1952, subject to the provisions of Article 11 of the Convention.
1950	North American Regional Broadcasting Agreement between the United States of America, Canada, Cuba, Dominican Republic, United Kingdon of Great Britian and Northern Ireland for the Territories in the North American Region (Bahama Islands and Jamaica). Signed at Washington D. C., November 15, 1950. Agreement will enter into force subsequent to ratification of at least three of these four countries, in accordance with part III, paragraph 1, of the agreement: Canada, Cuba, Mexico and the United States of America, subject to ratification procedure in the United States. (Not available from Government Printing Office. Available through the International Telecommunication Union, Geneva, Switzerland.)
1952	Agreement between the United States of America and Canada for the purpose of promoting Safety on the Great Lakes by means of Radio. The Agreement applies to vessels of all countries as provided for in Article 3. Enters into force 2 years from the date of exchange of instruments of ratification. Ratified by the United States July 17, 1952. Instruments of ratification not yet exchanged. (Not available at the Government Printing Office.

There are in addition to the foregoing, certain treaties, agreements, or arrangements primarily concerned with matters other than the use of radio but which affect the work of the Federal Communications Commission insofar as they involve communications. Among the most important of these are the following:

Date	Series [1]	Subject
1944	TIAS 1591	International Civil Aviation Convention. Signed at Chicago, Dec. 7, 1944. Effective April 4, 1947.
1946		Special Radio Technical Meeting (COT), Montreal.[2]
1946 to present.		ICAO Regional Air Navigation Meetings, Communications Committee Final Reports.[2]
1946		ICAO Communication Division, Second Session, Montreal.[2]
1949		ICAO Communication Division, Third Session, Montreal.[2]
1951		ICAO Communication Division, Fourth Session, Montreal.[2]

[1] T. S.—Treaty Series. E. A. S.—Executive Agreement Series. TIAS.—Treaties and Other International Act Series.

[2] Not available from Government Printing Office. Available from Secretary General of ICAO, International Aviation Building, 1080 University Street, Montreal, Canada.

○

Federal Communications Commission

19th annual report
Fiscal year ended June 30, 1953

With introductory summary and notation of subsequent important developments

UNITED STATES GOVERNMENT PRINTING OFFICE · WASHINGTON · 1954

COMMISSIONERS

Members of the Federal Communications Commission as of June 30, 1953

ROSEL H. HYDE,[1] *Chairman*
Term expires June 30, 1959

PAUL A. WALKER[2]
Term expires June 30, 1953

EDWARD M. WEBSTER
Term expires June 30, 1956

GEORGE E. STERLING
Term expires June 30, 1957

FRIEDA B. HENNOCK
Term expires June 30, 1955

ROBERT T. BARTLEY
Term expires June 30, 1958

JOHN C. DOERFER[3]
Term expires June 30, 1954

[1] Designated Chairman April 18, 1953, by the President.
[2] Succeeded October 6, 1953, by Robert E. Lee.
[3] Succeeded Eugene H. Merrill, April 15, 1953.

LETTER OF TRANSMITTAL

FEDERAL COMMUNICATIONS COMMISSION

Washington 25, D. C.

To the Congress of the United States:

The nineteenth annual report of the Federal Communications Commission is submitted herewith.

It covers the fiscal year ending June 30, 1953, with introductory notations of developments up to the time of going to press.

This report contains additional annual report data specified in section 4 (k) of the Communications Act as amended July 16, 1952 (Public Law 554).

Because of its volume, the biographical data required for all employees of the Commission at the close of the fiscal year is being transmitted as a nonprinted supplement to this report.

Respectfully,

ROSEL H. HYDE, *Chairman.*

Table of Contents

Introductory Summary

HIGHLIGHTS OF THE FISCAL YEAR

Historically, the fiscal year 1953 marked the 25th anniversary of early television experiments, pioneer trans-ocean radiophoto transmission, inauguration of the first police municipal radio system, and the initial functioning of the Federal Radio Commission which preceded the Federal Communications Commission.

Currently, the 19th year of the Federal Communications Commission closed with nearly 1,100,00 radio authorizations on its books. Over 235,000 of these were for safety and communication purposes on land, sea, and air, almost 5,500 others were broadcast, and the remainder consisted of various types of radio operator authorizations. The radio station authorizations cover the use of about 600,000 transmitters, of which number more than 430,000 are mobile.

Commission regulation of interstate and international telephone and telegraph communication is emphasized by the fact that there are now more than 48 million telephones in the United States, telephone service is provided to 106 overseas points, and there is telegraph service to 87 countries and through them to almost every point on the globe.

National Defense

Under Presidential authority, many wire and radio communication services are being linked through Commission cooperation to the military and civilian defense program. Of major importance is the CONELRAD (Control of Electromagnetic Radiation) plan for minimizing the possibility of radio signals being used as navigational aids by hostile aircraft and missiles. Through the cooperation of broadcasters, the first application of this plan was made to broadcast stations, effective May 15, 1953. Various radio services authorized by the Commission are dedicated to defense, disaster, and other emergency purposes.

Common Carriers

The public's use of telephone services continued to grow with no signs of leveling off—with domestic and international telegraph operations running at about the same level as the previous year.

Telephone.—For the calendar year 1952, the Bell System, which operates about 82 percent of the more than 48 million telephones in this country, reported new highs of a daily average of 143 million local and 6 million toll calls. Bell System's revenues amounted to $4 billion, which produced net income of $406 million, both up 11 percent over 1951. The public's unsatisfied requirements for telephone service continue at about the same level despite the addition of 2 million phones and a record $1.3 billion construction by Bell companies in 1952.

The dynamic growth in telephone business has been expressed in new kinds of services and facilities as well as in size. More than 2 million telephone circuit miles are provided by microwave radio; 35,000 miles of broad band channels (microwave and coaxial cable) are available to carry television programs; and mobile radiotelephone service is offered in 193 cities and is increasing rapidly.

In May 1953 the Bell System filed tariffs changing rates for teletypewriter exchange service (TWX) and teletypewriter private line service, which were designed to increase TWX revenues by $8 million a year with no change in private line revenues. The Commission permitted these rates to go into effect July 1, 1953.

During the year the Commission also permitted increases in interstate exchange rates in 13 border exchanges in Iowa and several border exchanges in Texas which are served by Bell companies. These increases are estimated to amount to about $1 million a year. Effective in January 1953, the Commission authorized the American Telephone and Telegraph Company to release an employment stabilization reserve during calendar 1953 to bolster interstate earnings. In addition, the Commission prescribed depreciation rates for 7 Bell companies, reducing their annual depreciation charges by $5.4 million.

The Commission concluded proceedings involving petitions by motion picture interests which requested assignment of a band of frequencies for intercity transmission of theater television programs. The Commission, in a decision issued June 25, 1953, concluded that such service can be provided by existing or future common carriers on frequency bands already established for common carrier operations. The Commission also held that the questions of public convenience and necessity could only be resolved when an application is before it for consideration.

Telegraph.—Western Union, the domestic telegraph carrier, experienced setbacks in calendar 1952, mainly as a result of a prolonged strike by employees in April and May. The volume of landline business for 1952 dropped to 159.7 million messages from 189.6 million messages in 1951. Revenues and earnings likewise were affected, with domestic gross revenues decreasing to $184 million, and earnings from all operations amounting to only $1.1 million.

The Commission permitted Western Union to increase rates in the fall of 1952 and it was estimated this would add $13.2 million in annual revenue. This increase was justified to offset like increases in wages. Effective July 1, 1953, Western Union revised rates for interstate telegraph private line service in view of similar rate revisions by the Bell System. Western Union estimates that this will reduce its revenues by $357,000 annually.

Western Union's operations for the calendar year 1953 promise to be much improved with revenues and earnings at the highest level since 1947. The carrier is experiencing rapid growth in private line telegraph services.

In March 1953 the Commission ordered Western Union to cancel proposed tariff schedules which would have restricted the use of telegraph facilities for disseminating horse and dog racing news to certain classes of subscribers. The tariffs were intended to prohibit the use of such news by gambling interests. However, the Commission decided that the tariffs would not accomplish this purpose and that their provisions were arbitrary and discriminatory.

International.—International telephone and telegraph carriers have continued to increase their world-wide networks. Telegraph service is offered to 87 countries and through them to almost every point on the globe, while telephone service is offered to 106 countries and overseas points.

The volume of international telegraph in calendar 1952 declined slightly to 516 million paid words. Total operating revenues, on the other hand, increased slightly to $58 million, reflecting a growth in special services.

The Commission was represented at an international conference in London, where payments to United States carriers on inbound messages from the United Kingdom were increased, and in Holland, where international operating procedures were reviewed.

The international carriers and the Commission are meeting the United States objectives of world leadership in promoting more orderly global use of the radio spectrum. By continuing strenuous efforts to revise frequency assignments, the Commission has cancelled two-thirds of all "out-of-band" frequency assignments to international carriers, placing these operators "in-band."

Hearings were held on the requirements of the Communications Act that Western Union divest itself of its cable system, to determine what position the Commission should take in the matter. Further hearings are scheduled for fiscal 1954.

In September 1952, following an investigation, the Commission issued a decision increasing the charges for improving the rate structure with respect to telegraph service between this country and ships at sea.

Safety and Special Radio Services

The largest group of radio stations comprise what is known as the Safety and Special Radio Services. The more than 235,000 authorizations for these 45 classes of nonbroadcast services represent the use of nearly 152,000 land and fixed transmitters and 433,000 mobile transmitters.

Safety of life and property at sea, in the air and on the land is aided by many of these services. There are nearly 40,400 stations in the marine services, more than 39,000 in the aeronautical services, and over 13,600 land public safety stations such as police, fire, forestry-conservation, highway maintenance and special emergency. The marine services use nearly 39,000 transmitters; the aeronautical services, over 44,000, and the public safety services, nearly 142,000. Of the latter number, more than 97,000 are employed for police communication.

The land transportation services embrace nearly 10,000 stations and 116,000 transmitters. They are utilized by railroads, city transit systems, intercity buses, taxicabs, highway trucks, and automobile emergency services. Routing of taxicabs alone requires nearly 88,000 transmitters.

The growing utilization of radio by industry is reflected in 9 types of service for which there are nearly 17,400 authorizations for the use of 127,000 transmitters. These services concern power, petroleum, forest products, special industrial, low power industrial, relay press, motion picture, agriculture, and radiolocation-land. The power industry has nearly 62,000 transmitters; special industrial, over 30,300; and petroleum, 21,800.

Authorized amateur stations now approach 112,000. (See reference in "Radio Operators" to the number of amateur operators.)

Direct public benefits are received from increased efficiency in navigating ships and aircraft, police and fire protection, emergency calls for doctors, ambulances, tow trucks, etc., and in the operations of land transportation, industry, pipelines, power and other utilities.

Broadcast Services

Television.—In the first 12 months of processing applications for new TV stations following the lifting of the freeze, 398 new TV stations were authorized and about 600 applications (mostly competitive) were pending. Eighty-nine of the new grantees received authority to go on the air with interim equipment, to augment the 108 pre-freeze operating stations. Of the post-freeze TV grants, 256 were for operation in the new UHF (Ultra High Frequency) bands, and 142 were for VHF (Very High Frequency) operation.

Seventeen grants were made to noncommercial educational TV stations, one of which started operating. Municipalities in which channels have been reserved for noncommercial education use were increased to 245.

TV stations have been authorized in all states except Vermont (where the only two applicants were in competition), and grants have been made in Hawaii and Puerto Rico. TV authorizations at the year end totaled 500.

In mid-1953 the Commission received various petitions to adopt the National Television System Committee (NTSC) "compatible" color TV specifications to replace the present "noncompatible" standards.

AM.—The older commercial AM (amplitude modulation) broadcast service continued to expand. The 2,584 authorized stations at the close of the year was an increase of 164 over 1952. Most of the newcomers were low-power daytime stations.

FM.—The number of authorized and operating FM (frequency modulation) stations continued to decrease—to 601 and 551 respectively—which was a loss of 47 construction permits and 31 licenses during the year. However, noncommercial educational FM gained 12 stations, making a total of 116.

Miscellaneous.—In addition to the broadcast services mentioned previously, there were 259 auxiliary TV stations (an increase of 38); 1,305 remote pickup stations (a gain of 130); 47 studio-transmitter links, 1 developmental station, and a fluctuating number of international broadcast stations.

Thus, the nearly 5,500 authorizations in the broadcast services represent a net gain of nearly 700 over 1952.

Field Engineering and Monitoring

Field engineering and monitoring is conducted through 9 regional offices which supervise 33 offices and 18 monitoring stations in this country and its possessions.

During the year the monitoring network, in addition to obtaining technical data, investigated more than 1,700 domestic and foreign radio interference complaints, inquired into nearly 500 reports of possible illegal radio operation, and obtained over 80,000 direction finding bearings necessary to identify transmissions, of which number 2,200 concerned sea or air craft lost or otherwise in distress.

The number of interference complaints requiring field investigation increased to nearly 22,000, which was almost double the number for the previous year. Most of the broadcast interference complaints were due to increased TV operation and the high susceptibility of its reception to interference. Other complaints involved interference

from noncommunications equipment and devices. The progress made in organizing FCC-sponsored local citizens interference committees has been helpful to TV viewers combatting interference in nearly 300 communities. Particular parts of the Commission's rules restrict radiation apparatus.

Despite curtailment of some inspection functions due to economy, field engineers made nearly 17,000 inspections of broadcast and non-broadcast stations, including nearly 9,000 ship radio installations.

The field staff issued in excess of 176,000 commercial radio operator authorizations during the year, and conducted more than 44,600 amateur radio operator examinations.

In studying proposed antenna towers to avoid hazards to air navigation, a special survey group cleared nearly 7,400 structures and referred about 700 others for special review by cooperating aviation interests.

Research and Laboratory

These activities, essential to engineering standards and technical rules, covered a wide range of subjects. They include VHF and UHF wave propagation, directional antenna performance, field conductivity, sunspot cycle records, noncommunications apparatus capable of causing interference, and equipment standards and related matters.

Revised rules, adopted during the year, encourage two classes of experimental radio stations—research and developmental. Nearly 450 such stations are authorized to use about 1,800 transmitters, of which 1,500 are mobile.

In proposing to amend its rules governing restricted and incidental radiation devices to deal with mounting interference problems, the Commission continued its efforts to enlist the cooperation of manufacturers in helping suppress harmful radiation.

June 30, 1953, marked the end of the 6-year period for amortizing obsolete medical diathermy and industrial heating equipment, and April 30, 1953, terminated the 5-year period for miscellaneous electronic equipment to conform to the rules.

The Commission's program of approving equipment before it is manufactured and distributed for use has been an added interference preventative. During the year it issued 36 "type approvals" of FCC-tested items, and 31 "type acceptances" of those tested elsewhere but subject to its review.

Frequency Allocation

The chief activity of the Commission in the international field has been in carrying out domestically the provisions of the Geneva Agreement (1951) to which some 65 countries are parties. Many of the

Commission's actions during the year with respect to national frequency allocations were directly or closely related to this Government's commitments to treaties and other agreements for coordinated and efficient use of frequencies throughout the world.

The Commission assisted in the United States preparation for and participation in 17 international conferences and meetings in fiscal 1953, and in planning for 13 other sessions projected for the future.

In addition to notifying the International Communication Union of new and changed frequency assignments in the United States, the Commission reported nearly 1,700 cases of treaty infractions to appropriate foreign administrations.

Radio Operators

At the close of the year there were nearly 840,000 existing radio operator licenses and permits of varying grades. Of these, more than 730,000 were for commercial station operation and almost 109,000 for amateur station operation.

Commission

The following changes occurred in Commission membership during the year: Vice Chairman Rosel H. Hyde was, on April 18, 1953, named Chairman by President Eisenhower, succeeding Paul A. Walker whose term as Commissioner expired June 30 thereafter. Nominated by the President on March 20, 1953, and confirmed by the Senate on April 2, John C. Doerfer was sworn in as a Commissioner on April 15 of the same year. He succeeded Eugene H. Merrill who, since October 6, 1952, had held a recess appointment vice Robert F. Jones, who resigned the previous September 19. (President Eisenhower, on October 6, 1953, appointed Robert E. Lee to succeeed Mr. Walker, and Commissioner Lee was sworn in that same day.)

On June 30, 1953 the Commission personnel totaled 1,070, which is the lowest number in 13 years.

During fiscal 1953 the Commission operated on an appropriation of $6,408,460, which was less than that for any of the 4 preceding years.

A major administrative activity of the Commission during the year was initiating ways of streamlining administrative procedure and reducing paperwork. These efforts ranged from proposing certain remedial legislation to simplifying forms and curtailing other paper work wherever possible and special attention to speeding the hearing process.

One indication of the Commission's workload is the fact that more than 350,000 applications of all kinds were received during the year, not counting legal, tariff and other filings which also required its consideration.

SUBSEQUENT EVENTS

National Defense

Under Presidential authority, the Director of the Office of Defense Mobilization reestablished the Telecommunications Planning Committee (September 23) to advise the ODM in Government telecommunications matters. It is representative of the Departments of State, Treasury, Defense and Commerce, Central Intelligence Agency, United States Information Agency, and Bureau of the Budget. The office of Vice Chairman is to be filled by a Commissioner of the Federal Communications Commission.

The first nationwide CONELRAD (Control of Electromagnetic Radiation) test was held in the early morning of September 16. Its purpose was to check the air navigation aspect and technical operation of civil defense program facilities and coverage. More than 1,200 AM broadcast stations participated, switching programs from one transmitter to another to confuse simulated "enemy" aircraft. A score of Air Force planes took part, and some 100 commercial airliners made observations.

Common Carriers

Increased rates for interstate long distance telephone service became effective October 1 as provided for in Bell System tariffs filed with the Commission on August 28. It is estimated that the new rates will produce about $65 million annually, exclusive of Federal excise taxes, an 8 percent increase. The Bell System will benefit to the extent of about $30 million annually; the balance will go principally for increased Federal income taxes although independent telephone companies connecting with the Bell System for long distance service will receive almost $2 million and there will also be increased payments to state authorities in the form of income and gross receipts taxes.

The 50th million telephone in the United States was installed on November 18, at the White House.

Safety and Special Radio Services

As of October 31, the number of authorizations in these nonbroadcast services was approaching 245,000. By major categories there were about 43,300 marine; 43,000 aeronautical; 19,300 industrial; 14,300 public safety (police, fire, etc.); 10,300 land transportation; 114,000 amateur, and the rest miscellaneous. These authorizations cover many times that number of transmitters—mobile and fixed.

Broadcast

Television.—On August 17 the Commission initiated rulemaking looking toward the adoption of new rules for color TV transmissions on the basis of "compatible" signal specifications proposed by the National Television System Committee. A formal demonstration of the NTSC "simultaneous" system was given in New York City on October 15, and pilot model color TV receivers were being tested in the Commission's laboratory.

Rules were proposed (July 2) which would require local advertising of initial applications for new TV stations and provide a "cut-off" period of 30 days from such publication after which no competing applications would be received for the TV applications so advertised.

The temporary processing procedure for applications for new TV stations was revised (July 17) to establish two groups: (a) those cities having no TV stations in operation, and (b) those cities with 1 or more operating stations. This procedure was further revised (August 24 and October 23) to reflect changed priorities due to grants made in the interval. Consideration is in order of population, with alternate handling of the two groups.

By rule amendment (September 30) hearings will not be scheduled for competitive TV applications in cities which already have 4 or more operating TV stations until places with fewer TV stations are first considered.

The license term for TV broadcast stations was extended from the present 1-year period to the maximum statutory period of 3 years, which is the license period for AM and FM broadcast stations (November 5).

Construction permit was granted (September 18) for interim operation for a new TV station in Shreveport, Louisiana, by a corporation formed for that purpose by 3 competing applicants pending the outcome of a hearing.

The first TV station grant in Alaska was made to a Fairbanks applicant (July 1).

FM.—The Commission (September 23) revised the license procedure for noncommercial FM broadcast stations to conform with the geographical pattern and 3-year period for commercial FM and AM broadcast stations.

Provision was made for FM intercity relay stations on the band 940–952 megacycles (October 28).

AM.—Guam received its first broadcast authorization (August 26) for an AM station.

Applications for AM broadcast stations were ordered to specify a definite site (October 28).

General.—The multiple ownership rules were amended (November 25) to preclude any party, or any of its stockholders, officers or directors, having an interest in more than 7 AM, 7 FM, or 5 TV commercial broadcast stations.

A ban was ordered on the filing of applications in conflict with the rules, even when accomplished by petitions for rulemaking (November 5).

As of October 31, outstanding TV, AM, and FM broadcast authorizations (not including auxiliary and experimental) totaled nearly 3,900. Of this number, nearly 3,500 were on the air. A breakdown follows:

Service	Authorized	Licensed	On air
TV commercial	545	101	315
TV educational	22	0	4
AM commercial	2,603	2,479	2,497
FM commercial	586	536	566
FM educational	118	110	110
Total	3,874	3,226	3,492

Miscellaneous

The Bureau of the Budget directed Federal agencies to establish fees for licensing, registration, and related activities of Federal agencies (November 5). The Commission started drafting proposed rules to that effect. It has not heretofore exacted any fees or other charges in connection with its functions.

The Commission withdrew its proposal of May 13, 1953 (docket 10500) looking to amending parts 10, 11, and 16 of its rules to establish new provisions regarding operational fixed stations functioning above 890 megacycles in the Public Safety, Industrial, and Land Transportation services (October 28).

The term of Restricted Radiotelephone Operator Permits was extended indefinitely, as of November 15.

The Chief, Field Engineering and Monitoring Bureau, was delegated authority (September 30) to issue orders to show cause why cease and desist orders should not be issued, and to issue cease and desist orders in certain cases, in connection with interference from operation of industrial, scientific and medical equipment subject to Part 18 of the Commission's rules.

Due to economy, the Commission closed its ship radio inspection office at Galveston, as of November 1.

General

AUTHORITY AND FUNCTIONS

The Federal Communications Commission operates under authority of the Communications Act of 1934, which created it, and subsequent amendments to that act.

It is basically charged with regulating interstate and foreign communication by radio, wire, and submarine cable. This includes:

Supervising interstate and international rates and services of telephone and telegraph companies subject to its jurisdiction;

Allocating frequency bands for different radio services;

Assigning particular frequencies to individual radio stations;

Authorizing and licensing radio transmitters;

Licensing operators of radio transmitters;

Encouraging more effective and widespread utilization of radio;

Protecting life and property through the use of wire and radio communication;

Participating in formulating and administering domestic wire and radio provisions of treaties and other international agreements to which the United States is a party; and

Helping coordinate the many forms of electrical communication with the national defense program.

Commission authority extends to the territories and possessions of the United States, but not to the Canal Zone. Communication facilities operated by the Federal Government are not subject to its jurisdiction.

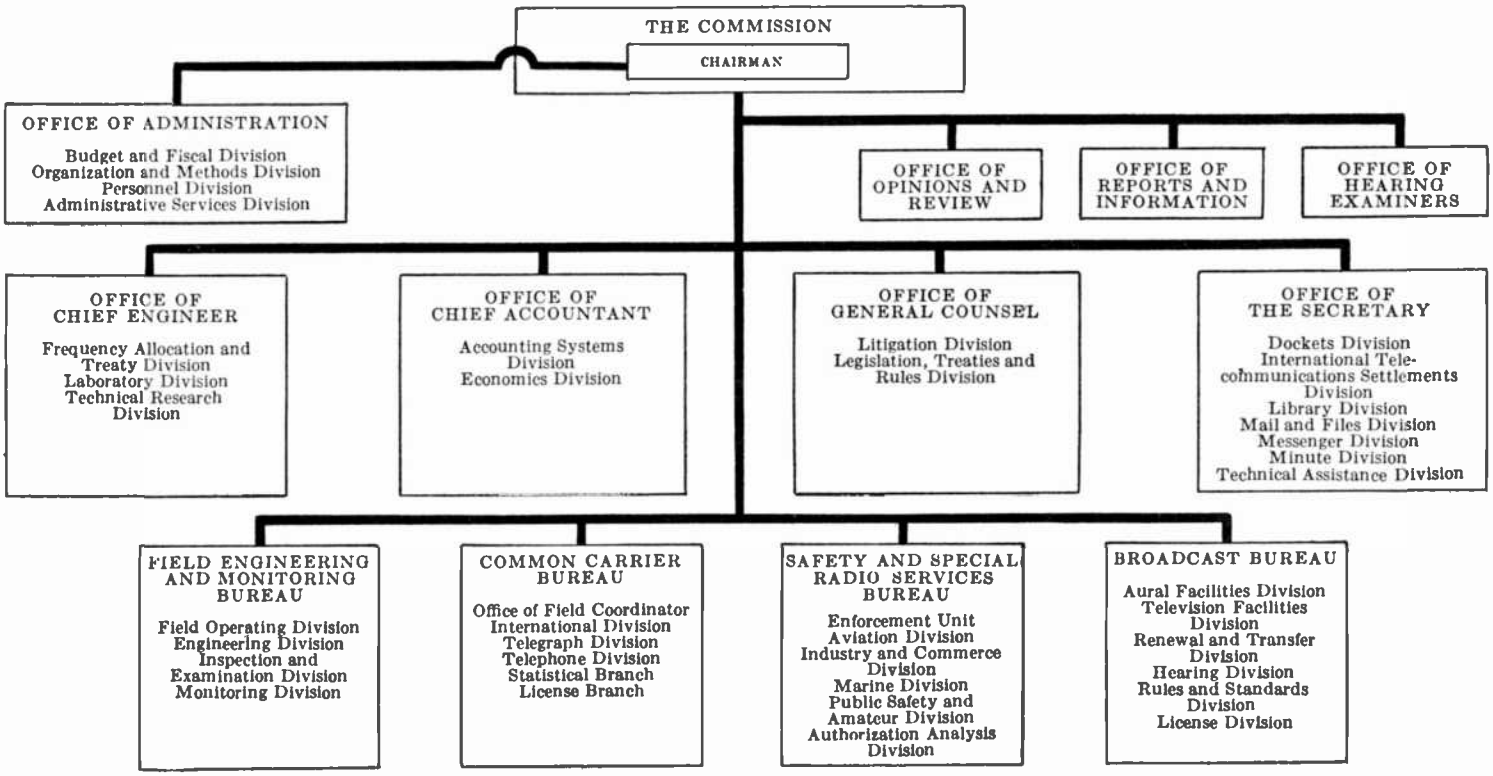
COMMISSION

The Commission is composed of seven Commissioners appointed by the President and confirmed by the Senate. One of these members is designated Chairman by the President without Senate confirmation. The normal term of a Commissioner is 7 years. Not more than four Commissioners may be members of the same political party.

The Commission functions as a unit and makes all policy determination. From time to time, committees of Commissioners or individual Commissioners are designated by the Commission to make special studies and supervise particular undertakings. The Chairman, under

FEDERAL COMMUNICATIONS COMMISSION

Organization Chart as of June 30, 1953



Commission authorization, exercises certain administrative responsibilities.

The following changes occurred in Commission membership during the year:

Commissioner Rosel H. Hyde, then Vice Chairman, was on April 18, 1953, designated by President Eisenhower to be Commission Chairman. In that capacity he succeeded Paul A. Walker, who had been Chairman since February 28, 1952. The current term of Commissioner Walker, a member of the Commission since its creation, expired on June 30, 1953. (President Eisenhower, on October 6, 1953, appointed Robert E. Lee to succeed Mr. Walker. Commissioner Lee took office that same day.)

Commissioner Robert F. Jones resigned on September 19, 1952, and, on October 6 Eugene H. Merrill received a recess appointment from then President Truman to replace Mr. Jones. On March 20, 1953, John C. Doerfer was nominated by President Eisenhower to fill out the remainder of the Jones term, which expires June 30, 1954. Confirmed by the Senate on April 2, Commissioner Doerfer succeeded Mr. Merrill on April 15.

STAFF ORGANIZATION

The staff of the Commission is organized on functional rather than professional lines. This was effected by a reorganization initiated by the Commission in 1949 and completed in 1952.

As a result, the present staff organization and general activities are:

Office of the General Counsel, whose functions as chief legal adviser to the Commission cover matters involving litigation, legislation, rulemaking, and general administrative activities presenting legal problems.

Office of the Chief Engineer, whose duties deal with the engineering phases of frequency allocations, radio rules and standards, technical research and experimentation, and problems of interference;

Office of the Chief Accountant, whose work includes matters of accounting regulation, and economic and statistical research;

Office of the Secretary, which has charge of official records, processing of correspondence and official documents, and certain functions relating to the internal management of the Commission;

Office of Administration, under the direction of the Chairman, reviews the programs and procedures of the Commission and handles its budget and personnel work;

Office of Hearing Examiners, which conducts hearings and prepares and issues initial decisions;

Office of Opinions and Review, which, under Commission direction, advises and assists the Commission in the preparation of decisions;

Office of Reports and Information, which is the central source of public releases and information;

Common Carrier Bureau, which supervises telephone and telegraph matters;

Safety and Special Radio Services Bureau, which supervises non-broadcast and non-common carrier radio services [except for common carrier aspects of marine services].

Broadcast Bureau, which supervises the broadcast services;

Field Engineering and Monitoring Bureau, which is responsible for field engineering, including radio station inspections, monitoring, operator examinations, technical studies, and certain enforcement activities.

An organization chart of the Commission appears as a separate page of this chapter.

PERSONNEL

As of June, 1953 the Commission employed 1,070 persons. This is 68 fewer than the previous year and the lowest number since 1940. About one-third of all Commission employees are in the field—mostly engaged in engineering work. Personnel was distributed as follows:

Office or Bureau	Washington	Field	Total
Commissioners	33	0	33
Office of Opinions and Review	13	0	13
Office of Hearing Examiners	24	0	24
Office of Reports and Information	4	0	4
Office of Administration	83	0	83
Office of Secretary	57	0	57
Office of General Counsel	14	0	14
Office of Chief Accountant	18	0	18
Office of Chief Engineer	85	22	107
Common Carrier Bureau	70	30	100
Safety and Special Services Bureau	101	0	101
Broadcast Bureau	144	0	144
Field Engineering and Monitoring Bureau	56	316	372
Total	702	368	1,070

Biographical information with respect to Commission personnel, required to be submitted to Congress by Section 4 (k) (3) of the Communications Act amendments of 1952, is being submitted to Congress as a mimeographed supplement to this printed report.

APPROPRIATIONS AND EXPENDITURES

For the fiscal year 1953, the Commission received an appropriation of $6,408,460, which was less than that for any one of the four preceding years.

A breakdown of its income and expenditures for fiscal 1953 is shown below:

Appropriation		*Obligations*	
Regular Appropriation (salaries and expenses)	$6,408,460	Personal services	$5,872,993
		Travel	54,764
		Transportaton of things	20,744
Total funds available	6,408,460	Communications services	151,760
		Rents and utilities	50,523
		Printing and reproduction	18,293
		Other contractual services	59,494
		Supplies and materials	105,655
		Equipment	66,979
		Land and structures	2,550
		Total obligations	6,403,755
		Savings, unobligated balance	4,705
		Total	6,408,460

The source of these funds and the authority for expenditures thereunder was Public Law 455, 82d Congress.

PARING PROCEDURE AND PAPER

A major activity of the Commission during the year was initiating ways of streamlining administrative procedure and reducing paperwork to simplify and speed the administrative process for the benefit of both the Commission and the services which it regulates.

These efforts range from legislation proposed by the Commission to modify detailed procedural requirements of the Communications Act to amending its own rules to curtail paperwork wherever possible. The latter includes simplification of the authorization process from the viewpoint of the applicant as well as the Commission, elimination of reports and form data no longer necessary from permittees and licensees, reduction in the volume of filings with and formal issue of the Commission, and means of speeding up the hearing procedure to facilitate the extension of communication services.

While some of these steps were prompted by the broadcast backlog—that of competitive television applications in particular—the net result affects regulation by the Commission as a whole. Specific illustrations are given in sections of this report dealing with individual services, hearings, and legislation.

HEARINGS

The time consumed, the expense involved, and the size of the written record compiled in the hearing procedure has been a major concern to

the Commission. It reached such proportions in early competitive hearings following the lifting of the television freeze that, with the cooperation of the Federal Communications Bar Association, steps were taken to remedy the situation.

The Commission has long provided for pre-hearing conferences in which attorneys for rival applicants could get together and work out stipulations to reduce the subsequent formal hearing to bare essentials. On February 6, 1953, this pre-hearing conference was made a part of the actual hearing. In other words, since that date all hearings have started off with an initial conference. This has worked to the advantage of the applicants as well as the Commission. For example, the first such TV hearing consumed only 4 days as compared with from 40 to 60 days for previous post-freeze cases.

Other Government agencies as well as lawyers practicing before them have evinced particular interest in the pre-hearing idea. In consequence, the Commission and its Bar Association demonstrated a mock pre-hearing conference before a large group on June 29, 1953. It was scheduled to be repeated for the benefit of the American Bar Association at the latter's convention in Boston in August.

The Commission and bar are likewise studying supplemental means of shortening hearings by reducing both the written and oral record. Of course, any such streamlining will have to be consistent with the requirements of law, and its successful operation will depend largely upon the cooperation of lawyers practicing before the Commission.

General Government interest in simplifying Federal hearings is reflected in the President's Conference on Pre-Hearing Procedure. FCC Commissioner John C. Doerfer, who is a delegate to that conference, is Chairman of its Pre-Trial Committee which is interested in adapting to other Government agencies the pre-trial conference idea.

The major portion of the Commission's hearing calendar continued to be occupied by broadcast matters, with AM cases predominating. Docket statistics for the year were:

Class	Pending June 30, 1952	Designated for hearing	Disposed of without hearing	Disposed of following hearing	Pending June 30, 1953
Broadcast:					
AM	210	54	58	53	153
FM	7	5	9	0	3
TV	8	186	53	23	118
Other	2	3	1	0	4
Safety and special	25	17	20	3	19
Common carrier	54	57	29	42	40
Joint and general	23	51	42	2	30
Total	329	373	212	123	367

TAX CERTIFICATES

During the past year the Commission has been called upon to consider a number of requests for tax certificates pursuant to the provisions of section 112 (m) of the Internal Revenue Code which provides that sale or exchange of property, including corporate stock, may be treated as an involuntary conversion of such property if it is certified by the Federal Communications Commission "to be necessary or appropriate to effectuate the policies of the Commission with respect to the ownership and control of radio broadcasting stations". These requests have, in recent years, usually related to situations in which a licensee who held the maximum number of station interests permitted by the Commission's multiple ownership rules wished to acquire a new station and was required, in order to do so, to dispose of one of its existing stations.

The Commission has given careful consideration to the requests for tax certificates in these cases. For the legislative history of section 112 (m) of the Internal Revenue Code appears to show that the problem with which Congress was primarily concerned at the time it adopted section 112 (m) was that relating to the involuntary sale or exchange of property by broadcast licensees resulting from the adoption in 1943 of Commission rules requiring certain licensees to dispose of existing facilities. And it is not clear that Congress, in adopting the section, contemplated that sales or exchanges made as part of a voluntary transaction initiated by the licensee itself and rendered necessary as a result of the voluntary transaction in order to keep licensees within the Commission's multiple ownership rules were to be comprehended within the provisions of the section.

After careful study of the matter, however, the Commission has determined that the language of section 112 (m) is sufficiently broad to include this later category of cases and the Commission has, accordingly, issued certificates in appropriate cases coming within this category. The entire problem of whether further clarification of congressional interest in this matter should be sought is, however, being presented to the Congress in connection with its present overall study of the Internal Revenue Code.

LEGISLATION

Public Law 554, 82d Congress, known as the Communications Act Amendments, 1952, was approved July 16, 1952. These amendments, introduced in Congress by Senator McFarland as S. 658, constituted the most extensive and significant revision of the Communications Act since its original enactment in 1934. Important changes in the organi-

zational structure of the Commission, in licensing procedures and in the provision for court review of Commission decisions and orders were effected.

The new law also added a new section to the United States Criminal Code (18 U. S. C. sec. 1343) making fraud by wire, radio or television a criminal offense. The enactment of the new fraud section was originally recommended to Congress as part of the Commission's legislative program.

Also included in the Communications Act Amendments was a provision, previously recommended by the Commission, amending section 4 (g) to authorize the Commission to construct certain structures relating to its monitoring and research activities.

The Commission submitted to Congress, with the approval of the Bureau of the Budget, several important proposals to amend the Communications Act. All were introduced in the 83d Congress and they included:

An amendment to section 319, which would simplify the procedure for obtaining licenses for certain types of radio stations by eliminating the existing requirement of first securing a construction permit from the Commission (H. R. 4557);

An amendment to section 309 (c), to extend the time within which the Commission is required to act on "protests" filed against the grant without hearing of construction permits for radio stations, from 15 days to 30 days (H. R. 4558);

An amendment to section 501, to change the criminal sanction contained in that section so that initial violations of the act shall constitute a misdemeanor rather than a felony (H. R. 4559);

An amendment to provide for monetary forfeitures in the case of violations of the Commission's rules and regulations relating to radio stations other than broadcast stations (S. 1979 and H. R. 5673);

Amendments to Title III, Part II, dealing with radio equipment and radio operator requirements on board certain ships, to bring those provisions more closely in line with the new Safety of Life at Sea Convention (London, 1948) which was ratified by the Senate on April 30, 1949, and which came into force on November 19, 1952 (S. 2543); and

Legislation to repeal certain provisions of the Ship Act of 1910 which remain in effect but which are no longer necessary (S. 1947).

H. R. 4557, H. R. 4558 and H. R. 4559, which respectively included the Commission's proposals to amend sections 319, 309 (c) and 501 of the Communications Act, were passed by the House of Representatives on May 19, 1953.

Various other important legislative proposals were considered by Congress which directly or indirectly affected the Commission. The

House Committee on Interstate and Foreign Commerce held hearings on H. R. 3189 and H. R. 3311, which would amend sections 2 and 221 of the Communications Act concerning the respective jurisdiction of the Commission and the various State and local regulatory bodies over communications common carriers. The Commission presented testimony with respect to four bills (H. R. 408, H. R. 477, H. R. 3522 and H. R. 5149) which propose to permit specified agents of the Federal Government to intercept communications in connection with certain cases affecting the national defense.

During the fiscal year the Commission submitted comments to Congress and the Bureau of the Budget concerning more than 35 legislative proposals which had been referred to the Commission for comment.

The Commission also participated in several hearings before congressional committees in addition to those specifically referred to above.

LITIGATION

Section 401 of the Communications Act confers upon the district courts of the United States jurisdiction to enforce the Communications Act and the orders of the Commission. Judicial review of Commission actions is provided for in section 402 of the act. Section 402 (a) gives jurisdiction to the courts of appeal (under Public Law 901, 81st Cong., effective Jan. 28, 1951) over suits to enforce, enjoin, set aside, annul, or suspend any order of the Commission with the exception of orders granting or refusing applications for licenses. Section 402 (b) provides for direct appeal from such other orders of the Commission to the United States Court of Appeals for the District of Columbia Circuit. The great majority of cases involving review of Commission action is instituted in the latter court.

During the fiscal year, there were 36 cases in which the Commission was a party in the Federal courts. Twenty-four of these were instituted during that period—4 in the Supreme Court, 15 in the Court of Appeals for the District of Columbia Circuit, 2 in the Court of Appeals for the Ninth Circuit, and 3 in the District Court for the District of Columbia. The other 12 cases were pending at the beginning of the year.

In addition to cases in which the Commission was a party there were eight cases pending in the Federal courts which involved criminal violations of the Communications Act which were instituted at the request of the Commission. Of these cases, 3 resulted in the conviction and sentencing of the defendant and 1 resulted in acquittal. The rest were pending at the close of the year.

The Supreme Court in one case reversed the decision of the Court of Appeals for the District of Columbia Circuit, which had set aside a Commission order, and remanded the case to the Commission for further consideration, and in another case denied *certiorari* on petition for review of a decision of the same court of appeals which had affirmed a Commission decision.

In the courts of appeals, the Commission was reversed in 1 case, 2 cases were remanded to the Commission on the Commission's motion, 1 case was dismissed on jurisdictional grounds, and 7 cases were dismissed by agreement of the parties. In the District Court for the District of Columbia, 1 injunction was issued to enforce an order of the Commission and 3 cases were dismissed on jurisdictional grounds. In the District Court for the Southern District of New York an order of the Commission was sustained in part and reversed in part in 3 companion cases.

As of June 30, 1953, 3 cases were pending in the Supreme Court, 9 cases in the Court of Appeals for the District of Columbia Circuit, and 2 cases in the United States Court of Appeals, Ninth Circuit. (After the close of the fiscal year but prior to the completion of this report the Court of Appeals for the District of Columbia Circuit affirmed the order of the Commission in 1 case, dismissed 1 on jurisdictional grounds, and 1 because it had become moot, and 2 cases were dismissed by agreement of the parties. During the same period 5 new cases were filed in that court, and 1 in the District Court for the Northern District of Illinois.)

A tabulation of the status of litigation for the fiscal year follows:

Court	Supreme Court	Court of Appeals for the District of Columbia Circuit, under sec. 402 (b)	Courts of Appeals including District of Columbia Circuit, under sec. 402 (a)	District courts	Total
Total	[1] 5	[1] 8	[1] 15	8	36
Decisions affirming Commission or refusing review of favorable decision	1			1	2
Decisions reversing case	[2] 1	1		[3] 3	5
Dismissed on jurisdictional grounds			1	3	4
Dismissed or remanded by agreement of parties		3	6		9
Cases pending June 30, 1953	3	4	8		15

[1] Includes 1 case on appeal from a judgment of the District Court for the District of Columbia.
[2] Reverses Court of Appeals decision adverse to Commission and remands to Commission for further action.
[3] Companion cases, sustained in part, reversed in part.

The following cases decided during the fiscal year were of particular interest:

In *Federal Communications Commission* v. *RCA Communications, Inc.*, (346 U. S. 86) the Supreme Court considered an order of the

Commission authorizing Mackay Radio and Telegraph Co., to render direct radiotelegraph service between the United States and Portugal and the United States and The Netherlands. Direct radiotelegraph service between these points was already being rendered by RCA Communications, Inc., and cable service by Western Union and Commercial Cable Co., an affiliate of Mackay. The Commission found that the addition of a competitive radio circuit to each of these points would not result in any detriment to the public, but also that no specific ascertainable benefits, such as lower rates or more efficient service, would flow from the grant of Mackay's applications. It decided as a matter of policy, relying primarily on the national policy in favor of competition manifested in the antitrust laws, that in situations such as these where competition is reasonably feasible, duplicate radio circuits should be autthorized. In addition, it determined that the grants to Mackay would not result in violation of Section 314 of the Communications Act, which prohibits common ownership, control or operation of radio and cable facilities in international communication where its purpose or effect may be substantially to lessen competition, restrain commerce or unlawfully to create monopoly. The Court of Appeals reversed the Commission's decision. On *certiorari*, the Supreme Court reversed the Court of Appeals. It affirmed the decision of the Commission insofar as it concerned the meaning and application of Section 314. It held that the absence of competition between Mackay and Commercial did not in itself constitute a substantial lessening of competition between cable and radio, but rather that the Commission was entitled to consider the entire competitive scene. The Supreme Court remanded the case to the Commission because of the failure of the Commission to make a determination on the basis of its own expertise regarding the desirability of competition between radiotelegraph carriers, and its reliance instead upon the national policy in favor of competition.

In *American Broadcasting Company, Inc.* v. *Federal Communications Commission, National Broadcasting Company, Inc.* v. *Federal Communications Commission* and *Columbia Broadcasting System, Inc.* v. *Federal Communications Commission* (110 F. Supp. 374), a three-judge district court ruled upon the validity of the Commission's rules pertaining to the broadcast of lottery information. These rules are interpretative of Title 18 U. S. Code, section 1304, which prohibits the broadcast of lotteries. The rules provide, in general, that a license will not be issued to a broadcast station which makes a practice of broadcasting lotteries, and they further delineate the element of consideration in a lottery. In these three companion actions brought to enjoin the enforcement of the rules, the court held that the adoption of the rules was within the Commission's statutory authority. It

further held that the Commission had properly interpreted 18 U. S. C. 1304 in finding it applicable to schemes in which a prize is awarded to a person whose selection is dependent in whole or in part upon chance and where consideration exists in that such winner is required to furnish something of value or to have in his possession a product sold or made by the sponsor. By a divided vote the court ruled invalid that portion of the rules which defines lottery consideration in terms of a requirement that the radio audience listen to a program as a condition of winning a prize or where such listening constitutes a substantial aid to wining a prize. These cases have been appealed by the Commission to the Supreme Court of the United States.

LICENSES AND OTHER AUTHORIZATIONS

At the close of the fiscal year the number of active authorizations on the books of the Commission totaled nearly 1,100,000.

As of June 30, 1953, there were nearly 235,000 nonbroadcast authorizations, representing the use of about 600,000 transmitters, of which number more than 430,000 are mobile. Broadcast authorizations totaled nearly 5,500, including more than 1,600 auxiliary transmitters.

Various classes of radio operator authorizations approached 840,000, including 730,100 commercial and 109,000 amateur operator licenses and permits.

APPLICATIONS AND OTHER FILINGS

The Commission received some 352,000 applications of all kinds during the year. Of this total, more than 193,000 concerned commercial radio operators, nearly 146,000 involved the nonbroadcast services, nearly 7,000 had to do with broadcast, more than 900 were experimental or miscellaneous, and about 4,800 were common carrier.

These figures do not include legal filings, periodic reports, and tariff schedules. In the fiscal period common carriers and holding companies filed 17,500 tariffs and 1,900 annual and monthly reports.

CORRESPONDENCE, RELEASES, AND PUBLICATIONS

Approximately 1,125,000 pieces of correspondence in the form of letters, telegrams, etc., were received or dispatched through the Commission's Mail and Files Division during the year. Of this number, some 750,000 were incoming and 375,000 were outgoing.

Regulatory and administrative procedure required the issuance, during the same period, of mimeographed public notices, orders, deci-

sions, opinions and rule-making which necessitated more than 45,700 stencils, 8,560,000 sheets of paper and about 12,865,000 impressions.

The Commission does not issue any press releases, maintains no public mailing lists, and makes no distribution of its printed publications. The latter are processed by the Government Printing Office and are sold by the Superintendent of Documents. A list appears in the appendix.

POINT 4 PROGRAM ASSISTANCE

Under the Government's point 4 program for foreign economic assistance, 13 representatives of foreign nations completed programs of study in the field of telecommunication with the Commission. Six of these officials were from India, 6 from Pakistan, and 1 from Honduras.

National Defense

GENERAL

The importance of communication by wire and radio in time of national emergency is emphasized in the Communications Act. Among the stated purposes of that statute is centralized regulation by the Federal Communications Commission in the interests of the national defense as well as to promote safety of life and property in general. The act also gives the President special emergency powers over electrical communication and radiation to further safeguard the Nation's defense and security during war or threat of war.

"CONELRAD" PROGRAM

Electronic developments since World War II have made it necessary to prepare for the control of radiating devices in addition to regular communication facilities in any emergency. This is necessary because certain equipment, though not used for communication purposes, can send out emissions which could be used as a "beam" to guide hostile aircraft, submarines, and radio-controlled missiles.

It was at the request of the Department of Defense that the Commission several years ago initiated a program for regulating electromagnetic radiation in the defense effort. In 1951 Congress gave the President additional emergency authority to deal with these radiations as a defense measure. The Chief Executive subsequently empowered the Federal Communications Commission to draft and enforce regulations in that connection. The text of this legislation and the related Executive Order were published in the Commission's previous annual report.

These additional delegated powers are being used by the Commission to carry out the so-called CONELRAD project for emergency and temporary control.

The first step was effecting a plan of procedure to be followed by broadcast stations during armed attack. This was announced by the White House on December 2, 1952, in the following statement:

The White House today announced a plan whereby standard radio broadcast stations may remain on the air immediately before and during air attack, while simultaneously minimizing the use of radio as a navigational aid to hostile aircraft.

No engineering method has yet been found to enable FM and TV stations to remain on the air.

The plan, called CONELRAD (Plan for the CONtrol of ELectromagnetic RADiation), is expected to be placed in operation in three months. Under present temporary arrangements, a detected air attack would have the immediate effect of silencing all broadcasting and telecasting until the attack or threat is ended.

This special system of emergency broadcasting, to be administered by the Federal Communications Commission, represents many months of close cooperation by the broadcasting industry with the Government. Although no station is required to remain on the air in this plan, to date more than 1,000 privately owned standard broadcast stations have volunteered to participate in CONELRAD and have spent approximately $1,500,000 of their own funds to make equipment changes necessary to operate in this new system.

The plan was developed on the basis of Executive Order No. 10312 (December 10, 1951) whereby the President authorized the Federal Communications Commission either to silence radio stations or to control their operations so that electromagnetic radiations may not aid the navigation of hostile aircraft, guided missiles and other devices of similar purpose.

CONELRAD will be invoked upon announcement of an air raid alert by the Air Defense Command, USAF. All standard broadcast stations in the CONELRAD system will switch to one of two pre-designated frequencies (640 kc. or 1240 kc.) and broadcast to the public a continuous flow of accurate, official information, news and civil defense instructions.

On April 10, 1953, the Commission released the proposed CONELRAD rules and covering manual for broadcast station operation in an emergency. The rules became effective May 15 thereafter. More than 1,500 individual broadcast stations are now participating.

CONELRAD plans for other radio services are being evolved and will be announced as quickly as each one is completed. The next such plan will be for the Amateur Radio Service.

OTHER DEFENSE ACTIVITIES

The impact of national defense is felt in all fields of electrical communication. Military, civilian defense and defense industry require and use wire and radio communication to an abnormal degree. The Commission's role, in general, is to help common carrier and other communication services cope with present and potential emergencies, to see that wire and radio facilities are linked to the defense effort, and that communication facilities are safeguarded.

In the matter of telephone, telegraph and cable, the Commission is hard pressed to see that additional service is provided for domestic government business and industrial use.

The safety and special radio services come into the defense picture because of the importance of marine, aeronautical, police, fire, land transportation and industrial communication, and the establishment of various special services to deal with present or future emergencies.

Among the special services is the Radio Amateur Civil Emergency Service (called RACES for short), which is for civil defense purposes exclusively. It was established on August 15, 1952, and the first authorization—to the District of Columbia—was issued on March 6, 1953. This service enlists the radio amateur, his equipment and some of his frequencies for expediting civilian defense communication in such matters as first aid, radiological survey, etc., should the need arise.

Another is the Disaster Communications Service, which has been authorized since 1951. It is to enable Government and non-Government stations to join in essential communication when armed attack, disaster or other cause disrupts normal communication facilities.

The Special Emergency Radio Service provides radio communcation for temporary operations by relief organizations, doctors in rural areas, ambulances, etc.

The State Guard Radio Service covers use of radio facilities by state guards in states where the National Guard has been called into Federal service. The Civil Air Patrol also has its own radio service.

Then there are long-established regular radio services used by police, fire, forestry conservation, highway maintenance, and automobile emergency authorities.

All these services are more fully described elsewhere in this report.

Meanwhile, in policing the spectrum with the Government's only monitoring network, the Commission is called upon to furnish bearings to lost aircraft, trace calls of ships in distress, and be on constant watch to detect, locate and close illegal radio transmission and trace interference to authorized radio services.

In addition, the Commission is working on particular defense projects for other Government agencies. These activities cannot be mentioned other than to say that they concern experimental and other authorizations in connection with national defense developments, protection of communication facilities, and arrangements to make circuits available under any contingency.

Because of the scarcity of radio operators for ships and certain land stations, the operator rules have been liberalized in some instances. At the same time, the Commission has made it easier for operators serving in the Armed Forces to maintain their licenses.

An Executive Order of June 17, 1953 abolished the office of Telecommunications Adviser to the President, which had been in operation since October 9, 1951, and transferred its functions to the Director of Defense Mobilization.

Common Carrier Services

DOMESTIC TELEPHONE

General

Domestic telephone service continued in heavy demand, and the telephone industry maintained an accelerated construction program to supply additional services for millions of new customers. During calendar year 1952 the Bell System expended $1,261 million for new plant facilities, which brought its total plant book cost to approximately $12 billion. Although no precise figures are available, the independent telephone companies also made substantial plant additions which, if added to the Bell System totals, would bring the total telephone plant gross book costs in the nation to about $13.3 billion.

The extent of the telephone plant expansion is illustrated by the fact that Bell System construction expenditures during calendar year 1952 amounted to more than one-fourth of the total amount of its gross plant book cost at the end of 1940. Highlights of developments during fiscal 1953 included completion of new radio relay "backbone" routes between Kansas City, Dallas and San Antonio, between Pittsburgh and St. Louis, between Washington and Atlanta, between Portland and Seattle, and a section to provide a new through system between Albany and Buffalo. New coaxial cable systems were completed between Oklahoma City and Amarillo, between Chattanooga and Knoxville, between Orlando and Tampa, and between Memphis and Little Rock. New techniques were applied to a coaxial system between New York and Philadelphia to triple its capacity, and similar changes were in progress to extend this system to Chicago. Construction was started on 8 additional microwave radio systems which would provide major transmission paths totaling about 16,000 broad band radio channel miles.

Microwave transmission paths already in service were providing more than 2 million long distance telephone circuit miles at the end of calendar 1952. Telephone companies also made considerable progress in establishing alternate routes and dispersing circuit concentrations to insure continuity of service in the event of emergency.

There were more than 48 million telephones in service throughout the nation at the end of calendar 1952, of which 39.4 million were operated by the Bell System and over 8.5 million by independent tele-

phone companies. The Bell System added more than 2 million telephones during 1952 and reported 605,000 held orders for main service and 1.3 million requests for regrades in existing service as of June 30, 1953.

There were about 175 million—143 million in the Bell System—average daily local telephone conversations during calendar 1952 while daily long-distance calls exceeded 6 million. Many calls were reclassified from "toll" to "local" during this period as a result of the expansion of local exchange areas. After adjusting for these reclassifications, the local and toll calls increased 2.8 and 5.2 percent, respectively, over 1951. Teletypewriter exchange service (TWX) calls increased about 12 percent during the same period to reach a total of over 18 million. Telephone calls to and from foreign countries and ships at sea continued to increase, the Bell System reporting a total of 940 thousand calls during calendar 1952, including about 23 thousand to and from ships at sea.

Telephone companies continued to expand the use of dial equipment, both for local and long-distance calls. Seventy-nine percent of all Bell telephones and 57 percent of all independent company telephones are now dial operated. Bell operators were dialing about 40 percent of all toll calls directly through to destination by the end of 1952, and 1,700 cities and towns were connected to the toll dialing network, a gain of about 325 during the year. The number of large traffic centers equipped for operator toll dialing rose to 18 by the end of 1952, and construction was under way to provide like facilities at a number of other cities. Customer toll dialing in the Englewood, New Jersey, area permitted 10,000 subscribers to dial about 96 percent (all station-to-station calls) of toll calls from that area to such cities as Boston, Providence, New York, Pittsburgh, Cleveland, Detroit, Chicago, Milwaukee, Sacramento, San Francisco, and Oakland. These calls are automatically timed and billed.

Bell System operating revenues reached a new high of $4,039,664,218 in 1952, an increase of about 11 percent over the previous year. Bell consolidated net income applicable to American Telephone & Telegraph Co. capital stock amounted to $406,661,306, an increase of 11.4 percent over 1951. However, earnings per share declined from $11.76 in 1951 to $11.45 in 1952 due to increase in number of shares outstanding.

The expansion of the Bell System is illustrated by the following table of selected data:

Year	Number of telephones	Plant book cost	Revenues	Employees
1940	17,483,981	$4,701,177,364	$1,174,322,517	275,317
1945	22,445,519	5,702,056,557	1,930,889,452	387,300
1950	35,343,440	10,101,521,562	3,261,528,032	523,251
1952	39,413,889	11,971,435,727	4,039,664,218	579,500

Domestic Telephone Services

Construction of facilities.—As indicated previously, the Bell System spent about $1,261 million in the expansion and improvement of existing facilities during calendar year 1952. Of this amount, the largest portion went for additions to exchange plant, such as central office buildings, exchange switching equipment, exchange distribution plant, and subscriber station equipment. However, the A. T. & T. Long Lines Department, which provides the bulk of the interstate long distance telephone circuits throughout the nation, spent a record $107 million for new plant construction during that period.

During fiscal 1953, the Commission granted 358 applications involving estimated expenditures of $89,228,416 to the industry for authority to construct, lease, acquire or operate wire and cable facilities in connection with interstate and foreign telephone services.

The following table shows the estimated costs and amounts of wire and cable construction authorized by the Commission since 1943.

Fiscal year	Number of projects	Cost	Sheath miles of cable	Tube miles of coaxial units	Conductor miles of open wire
1944	121	$9, 582, 239	574. 8		7, 968
1945	210	70, 091, 140	2, 378. 3	7, 902	2, 963
1946	239	78, 896, 450	3, 193. 8	16, 580	12, 261
1947	289	126, 325, 771	5, 587. 7	23, 490	15, 976
1948	348	127, 162, 499	2, 637. 5	46, 080	16, 373
1949	313	38, 638, 919	1, 370. 5	1, 323	7, 278
1950	141	13, 230, 678	399. 3		3, 491
1951	218	45, 795, 086	957. 1	2, 704	5, 461
1952	323	107, 533, 688	1, 388. 7	2, 972	5, 998
1953	358	89, 228, 416	1, 494. 0	5, 678	2, 006

This tabulation includes 14 authorizations issued by the Commission during fiscal 1953 for the acquisition or lease by telephone companies of the facilities owned by other companies. In one of the largest transactions in this category, Bell companies acquired the private landline communication facilities of the Phillips Petroleum Co. at a cost approximating $1.2 million.

In addition to the cable and wire construction, the Commission received applications from Bell companies during fiscal 1953 for authority to construct 9 new major and 3 new minor microwave radio relay systems. All were approved by the close of the year except for two major microwave systems. The authorized radio construction, when completed, will provide an additional 16,520 channel miles of broad band channels, and will cost an estimated $29.5 million. These additional microwave systems will bring the Bell System expenditures for such radio facilities to more than $120 million, all of which have been constructed since World War II.

At the end of calendar year 1952, the Bell System operated over 2 million telephone circuit miles over microwave radio, an increase of

more than 1.5 million miles during the year. The microwave systems were also being used, together with coaxial cable systems, to provide about 35,000 channel miles of television program circuits to link 140 television stations in 92 cities located in 36 States and the District of Columbia as of June 30, 1953. Plans were underway to connect 67 additional TV stations, of which 55 are located in cities not currently served by the network. The nationwide television network was also linked with the Bell Telephone Co. of Canada to furnish service to Toronto and Montreal.

Part of the new microwave construction will be used to establish so-called round-robin TV networks to link various cities in the east and middle west. These circuits will permit TV broadcasters to originate programs in rapid succession from various points.

Although the Bell companies predominated in the construction of microwave systems, various independent telephone companies also showed continuing interest in using radio for point-to-point telephone service, as evidenced by grants for three new independent company systems during fiscal 1953.

Discontinuance, reduction or impairment of service.—During fiscal 1953, the Commission granted 10 applications for authority to discontinue telephone service. Seven involved the substitution of one carrier for another in furnishing wire line toll service. One involved the closing of a toll telephone station in a community no longer requiring this service. The other two covered discontinuance of domestic public land mobile radio service in Port Sulphur, Louisiana, and Camden, Ohio.

Speed of service.—Despite the increase in long-distance traffic, Bell System speed of service during 1952 was about the same as that rendered in 1951. The average time required by Bell to complete long-distance calls during each of these years was about 1.8 minutes. Bell also reported that it completed 93 percent of all long-distance calls on a "no hang-up" basis.

Foreign attachment cases.—Final decision was still pending in the case of *Hush-A-Phone Corp. et al.* v. *American Telephone and Telegraph Company, et al.* (docked 9189), which involved the lawfulness of the so-called foreign attachment provisions of the defendant's tariffs insofar as they were construed to prohibit the use of the Hush-A-Phone device. Nor has final determination been made in the cases of *Jordaphone Corporation of America, et al.* v. *American Telephone and Telegraph Company et al.* (docket 9383) and *In the Matter of the Use of Telephone Answering Devices in Connection with Interstate and Foreign Telephone Service* (docket 9701), both of which proceedings involve the lawfulness of the foreign attachment regulations as applied to automatic telephone answering devices in connection with interstate and foreign telephone service. The Bell com-

panies themselves offer automatic telephone answering and recording service in all but one state.

On November 5, 1952, the Commission denied a petition for rehearing and reconsideration and for oral argument filed by the complainants in the case of *Walter S. Berkman, et al.* v. *American Telephone and Telegraph Company, et al.* (docket 9100). As reported in previous annual reports, the Commission on March 23, 1949 dismissed the original complaint, which sought use of a call waiting indicator device which would inform a party using the telephone that another call was seeking a connection.

Interconnection cases.—On October 9, 1952, the Commission held that it was neither necessary nor desirable in the public interest to require interconnection of the intercity video transmission facilities of the Bell companies with those of the Western Union Telegraph Co. (docket 9539). A further petition by Western Union for reconsideration and rehearing was denied March 23, 1953.

On December 17, 1952, the Commission dismissed the complaint of *J. L. Dezauche, Jr., and R. A. Gartman, d/b as Mobile Marine Radio* v. *Southern Bell Telephone & Telegraph Co.* (docket 10163) which alleged that Southern Bell had refused to allow the complainants to connect their public coastal radiotelephone station to Southern Bell's telephone facilities upon request. Negotiations had resulted in an agreement to interconnect these facilities.

Domestic public land mobile radio service.—Activity in this service was particularly noteworthy for the interest shown in the one-way signaling type of operation. This operation involves communication from a base station to pocket-type receivers carried on the subscriber's person. On June 30, 1953 there were 45 such authorizations in 35 cities but not all were in operation. In 7 other cities the number of applicants at the end of the fiscal year exceeded the number of frequencies (two) available for the service, necessitating comparative hearings to determine which applications should be granted.

The two-way mobile service furnished by landline telephone companies was extended to 13 new cities during the year, making it available in 193 cities throughout the country and Hawaii. Similar service by miscellaneous (nontelephone company) carriers was established in 31 additional cities, for a total of 224 cities in 38 States and the District of Columbia, Puerto Rico, Alaska, and Hawaii.

Final decisions were issued in comparative cases involving applications to establish such systems in the New York City area (dockets 9761 et al.), the Miami-Fort Lauderdale area (dockets 10017 et al.), and the Los Angeles area (dockets 9723 et al.).

Petitions of Bell Telephone Laboratories, Inc., and the United States Independent Telephone Association, requesting the allocation of spectrum space between 216 and 470 megacycles for a broad band

multichannel public mobile operation, were dismissed because the Commission did not feel that the petitions presented sufficient justification for displacing other established services in the part of the spectrum requested (docket 10323). At the same time, the Commission adopted rules which rearranged the frequency allocations in the 450–460 megacycle band to permit greater flexibility in the assignment of such frequencies to mobile common carriers, among others.

A possible means of alleviating the shortage of frequencies in the 152–162 megacycle band was indicated by grant of an application for a developmental authorization to investigate the feasibility of operation on channels in this band 20 kilocycles wide in lieu of the present 60-megacycle spacing.

Community antenna TV systems.—There has been a continued increase in the number of community antenna television systems whereby a receiving antenna is located at a favorable point for receiving a TV signal from a distant station and the programs so received are distributed to individual subscribers by wire lines. There are now a total of 240 communities in which such systems are located, with another 30 systems in the construction or planning stages. The Commission is presently studying the question of whether persons engaged in furnishing this service are engaged as common carriers for hire in interstate communications and, therefore, subject to the common carrier provisions of the Communications Act.

The growth of these so-called community antenna systems has led to requests for microwave facilities to relay the received TV signal from the point of reception to the point from which it is distributed to the subscriber. Applications for such microwave relay facilities pose substantial legal and policy questions relating, among others, to the status of the proposed operation as a communications common carrier.

Theater television.—During the year the Commission held hearings to consider certain petitions filed by various motion picture industry associations requesting the assignment of frequencies for the rendition of a "theater television" transmission service, whereby video programs would be transmitted to various theaters or other public halls for exhibition (docket 9552). In a report and order issued June 25, 1953, the Commission determined that this was essentially a service which should be performed by communications common carriers. It further determined that there is nothing in the Communications Act or the Commission's rules which would prevent a common carrier from rendering this specialized type of service on frequencies set aside for general common carrier use. Applications for the use of such frequencies, however, will be considered on their individual merits with consideration given to, among other things, whether they

meet the standards of public interest, convenience or necessity, and whether, in the light of any existing general common carrier facilities between the points proposed to be served, there is a need for separate or additional facilities, etc.

Rural subscriber and short haul toll radiotelephone services.—Further expansion was noted in these services which provide short distance radio communication to points where unfavorable terrain factors make it impractical to construct wire lines. The first authorization was issued for rural subscriber service extending across the Canadian border.

Radiocommunication service in territories and possessions (except Alaska).—A rule-making proposal to allocate frequencies in the 76–88 megacycle and 98–108 megacycle bands for the use of common carriers operating in the Territory of Hawaii (docket 10094) was finalized, and those frequency bands are now available for use in interisland communications in that territory.

Coastal and Alaskan services.—These services, though largely authorized on a common carrier basis, are discussed in a separate chapter on Safety and Special Radio Services because of their close relationship to radio aids for the safety of life and property.

Reclassification of telephone companies.—The Commission granted petitions filed by 3 telephone companies requesting that their classification be changed from "fully subject" status to "connecting carrier" status under section 2 (b) (2) of the Communications Act of 1934, as amended. As "connecting carriers", such companies are subject only to the provisions of sections 201 through 205, inclusive, of the act.

Acquisitions and consolidations.—The Commission received 16 applications from domestic telephone carriers for authority under section 221 (a) of the Communications Act to acquire the property of another domestic telephone company. After due notice of public hearings, 13 of these applications were granted. An initial decision looked toward a grant of 2 of the remaining applications, and 1 application was scheduled for hearing.

Interlocking directorates.—The Commission received and granted 10 applications filed by individuals pursuant to section 212 of the Communications Act for authority to hold positions of officer or director of more than one domestic telephone carrier subject to the act.

Contract filings.—The Bell System companies have and are continuing to file thousands of amendments to existing traffic agreement contracts in connection with a recently negotiated revised toll settlement plan for the division of revenue derived from message toll telephone services furnished jointly by Bell and independent connecting companies. These amendments are in addition to the new traffic

agreements, cancellations of, and amendments to contracts arising through normal business. It has been estimated that the revised arrangements will increase the revenue share of the independent telephone companies by $18 million annually.

Rates and Tariffs

Tariff schedules.—At the close of the year, 336 telephone carriers had 752 tariffs and concurrences on file with the Commission. This represented an increase of 42 carriers during the year and was due to new carriers in the Domestic Public Land Mobile Radio Service. These carriers filed 15,171 tariff publications during the year establishing new rates or modifying rates, regulations, practices and classifications of service. Of these, 24 were rejected for failure to comply with the rules. None were suspended.

Special permissions.—Nineteen applications for special permission to make changes in the tariffs to become effective on less than statutory notice, or involving a waiver of certain rule requirements, were received and granted.

Unlawful use of telephone facilities.—On March 19, 1953, the Commission denied a petition for rehearing and reaffirmed its December 21, 1951, decision in the case of *Harry and Bertha B. Katz* v. *American Telephone & Telegraph Co. et al.* (docket 9500) in which it held unjust and unreasonable that part of a tariff regulation providing for automatic refusal or discontinuance of service by the carrier on advice of a law enforcement agency that the telephone is being or will be used for unlawful purposes, but not affecting the tariff condition that telephone service will not be used for unlawful purposes.

Private line teletypewriter service.—Revised tariffs were filed to permit interconnection on customers' premises between private line telegraph facilities provided by Bell System companies with similar facilities provided by an overseas radiotelegraph carrier, where the customer required such connection for communications involving the safety of life and property. Bell System regulations for private line service were amended to include provisions relating to interconnection with facilities of the Army, Navy, and Air Force or those owned by the oil, gas, and other so-called right-of-way companies.

Collect telephone call practices.—Bell System tariffs were revised to permit calls to be made to overseas points from coin telephones. This practice previously had been prohibited because of the limited capacity of the coin receptacles. Lower rates for overseas calls made the previous prohibition obsolete. Arrangements were also completed to permit collect calls to be made from, but not to, most vessels on the high seas.

Bell System TWX and private line telegraph rates.—The Bell System companies filed revised tariff schedules, which became effective July 1, 1953, providing for increases in the rates and charges for interstate teletypewriter exchange (TWX) service and for increases and reductions in the rates and charges for interstate private line telegraph services and facilities.

With respect to TWX service, the 3-minute initial period rates were increased by 5, 10, and 15 cents for TWX connections involving most distances up to 2,300 miles; the overtime charges (per additional minute) were increased from approximately 25 percent of the initial period rate to about 30 percent; and report charges for unaccepted collect calls were discontinued. In addition, the companies established a fixed monthly interstate interexchange charge of $10 per TWX station and discontinued the monthly guarantee of revenue of $10 per station. It was estimated that the rate changes would produce additional annual TWX revenues of about $8 million. The Commission, on June 30, 1953, denied requests made by a group of TWX subscribers for suspension and investigation of the new rates. It also denied a request by the Public Utilities Commission of California for suspension of the fixed monthly interstate interexchange charge portion of the new rates.

The revised Private Line telegraph schedules provided for increases of 20 percent in the charges for the most commonly used types of teletypewriter equipment and reductions in the charges for interexchange telegraph channels as well as a simplification in this part of the rate structure. The net effect of these rate adjustments was a small reduction in annual revenues from the Private Line telegraph services.

The above rate changes were the result of a study, which was instituted by Bell System companies in the early part of 1952, to ascertain approximate current costs applicable to the furnishing of TWX and other telegraph services. This study was made at the request of the Commission inasmuch as many of the plant and operating expense accounts of the Bell companies do not reflect a segregation of costs applicable to telegraph services. In the absence of such a segregation, it had not been possible to determine whether the rates of the Bell companies for the services in question produced sufficient revenues to compensate for the costs incurred in rendering the services.

Interstate telephone exchange service rates.—Effective October 1, 1952, the Northwestern Bell Telephone Co. increased its rates for exchange telephone service in its 13 border exchanges in Iowa which include subscribers in adjoining States. It was estimated that revenues from the 90,000 telephones involved would be increased by $1,000,000 annually. Since there is no State regulatory authority in

Iowa, charges for interstate exchange service are subject to the jurisdiction of this Commission. The rates for exchange service in these border localities had remained at prewar levels although rates in cities in Iowa had been increased several times during the same period. This resulted in a wide disparity in charges for service in the border points as compared with similar charges in the interior points. The rate adjustment removed some of this disparity.

In El Paso County, Tex., where certain exchanges overlap the Texas-New Mexico border, the Commission has jurisdiction over exchange rates in the Texas portion of such localities since in the particular instance there is no State or local regulation. Adjustments were made effective March 7, 1953 in these exchanges to equalize the rates for subscribers on both sides of the State line and to extend the calling areas.

Other Regulatory Matters

Charges for interstate telephone service within Washington metropolitan area.—On March 18, 1953, the Commission dismissed its proceedings referred to in the Eighteenth Annual Report involving the reasonableness of charges for interstate telephone calls between metropolitan area points in Virginia and Maryland, and the jurisdiction of the Commission over such charges (dockets 8110 and 8112). The Commission stated that, because of changed conditions, no substantial basis existed upon which to question the justness and reasonableness of the rates and charges at issue, and that the dismissal was without prejudice to such future determinations as may be made by the Commission with respect to the jurisdictional questions involved.

Depreciation.—The program of continuing studies, in connection with the Commission's responsibility to fix depreciation rates for telephone companies, as required by section 220 (b) of the Communications Act, was carried out during the year with respect to several Bell companies. On the basis of such studies, supplemented by joint reviews of relevant facts with State commissions and the companies concerned, depreciation rates were prescribed during the year for each of the operating areas served by The Mountain States Telephone & Telegraph Co. (eight States) and The Cincinnati & Suburban Bell Telephone Co. (two States). The rates prescribed for these companies resulted in annual depreciation charges aggregating $14,515,000 and represented a reduction of $677,800, or 4.5 percent in the annual charges based on the depreciation rates in effect prior to the Commission's action. In addition, the Commission modified most of the depreciation rates previously prescribed for the Long Lines Department of A. T. & T., and the 4 telephone companies comprising the

Chesapeake and Potomac group. The represcribed rates for these five companies produced annual charges aggregating $57,720,300 and represented a total reduction of $4,763,200, or 7.6 percent in the annual charges based on the rates prescribed previously.

By the end of the fiscal year, the program of prescribing depreciation rates for telephone companies had been carried out with respect to 20 Bell companies, including the Long Lines Department of A. T. & T., out of the 23 companies within the system. In the case of 10 companies, prescribed rates were revised at least once during the past 4 years in order to reflect in depreciation rates and charges changes arising from developments in the art and other factors. The net effect of the rates thus far established by the Commission, estimated on the basis of the annual depreciation charges for 12 months ending April 30, 1953, represents a reduction aggregating approximately $25,400,000, or 6.6 percent in these charges on an annual basis.

This net effect does not include a reduction of approximately $660,000 in depreciation charges of the Pacific Telephone & Telegraph Co. As noted in the last two annual reports, this company has, on its own initiative, adopted depreciation rates recommended by the Commission, although formal action on these rates has been deferred at the request of certain of the state commissions within the territory served by the company.

In spite of the downward adjustments in depreciation rates, depreciation expense charges of telephone companies continued to rise due to a substantial increase in plant facilities. For the 12 months ending April 30, 1953, these charges in the case of the 23 Bell companies amounted to over $419,000,000, an increase of $31,816,000, or 8.2 percent over the charges for the previous year. The increase in depreciable plant facilities, however, (expressed in terms of the recorded book cost) amounted to 8.6 percent during the same period.

NARUC committee on depreciation.—The Commission's representatives continued active participation in the work of this committee of the National Association of Railroad and Utilities Commissioners (NARUC). This Commission provided the committee with a tabulation of Bell System depreciation rates, together with estimated service lives and estimated salvage factors, for incorporation in a publication of the committee containing such data for all utilities.

Western Electric earnings and prices.—The Commission, cooperatively with the NARUC, continued its studies of the prices, earnings, and costs of Western Electric Co., Inc., the manufacturing and supply unit for the Bell System. In the previous annual report, reference was made to the reduction made by Western, effective April 1, 1952, in its prices charged to Bell System companies for switchboards, which reductions amounted to about $45 million annually based on current

sales volume. Effective August 1, 1952, a second reduction amounting to about $65 million annually was made in prices on Western's manufactured products. Western's sales in 1952 to Bell system customers amounted to $936 million as compared with $805 million in 1951. Notwithstanding the above price reductions, the company, in 1952, realized a return on its net investment in assets of 9.9 percent.

Release of A. T. & T. employment stabilization reserve.—As a means of improving interstate earnings of the Bell System companies, the Commission, on January 14, 1953, authorized the American Telephone & Telegraph Co. to transfer its so-called Employment Stabilization Reserve of $11,500,000 to income by monthly installments of $1 million during 1953.

The reserve, which was accumulated through charges to operating expenses by A. T. & T. during the war years (1943–45) pursuant to Commission approval, was intended to meet postwar costs of plant rearrangements and other maintenance projects deferred during the war. However, the reserve was never used for this purpose because it was not found practicable to identify the portions of postwar maintenance which had been deferred, and postwar interstate earnings appeared adequate to meet deferred and current maintenance costs.

In releasing the reserve, the full amount became available for addition to net income. It had not been allowed as a deduction from taxable income during the years of its accumulation. Accordingly, at current Federal income tax rates, it would have required an interstate rate increase of about $24 million annually to produce an annual increase in net income after taxes of $11.5 million.

Bell System Federal income taxes.—In the 1952 annual report it was explained that A. T. & T. had commenced filing consolidated Federal income tax returns for itself and those of its telephone operating subsidiaries eligible for inclusion in such returns. It was also pointed out that the consolidated basis of filing necessitates an allocation of the consolidated tax liability among the companies included in the return and that this matter had been discussed with representatives of the company and with representatives of state regulatory commissions. Attention was given to apportioning the corporate debt of the parent company among the subsidiaries as a part of the tax allocation formula. Work on this matter continued during fiscal 1953 and a report was published by a committee of the NARUC. It is expected that a second report will be issued by the NARUC in fiscal 1954.

NARUC committee on accounts and statistics.—This committee, which includes Commission representation, is developing revised uniform systems of accounts for electric, water, and gas utilities. The principles adopted in these systems will be followed to the extent deemed advisable in revisions of the Commission's systems of accounts.

During the year this committee considered jointly with the NARUC Committee on Depreciation possible revisions in the accounting for telephone station apparatus and the advisability of classifying station installations and drop and block wires as depreciable telephone plant.

The committee also collaborated with the Commission in studies which led to certain revisions, adopted during fiscal 1953, of continuing property record requirements in the Commission's Uniform System of Accounts for Class A and Class B Telephone Companies and in the Standard Practices for the Establishment and Maintenance of Continuing Property Records applicable to telephone companies having a plant investment in excess of $8,000,000.

The committee continued its studies and discussions with respect to appropriate allocation among the companies included in the consolidated tax return of the Federal taxes on the income of the American Telephone and Telegraph Company and its telephone subsidiaries.

Pensions and relief.—Pension plans of Bell System companies were amended in various respects during fiscal 1953. These plans, which were originally placed into effect in 1913, provide in part that any employee who has reached the age of 60 (women, 55) and whose term of employment has been 20 years or more is entitled to retire on a pension at his own request, and an employee must retire at age 65. The minimum pension is $75 per month (before age 65) and $100 per month (after age 65). It had been provided that an amount equal to one-half of all Social Security payments was deducted from company pension payments for those who received more than minimum pensions. As a result, whenever Social Security payments were increased the company pension payments were decreased by one-half of the Social Security increase. The pension plans were revised so that for the increase in Social Security payments made effective September 1, 1952 no reductions were made in company payments and this will be the rule in the future.

Another change provided that persons 65 years of age or more who were receiving minimum pension payments prior to September 1 and who were also receiving Social Security payments will receive in combined payments from the company and the Government an amount equal to $100 per month plus one-half of the Social Security payments to which they were entitled August 31, 1952 and all Social Security increases after that date. Previously, the full Social Security payment was included in the combined payments totaling $100 per month. Like treatment would be accorded those retiring after August 31, 1952 at age 65 and qualified only for the minimum pension.

A third amendment in the pension plans did away with the requirement that the plans of all companies in the Bell System must be the same in order to entitle an employee transferring from one company

to another to carry his service record with him for pension credit under the pension plan of the company to which transfer was made.

For the calendar year 1952, pension and other benefit costs (including Federal taxes for Social Security benefits) for the Bell System, including manufacturing and research activities, amounted to approximately $245,000,000. The combined pension trust funds of these companies totaled approximately $1,560,000,000 as of December 31, 1952. At the end of 1952, 30,126 retired employees of these companies were receiving service pensions.

During fiscal 1953, a review was made of the actuarial data underlying each of the basic actuarial factors used in the Bell System pension studies.

Continuing property records.—Studies of the continuing property records plan of the Bell System companies continued. One of the major features of a continuing property records plan is the provisions relating to the retirement of plant costs from the accounts. In general, plant retirements are made on two bases: (1) Actual cost basis for large items of plant, such as buildings and central office equipment, and (2) average cost basis for plant consisting of a large number of similar units, such as telephones, bell boxes, poles, etc., with recognition being given in the development of average costs to size of unit, to type of plant and in certain cases to volume of new plant construction. The Bell System has proposed a revised method for the development of average retirement unit costs which gives recognition also to the trends in the level of costs and to the age distribution of retirements. Further study is being made of this and other methods of developing average costs which would also recognize these factors prior to permitting any change from present procedures.

Plant accounting practices.—An examination of the accounts of one Bell System company revealed plant accounting practices which were considered improper. It was subsequently revealed that these practices were in fairly general use and corrective action was taken. Briefly, the accounting practices to which exception was taken were that certain plant construction costs were being charged directly to telephone plant in service accounts rather than being accumulated in construction work in progress accounts until completion of projects. In other instances there was delay in clearing amounts in construction work in progress to telephone plant accounts upon completion of projects, and there were some unduly long timelags between the time telephone plant was physically retired from service and the time accounting entries were made recording the retirements in the accounts.

Restatement of plant accounts on basis of original cost.—The accounting for several current acquisitions of plant, including mergers of small companies and acquisitions of communication plant from

nontelephone companies, was handled during the year in accordance with the Commission's accounting regulations. In certain instances this involved the disposition of amounts in excess of original cost. As stated in the 1952 report, the restatement of the telephone plant accounts on basis of original cost has been substantially completed. There remain, however, a few significant items among Bell System companies and several items among non-Bell companies for which final adjustments have not been effected in the accounts.

Annual and other reports.—All report forms were reviewed and minor changes made in some. Annual Report Form L (applicable to miscellaneous common carriers operating in the Domestic Public Land Mobile Radio Service) was redesigned and simplified so as to produce only a minimum of data needed by the Commission for its regulatory functions. At the close of the fiscal year rulemaking was in process with regard to revising other reporting requirements.

Uniform systems of accounts.—Several informal interpretations of the system of accounts were made during the year, including such subjects as the accounting classification to be accorded certain items of mobile radiotelephone station equipment and the appropriate accounting for telephone messages in metropolitan "extended areas".

Studies, in collaboration with industry representatives, continued with respect to revision of the lists of retirement units which are used in determining whether costs are to be included in the operating expense accounts or the capital accounts. Amendments were made in the accounting rules with respect to continuing property record procedures.

Accounting research.—Research continued with regard to accounting regulations of other regulatory commissions and accounting principles enunciated by professional accounting organizations, with the purpose of determining the applicability of such regulations and principles to the communications industry. This included a study of accounting to be performed for emergency facilities with respect to which certificates for rapid amortization have been granted pursuant to section 124A of the Internal Revenue Code. Studies also continued with respect to matters as the "all-inclusive" income statement, certain aspects of depreciation accounting, accounting for tax savings under consolidated income tax returns, and original-cost accounting on plant acquisitions of comunications systems from vendors not engaged in the communication carrier field of operation.

DOMESTIC TELEGRAPH

General

The Western Union Telegraph Co. provides practically all of the domestic message telegraph service in the United States. Western

Union also furnishes private line and other nontransmission telegraph services but the telephone companies furnish the great bulk of such services, including teletypewriter exchange service, within the United States.

The financial results of Western Union's landline operations during fiscal 1953 were much improved over fiscal 1952, when the company's employees were on strike for almost 2 months. Western Union agreed to pay its employees increased wages, estimated to increase operating expenses $9,800,000 a year, effective September 1, 1952. At the same time, it was permitted to revise interstate telegraph rates which, together with similar intrastate rate revisions and increased rates for service between the United States and Canada, were estimated to increase annual revenue by $13 million. The increased rates were also designed to offset the September 1951 wage increases, the recovery of which was not provided for in the 1951 rate increases.

For the calendar year 1952, Western Union reported gross landline revenues of $184,335,000 and 159,735,000 messages handled, as compared with $192,089,000 revenues and 189,637,000 messages for 1951. System-wide net income amounted to $1,103,000 after providing $200,000 for Federal income taxes, compared with 1951 net income of $5,405,000 after a $4,900,000 Federal income tax provision.

In the first half of calendar year 1953, Western Union reported net earnings from its combined landline and cable operations of $4,320,000 with $4,773,000 provided for payment of Federal income taxes. The company estimates that it will earn in excess of $8½ million in 1953, or over $7 per share, after provision of over $9 million for Federal income taxes, and after providing for a further wage increase effective in May 1953 estimated to add close to $1 million to annual operating expenses.

Western Union operates, under long-term leases, the properties of several telegraph companies which are physically merged with its own properties. In fiscal 1953, Western Union increased its stockholdings in these lessor companies, thus reducing its reversionary liability thereto, and with respect to three companies, eliminated the reversionary claim entirely and terminated the leases. In exchange for the stock of the largest of these, Northwestern Telegraph Co., Western Union, among other things, issued $2,000,000 of 4¾ percent debentures, due July 1, 1980. These debentures, together with $35,000,000 of 5 percent bonds due March 1, 1960, represent all the company's outstanding long-term bonded indebtedness.

At the close of fiscal 1953, Western Union filed revised rates for its interstate private line telegraph services which are estimated to reduce revenue therefrom by about $357,000 annually. The new rate schedules are similar to those filed by the Bell System companies, effective July 1, 1953.

Services and Facilities

Speed of service.—Western Union is required to conduct daily studies of the speed of service rendered at its 25 largest offices and to report monthly summaries to the Commission. These reports show the average origin to destination speed of service (interval between the time a message is filed by sender and the time it is delivered to addressee, or first attempt) and the average office relay drag (time required for a message to pass through a large message center). The following table compares the average speed of service in minutes reported by Western Union for the fiscal years 1952 and 1953:

	Average speed in minutes	
	1952 (10 months) [1]	1953 (12 months)
Origin to destination:		
Delivered by:		
Telephone	41.6	43.0
Messenger	45.1	46.2
Private tie line	37.5	37.8
Office relay drag	8.5	8.4

[1] Speed of service studies suspended during April and May 1952 because of strike of telegraph employees.

Due to limited personnel and funds, investigations of service conditions by the Commission's Common Carrier Bureau are limited to the most pressing situations. However, the Field Engineering and Monitoring Bureau personnel in 17 district offices assist by making, to the extent feasible, routine speed of service inspections of Western Union offices and agencies during their regular field inspection trips. During the year, the field engineers made 131 such inspections. The Common Carrier Bureau field offices located in Atlanta, New York, San Francisco and St. Louis made similar inspections of 391 Western Union offices located in or adjacent to those cities.

Western Union modernization program.—As an adjunct to 15 reperforator switching centers completed in November 1950, Western Union has provided 214 large branch offices, including 91 added during fiscal 1953, located in 19 nonreperforator cities, with direct circuit connections to distant reperforator centers. Of this number, 203 branch offices are equipped for sending of originating messages and the remainder are equipped for both sending and receiving messages. These direct circuit connections reduce delays in handling messages through manual relays.

Western Union operated about 3,190,000 telegraph channel miles as of June 30, 1953, including 95,000 added during the fiscal year. This is approximately double the 1946 capacity. The increased channel mileage was derived, almost entirely, from the application of carrier equipment to voice frequency channels. About one-half of this mileage is obtained from facilities leased from Bell System companies.

Western Union's long range program provides for the construction of some 7,300 route miles of microwave radio relay facilities. About 1,000 miles of this, constituting a triangle between New York, Pittsburgh, and Washington, has been in operation for several years. Although options on repeated sites have been obtained as far west as Kansas City, there is no indication that this phase of the program will be implemented in the near future.

The principal development affecting the New York, Pittsburgh, and Washington triangle during fiscal 1953 was the increase in power to provide greater continuity of operations during periods of atmospheric disturbance.

On October 9, 1952, the Commission held that it was neither necessary nor desirable in the public interest to require interconnection of the intercity video transmission facilities of Western Union and the Bell System (docket 9539). A further petition by Western Union was denied on March 23, 1953.

Western Union is providing increasing numbers of deskfax tie lines for the purpose of improving the speed and efficiency of local pick-up and delivery of messages. During fiscal 1953, the company installed 4,220 deskfax tie lines, bringing the total to 8,810. The projected installation of deskfax units for the calendar year 1954 is 3,000.

Gross expenditures on the modernization program through calendar year 1952 amounted to some $52 million, with an estimated $29 million to be spent in future years. Estimated savings in operating expenses resulting from this program to date amount to about $30 million a year.

Construction of wire facilities.—The Commission received 8 Western Union requests for wire telegraph construction and extensions. Six were granted and 2 were pending. Those granted covered the leasing of 71,099 telegraph channel miles of line at an annual rental of $109,032 and the construction of 59,427 telegraph channel miles of line and associated equipment at a cost of $1,298,980.

Discontinuance, reduction, or impairment of service.—A total of 1,953 applications for reduction in hours of service or closure of public telegraph offices were filed by Western Union. In addition, 148 such applications were pending at the beginning of the year. Of the total, 1,854 applications were granted, 22 were withdrawn, 1 was denied and 224 were pending. Generally, where hours were reduced or offices closed, substitute service was made available.

Rates and Tariffs

Tariff schedules.—At the end of the fiscal year, 36 domestic telegraph carriers had tariffs or concurrences on file with the Commission.

During the year, they filed 1,010 tariff publications establishing or changing rates, regulations, practices, and classifications of service.

Special permissions.—During the year, 37 requests for special tariff permissions to make changes in tariffs or to file new tariffs to become effective on less than statutory notice, or involving waiver of certain requirements of the Commission's rules, were acted upon. Of this number, 36 were granted and 1 was denied.

Western Union domestic rates.—As reported in the 1952 annual report, Western Union filed revised tariff schedules in June 1952, containing new and increased charges and regulations largely for interstate message telegraph, press, money order, and miscellaneous services, designed to provide a $13,200,000 increase in operating revenues on an annual basis to offset the cost of wage increases in approximately the same amount. After certain adjustments in the proposed rates were made, the Commission permitted the adjusted intra-United States rates to become effective September 1, 1952, while the effective date of the United States-Canada rates was deferred until November 1, 1952.

On June 16, 1953, Western Union filed new and revised rates and regulations, effective July 1, 1953, for interstate leased facilities (private line telegraph services). They result in both increases and decreases, the overall effect of which amounts to an estimated reduction in the company's revenue of $357,000 annually on a systemwide basis. The new schedules were filed by Western Union so as to maintain its interstate leased facilities rates on a competitive level with the revised private line rates of the Bell System.

Teleprinter "ticker" equipment charges.—Western Union's revised tariff schedules establishing new and increased charges and new regulations applicable to "tickers" used in leased facility service were allowed to become effective August 1, 1952 pending a public hearing to determine their lawfulness (docket 10274). Hearings were held in January and April 1953, and on June 30, 1953 the record was certified to the Commission for decision.

Transmission of horse or dog racing news.—In the previous annual report reference was made to the proceedings in docket 10112 concerning the lawfulness of Western Union's tariff schedules applicable to leased facilities used for the transmission of horse and dog racing news. The tariff schedules restricted such use to (1) a press association; (2) a publisher of a newspaper or other periodical entered as second-class matter; (3) a radio station; or (4) a person, firm, or corporation engaged in the collection or transmission of horse or dog racing news to press associations, newspapers, or radio stations for publication or broadcasting. In its decision released March 24, 1953, the Commission found that such tariff provision was arbitrary

and discriminatory in that it would have denied service to persons who would use the facilities for legitimate purposes and would have allowed service to be furnished to persons who have used it for unlawful purposes in the past. Accordingly, Western Union was ordered to cancel this tariff provision.

Acceptance of libelous messages.—A formal complaint was received during the year concerning Western Union's tariff schedules which provided that messages containing libelous language would not be accepted for transmission (docket 10327). In an effort to dispose of the complaint without the necessity for a formal hearing, informal conferences were held between Western Union and Commission representatives. As a result, Western Union amended these schedules, effective May 18, 1953, to provide that messages containing defamatory statements will not be accepted if the receiving clerk knows that the message is spurious or that the sender is acting in bad faith and for the purpose of traducing another. The proceeding was accordingly terminated.

Responsibility of carrier for messages picked up by messenger.—As a result of negotiations between Western Union and the Commission, the company amended its tariff regulations to show that the responsibility of the carrier attaches at the time a message is accepted by its messenger, in those cases where the company dispatches a messenger to pick up the message. Previously, the company's tariff provided that since the messenger acted as agent of the sender and not as an agent of the company, no responsibility attached until a message was accepted at one of the transmitting offices.

Other Regulatory Matters

Original cost of plant and continuing property records.—Commission studies directed toward analysis of methods and procedures applied, verification of accounting performed, and entries recorded in connection with Western Union's reclassification of its plant and equipment on basis of original cost, were still in progress at the end of the year. Concurrently, studies necessary for the verification of the form and content of Western Union's continuing property records and for the evaluation of the effectiveness of continuing property record procedures are being pursued.

Depreciation.—Western Union continued a review of the factors underlying the development of depreciation rates undertaken in cooperation with the Commission. The purpose is to determine what modifications in presently effective rates are necessary to reflect, more accurately, existing plant conditions under the circumstances of obsolescence and retirement of a substantial amount of its older equip-

ment and replacement in the plant structure of newer types of equipment having different service life and salvage characteristics.

Miscellaneous accounting matters.—For the purpose of assuring proper treatment in and reporting of accounts as an aid to effective rate regulation, the Commission directed its attention to the telegraph carrier's accounting procedures regarding, among other things, (*a*) research and development costs incurred under defense contracts, (*b*) rapid amortization for tax purposes of appropriately certified defense facilities, (*c*) traffic damage claims, and (*d*) uniforming of messengers.

Uniform system of accounts.—Tentative drafts of unified accounting rules to be applied to all international (cable and radio) and to domestic telegraph carriers were completed. Further conferences with industry representatives are planned.

During the year interpretations were issued with respect to the retirement unit to be used in connection with accounting for rerouting of ocean cable, and the accounting for revenue from transmission of international messages that do not originate or terminate at, or transit through, points designated as gateway points in the continental United States.

Annual and other reports of carriers.—As of the close of the year, proposed rule making was in progress with regard to revising the reporting requirements.

INTERNATIONAL TELEGRAPH AND TELEPHONE

General

After experiencing two years of increasing traffic volume, the United States cable and radiotelegraph carriers reported a decline in the word volume of international telegraph traffic handled during the calendar year 1952. In 1952, this traffic amounted to 516,261,573 paid words, a decrease of 20,347,060 paid words or 3.8 percent from the 1951 level of 536,608,633 paid words.

Revenues from message traffic accruing to the international telegraph carriers totaled $44,916,817 in 1952, a decrease of 3.3 percent from the previous year's revenues of $46,466,766. Total operating revenues, on the other hand, increased to $57,605,377 in 1952 as compared with $56,948,819 for 1951. As a result of higher operating costs, however, net operating revenues before provision for Federal income taxes decreased to $6,047,939 in 1952, or 23.1 percent below the $7,861,188 reported in 1951.

During 1952, the volume of international radiotelephone calls and the revenues therefrom continued their upward trends and exceeded

the previous record highs established in 1951. The chargeable calls in 1952 rose to a total of 982,860, an increase of 5.4 percent over the previous year. The resulting revenues (including associated landline charges) amounted to $10,345,161 for 1952 or 2.1 percent above those in 1951.

International Services

Telegraph circuits.—At the close of fiscal 1953, 87 foreign countries and overseas points were served by United States radiotelegraph carriers, either by direct radiotelegraph circuits or via the Tangier, North Africa, relay stations. Of this number, 23 were served primarily via the Tangier relay stations, or 12 more than the year previous. Service via Tangier increased because of difficult radio propagation conditions over the North Atlantic. As a result, more reliable service has been provided, particularly to countries in Northern Europe, the Near East and Asia. Relayed service is also provided to many countries in the Far East via the stations of United States companies operating in the Philippine Islands. In addition, connections with the facilities of foreign carriers make telegraph communication possible with most other points in the world.

Certain of the United States radiotelegraph carriers have continued to provide program transmission and reception service. Many of the world news "round-ups" broadcast in the United States are handled by these carriers. The United Nations and the Department of State have utilized program transmission facilities to transmit information to distant points where it is retransmitted in local areas by foreign broadcast stations.

Some United States radiotelegraph carriers also provide radiophoto transmission and reception service which is used primarily by news distributing agencies.

International leased telegraph channel service continues in increasing demand. Such channels provided by United States carriers are used principally by United States and foreign governments and by airlines operating in the international air-travel service.

The demand for international teletypewriter exchange service is also increasing. This service, which is similar to TWX service within the United States, permits subscribers in the New York and Washington areas to conduct two-way teletypewriter communications with subscribers in 11 European countries. Such service is also available between San Francisco and Honolulu.

Telephone circuits.—Radiotelephone message toll service was in effect with 106 foreign countries and overseas points at the close of the year. Of this number, 58 were served directly, while the rest were

served through connecting carriers at the distant points. At the close of the previous fiscal year 93 foreign countries and overseas points were served, 55 being served directly. Bell System companies continued to provide program service and private line service to many foreign countries and overseas points.

Merger.—The Senate Committee on Interstate and Foreign Commerce is continuing its studies of communications pursuant to the authority contained in Senate Resolution 41, 83d Congress, 1st session (1953). Included is the question of legislation authorizing the merger of international telegraph companies.

Applications.—During the fiscal year, licensees in the international fixed public service filed a total of 591 applications for authorizations for additional frequencies, transmitters, and points of communications, as well as for renewal of licenses and temporary authorizations. Licensees in the radiotelegraph service accounted for 430 of these applications while the others were filed by radiotelephone licensees. The Commission acted on practically all of these applications, as well as approximately 100 applications carried over from the previous year.

Applications for authority to use additional frequencies continued to constitute a large proportion of the total volume. This is a result of the Geneva, 1951, agreement whereby the fixed service operations are being gradually transferred to frequencies in accordance with the Atlantic City Table of Frequency Allocations.

About 90 new "in-band" frequency assignments have been made to stations in the international fixed public service and approximately the same number of "out-of-band" frequencies have been deleted. At the close of the year, 35 "out-of-band" frequencies or less than 5 percent of the total assignments remain authorized to the companies in the international fixed public service. This means that approximately two-thirds of all of the "out-of-band" frequencies previously assigned have been deleted from the licenses. Because of the crowded conditions in the spectrum, the problem of deleting the remaining third will be more difficult. However, it is expected that with some additional assignments and continued improvement of techniques in transmission and reception, the task will be completed within the time limits contemplated in the Geneva agreement.

In addition, the Commission has received and acted upon a number of miscellaneous applications filed by international carriers. These include requests for authorization to hold interlocking directorates in two or more companies, authorizations to decrease or discontinue service, and renewal of authorizations to supplement facilities of the international companies by the use of wire lines.

International Conferences

The Commission was represented at a conference held in London during July 1952 to consider further revisions of the Bermuda telecommunications agreement of 1945 (as revised in London 1949). The resulting revisions became effective October 1, 1952. They provide that (1) the accounts for telegraph traffic exchanged between the United States and the United Kingdom or Commonwealth countries shall be drawn up in dollars at the settlement rates in effect July 1, 1952; and (2) where payment is due in a currency other than dollars the conversion of the dollar balances into the currency of payment shall be made at the then current rate of exchange.

The Commission was also represented at the seventh plenary meeting of the International Telegraph Consultative Committee (CCIT) held in Arnhem, Holland, in May–June 1953. The meeting adopted recommendations of the CCIT study groups relating to standardization of operating practices and equipment used in international telegraphy, including facsimile and phototelegraphy.

Docket Cases

Western Union—Globe and Tropical contracts.—Reference was made in the previous annual report to the complaint proceeding (docket 9292) involving the lawfulness of certain agreements between The Western Union Telegraph Company, on the one hand, and Globe Wireless, Ltd., and Tropical Radio Telegraph Company, on the other hand, for the exchange of specified international telegraph traffic. On May 18, 1953 the Commission issued its final decision wherein it concluded that the agreements violate Section 222 of the act and the formula prescribed under the authority of that section, and ordered Western Union, Globe and Tropical to cease and desist from transferring traffic pursuant to such contracts. In addition, it ordered that the parties enter into negotiations with a view to reaching agreement on the question of damages and report the results to the Commission by July 15, 1953. On June 11, 1953, the Commission granted petitions of Western Union, Globe and Tropical for a stay of the effective date of the order pending a decision on petitions for rehearing.

Bank and Fund case.—The 1952 annual report mentioned the proceeding (docket 9362) occasioned by the complaint of the International Bank for Reconstruction and Development and the International Monetary Fund against certain United States international telegraph carriers. This case presented for determination by the Commission the question of whether these agencies should be accorded

the same rates for their outbound official telegraph communications as those accorded to certain governments for similar communications. The Commission's final decision, released March 23, 1953, covered all issues except the question of damages, and held that the Bank and Fund were entitled to government rates provided that, in each case, equivalent rates were accorded these organizations on their official inbound messages and that settlements of traffic accounts were made on the basis of such rates. As of June 30, 1953, 13 countries which are members of the Bank and Fund had agreed to participate in the handling of its messages at government rates. The question of damages was under negotiations at the close of the year.

Puerto Rico application.—Reference was made in the previous annual report to the pendency of an initial decision on the applications of Mackay Radio and Telegraph Company and All America Cables and Radio, Inc., for modification of their respective licenses to permit them to operate a radiotelegraph circuit between the United States and Puerto Rico on a regular instead of an emergency basis (docket 10056). On September 4, 1952, the hearing examiner proposed to deny these applications. Exceptions were filed and oral argument, originally scheduled for February 24, 1953, was postponed upon petition of Mackay and All America.

Western Union divestment.—Section 222 of the Communications Act, which authorized the merger of the Western Union Telegraph Co., and Postal Telegraph, Inc., specifically required that any merger plan should provide for the divestment by Western Union of its international telegraph operations within a reasonable time, and after the Commission found the compensation for the property to be divested commensurate with its value. In approving the merger in 1943, the Commission required Western Union to exercise due diligence to effect such divestment (docket 6517). Since Western Union had not effected this divestment, the Commission on March 5, 1952 instituted an investigation and hearing (docket 10151) into the matter. Hearings were held on 14 days between October 7, 1952 and May 22, 1953 and then recessed until August 4, 1953.

Metropolitan area tieline service.—This is a consolidated proceeding involving complaints by the Western Union Telegraph Co., against an existing tariff provision of RCA Communications, Inc. (docket 10335), and a similar proposed tariff provision of the American Cable and Radio Corporation (AC&R) operating companies, All America Cables & Radio, Inc., the Commercial Cable Co., and Mackay Radio & Telegraph Co., Inc. (docket 10378), relative to the furnishing of teleprinter equipment. The provision in question provides that the companies will, upon reasonable request therefor, provide, install,

275623—53——5

and maintain upon the customer's premises in "metropolitan areas" of cities where the carrier has operating telegraph offices, teleprinters connected by wire with such telegraph offices. Formerly, the defendants limited such teleprinters to the customer's premises located within the "corporate limits" of such cities. The issues presented involve the clarity and lawfulness of the tariff provision, and the effect of the practices upon the international formula. At the request of the AC&R companies, the hearings in this matter originally scheduled to commence on March 3, 1953 were postponed.

Duplicate circuits to Turkey.—This is a consolidated proceeding (dockets 10360 and 10489) involving applications of Mackay Radio and Telegraph Company and RCA Communications, Inc., for modification of their point-to-point radiotelegraph licenses to authorize communication with Ankara, Turkey, and the application of Mackay to authorize communication with Istanbul, Turkey. These applications present two important policy questions. The first relates to the question of whether competing circuits to Turkey are in the public interest and the second relates to the question of whether the public interest would be served by authorizing a direct circuit to more than one point in Turkey. Hearings were originally scheduled to begin on March 3, 1953, but were postponed at the request of Mackay.

Buccaneer application.—This proceeding involves an application filed on June 9, 1952, by Buccaneer Line, Inc., for a new fixed public point-to-point radiotelephone station to be located at Jacksonville, Fla., to provide radiotelephone service between Jacksonville and certain points in the Yucatan peninsula of Mexico. This application was scheduled for hearing on April 14, 1953. At a prehearing conference held March 30, 1953, it appears that the American Telephone & Telegraph Co. was negotiating for the establishment of communication between the points desired by the applicant through interconnection of existing facilities. Buccaneer indicated that if such a service could be successfully established, it would not press its application. Accordingly, on March 31, 1953, the hearing was postponed indefinitely. A. T. & T. reported on June 15, 1953, that successful test calls had been made from Tarrytown, N. Y., and Colonia, Yucatan, but that additional tests, including test calls between Jacksonville and points in Mexico, were considered essential before determining the feasibility of the service.

Press Wireless application.—On June 8, 1953, Press Wireless, Inc., requested special temporary authorization to communicate with Hamilton, Bermuda, for the purpose of handling press traffic in connection with the then tentatively scheduled Three Power Conference. RCA Communications, Inc., filed objections to the grant and the application

was designated for hearing (docket 10539). At a prehearing conference on June 11, 1953, the parties waived hearing and requested that the Commission decide the matter on the basis of the pleadings filed by the parties in interest and other relevant data in the Commission's files. Accordingly, the Commission canceled the hearing and, on June 17, 1953, granted the Press Wireless application.

Rates and Tariffs

Rate levels.—There were no changes in the level of rates for telegraph traffic outbound from the continental United States. In the case of telegraph traffic inbound to the United States there were changes in several instances. Of particular interest was the change in rates for telegraph traffic inbound to the United States from the United Kingdom. This upward revision amounting to about 5 cents per full rate word was put into effect September 1, 1952. It is estimated that this new inbound rate, together with certain changes in the division of tolls arrangements between the United States international telegraph carriers and their British correspondents, will provide approximately $800,000 in additional annual revenues to the United States carriers.

Marine rate case.—This is a consolidated proceeding involving an investigation into the matter of charges for coast-station and landline handling of marine traffic (docket 9915) and a complaint by Tropical Radio Telegraph Co. that the Western Union Telegraph Co. had failed to comply with the formula for the distribution of outbound traffic in its division of tolls with Tropical (docket 9822).

The effect of the Commission's action in docket 9915 was: (*a*) to provide additional needed revenues; (*b*) to end an existing disparity between landline and coast-station charges applicable to traffic inbound from ships of foreign registry, on the one hand, and all other marine traffic, on the other; (*c*) to establish a uniform country-wide landline charge for the domestic handling of marine traffic in lieu of a previous zonal system; and (*d*) to end the then existing differences in the divisions of tolls between Western Union and the several marine carriers for the domestic handling of marine traffic. It was estimated that the revised landline rates would produce approximately $75,000 in additional annual revenues to Western Union. The overall annual increase in revenues accruing to the major marine carriers from both the new landline and coast-station rates was estimated at about $110,000.

On May 18, 1953, the Commission issued its decision in the Tropical complaint (docket 9822). It stated therein that the power to prescribe

division of tolls under Section 222 (e) of the act relates to divisions to be observed in the future and does not give the Commission authority to make retroactive adjustments of divisions covering periods prior to the prescription or approval of a specific method for dividing charges. The Commission, therefore, denied the petition insofar as it requested damages for past periods.

Tariff schedules.—At the end of the fiscal year, 94 international cable and radiotelegraph carriers had tariffs or concurrences on file with the Commission. During the year, these carriers filed 1,211 tariff publications establishing or changing rates, regulations, practices, or classifications of service.

Special tariff permissions.—During fiscal 1953 the Commission received and acted upon 40 applications wherein special permission was requested to make changes in existing international telegraph tariff schedules on not less than 1 day's notice.

Contracts and divisions of tolls.—International and marine telegraph carriers filed 267 new contracts, 664 amendments to existing contracts, and 108 reports of negotiations with other carriers and with foreign administrations. In addition, various international telegraph carriers filed 357 statements showing revisions in the division of charges for telegraph messages exchanged between these companies and their overseas correspondents.

Other Regulatory Matters

Depreciation.—Continued progress was made in studies relating to the reasonableness of annual depreciation rates and charges, the recorded depreciation reserves, and the propriety of the depreciation practices of the international telegraph carriers. Further progress was also made in developing information necessary for the Commission to prescribe annual rates of depreciation for these carriers. It may therefore be possible to prescribe depreciation rates for some of these carriers in fiscal 1954.

Continuing property records.—Two of the three international telegraph carriers that had not, at the end of fiscal 1952, completely fulfilled the requirement to establish and maintain continuing property records completed the restatement of their basic records during the year. The third carrier has made considerable progress and is expected to complete its record by the end of fiscal 1954.

Relief and pensions.—Four carriers introduced further changes in their pension arrangements during fiscal 1953, primarily to expand the coverage of employees and to effect liberalization of benefits.

Reclassification of plant.—At the end of fiscal 1953, final adjust-

ments in the accounts of three international telegraph carriers in the matter of restatement of plant on the basis of original cost has not been completed. On the basis of the progress made and with the advice and assistance of the Commission it is expected that the matter will be resolved during fiscal 1954.

Uniform system of accounts.—Plans were made to merge the accounting rules applicable to domestic telegraph operations with those applicable to international operations. This has required special attention to such matters as leased plant accounting, messenger uniforms, depreciation accounting, and domestic revenue.

Preservation of records.—An interpretation of the preservation of records regulations was made with respect to vouchers, invoices, and certain payroll data affecting the plant accounts. Since the carrier was interpreting the rules as providing for retention of these records for a longer period than required, this interpretation provided relief with respect to storage facilities.

In administering the preservation of record rules consideration has been given to the need for retention of certain records in which other agencies of the Government have a special interest.

Annual and other reports to the Commission.—All reports were modified and relief extended on the filing of certain statistical data. As at the close of the fiscal year 1953, rulemaking was in progress with regard to revising the reporting requirements.

STATISTICS

General

Reports were filed on an annual basis by 305 common carriers and 21 controlling companies for the calendar year 1952. Considerable financial and operating data taken principally from these reports are published annually in a volume entitled "Statistics of the Communications Industry in the United States". The larger telephone and telegraph carriers also file monthly reports of revenues and expenses, and summaries of these data are published monthly by the Commission.

Telephone Carriers

The annual reports received from common carriers include those from 91 telephone carriers and 195 carriers engaged in rendering mobile radio-telephone service. Selected financial and operating data concerning large telephone carriers for the year 1952 as compared with 1951 are shown in the following table:

Telephone carriers [1]

Item	1951	1952	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$11, 546, 812, 614	$12, 608, 517, 366	9. 19
Depreciation and amortization reserves	$3, 186, 343, 655	$3, 411, 440, 935	7. 06
Net investment in plant and equipment	$8, 360, 468, 959	$9, 197, 076, 431	10. 01
Local service revenues	$2, 258, 925, 770	$2, 516, 731, 327	11. 41
Toll service revenues	$1, 403, 479, 156	$1, 534, 854, 055	9. 36
Total operating revenues	$3, 817, 536, 794	$4, 228, 750, 352	10. 77
Operating expenses	$2, 698, 098, 095	$2, 986, 565, 273	10. 69
Taxes	$659, 279, 145	$737, 732, 268	11. 90
Net operating income after all taxes	$460, 159, 854	$504, 452, 211	9. 63
Net income	$377, 423, 081	$420, 733, 463	11. 48
Dividends declared	$303, 374, 075	$346, 388, 050	14. 18
Company telephones:			
Business	12, 346, 101	12, 899, 770	4. 48
Residence	27, 568, 621	28, 987, 800	5. 15
Number of calls originating during the year:			
Local [2]	66, 620, 928, 423	68, 369, 589, 937	([3])
Toll [2]	2, 140, 402, 857	2, 194, 086, 251	([3])
Number of employees at end of October	586, 809	615, 141	4. 83
Male	198, 209	207, 350	4. 61
Female	388, 600	407, 791	4. 94
Total compensation for the year	$1, 975, 535, 384	$2, 200, 657, 106	11. 40

[1] Intercompany duplications, except in minor instances, have been eliminated.
[2] Partly estimated by reporting carriers.
[3] The number of calls shown are not comparable, as many calls were reclassified from "Toll" to "Local" during 1952, due to enlargement of numerous local calling areas.

Business and Residence Telephones by States

There were 48,056,300 telephones in the continental United States of which 33,618,900 were located in residences, and 14,437,400 in business establishments, as of January 1, 1953. The number of telephones arranged by States, are shown in the following table. The figures were compiled by the American Telephone & Telegraph Co. and are partly estimated.

State	Business	Residence	Total
Alabama	137, 900	352, 900	490, 800
Arizona	72, 300	122, 900	195, 200
Arkansas	88, 100	188, 500	276, 600
California	1, 468, 200	2, 873, 300	4, 341, 500
Colorado	156, 000	339, 500	495, 500
Connecticut	242, 600	633, 400	876, 000
Delaware	42, 700	92, 700	135, 400
District of Columbia	257, 200	281, 300	538, 500
Florida	335, 100	495. 400	830. 500
Georgia	209. 900	464, 900	674, 800
Idaho	44. 400	110, 600	155. 000
Illinois	1, 043. 400	2, 224, 700	3, 268. 100
Indiana	315, 100	928, 700	1, 243. 800
Iowa	178, 700	688, 700	867. 400
Kansas	154, 100	493, 800	647, 900
Kentucky	141. 200	380, 200	521. 400
Louisiana	175. 400	417, 800	593, 200
Maine	61. 900	182. 600	244, 500
Maryland	219, 500	551, 500	771, 000
Massachusetts	497, 900	1, 204, 500	1, 702, 400
Michigan	593. 400	1, 667, 900	2, 261, 300
Minnesota	242, 500	738. 100	980. 600
Mississippi	75. 100	179. 600	254, 700
Missouri	358, 300	888, 800	1, 247. 100
Montana	48, 800	116. 300	165. 100
Nebraska	104, 600	327, 600	432, 200
Nevada	25, 200	33. 200	58, 400
New Hampshire	39, 800	116, 600	156, 400
New Jersey	537, 700	1, 325, 300	1, 863, 000
New Mexico	61. 200	85, 300	146, 500
New York	2, 164, 600	4, 045, 500	6. 210, 100

State	Business	Residence	Total
North Carolina	197,900	468,200	666,100
North Dakota	34,300	101,600	135,900
Ohio	739,700	2,153,700	2,893,400
Oklahoma	184,500	443,600	628,100
Oregon	144,900	345,300	490,200
Pennsylvania	937,500	2,549,200	3,486,700
Rhode Island	76,200	183,600	259,800
South Carolina	95,400	205,100	300,500
South Dakota	38,900	124,200	163,000
Tennessee	196,900	513,900	710,800
Texas	700,000	1,500,800	2,200,800
Utah	63,400	162,100	225,500
Vermont	25,300	73,300	98,600
Virginia	249,200	549,000	798,200
Washington	241,700	582,000	823,700
West Virginia	102,500	280,500	383,000
Wisconsin	288,100	771,100	1,059,200
Wyoming	28,300	59,600	87,900
United States	14,437,400	33,618,900	48,056,300

Land-Line Telegraph

Annual reports containing financial and statistical data for the calendar year 1952 were received from 19 domestic and international telegraph carriers. The accompanying table sets forth financial and operating data relating to the domestic land-line operations of the Western Union Telegraph Co. for the calendar year 1952 as compared with 1951. The data pertaining to its cable operations are included in a later table relating to ocean-cable carriers.

The Western Union Telegraph Co.[1]

Item	1951	1952	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$284,293,024	$286,371,865	0.73
Depreciation and amortization reserves	$123,825,430	$126,579,820	2.22
Net investment in plant and equipment	$160,467,594	$159,792,045	(0.42)
Message revenues	$161,739,467	$153,086,977	(5.34)
Total operating revenues	$192,089,102	$184,336,414	(4.04)
Operating expenses, depreciation and other operating revenue deductions	$182,022,613	$183,394,757	0.75
Net operating revenues	$10,066,489	$941,657	(90.65)
Provision for Federal income taxes	$4,007,000	[2] $200,000	(95.01)
Net income (or deficit)	$4,711,159	($724,008)	(115.37)
Dividends declared	$3,381,229	$3,688,959	9.10
Number of revenue messages handled [3]	189,636,984	159,735,155	(15.77)
Number of employees at end of October	40,319	39,853	(1.16)
Total compensation for the year	$127,818,175	$126,974,301	(.66)

[1] Represents data for land lines operations. Figures covering cable operations are included in the table below relating to ocean-cable carriers.

[2] Represents the provision for Federal income taxes on the net income of the company as a whole. Although applicable to both wire-telegraph and ocean-cable systems, this amount has not been allocated to such systems by the carrier in its records.

[3] Includes domestic transmission of transoceanic and marine messages (about 8,882,000 in 1951 and about 8,620,000 in 1952).

Radiotelegraph and Ocean-Cable Carriers

There are shown in the accompanying tables the principal financial and operating statistics selected from the annual reports filed by the United States radiotelegraph and cable carriers furnishing inter-

national communications services. These tables compare the figures for the calendar year 1952 with those for the previous year.

Radiotelegraph carriers

Item	1951	1952	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$38, 812, 497	$37, 930, 603	(2. 27)
Depreciation and amortization reserves	$18, 508, 966	$16, 966, 280	(8. 33)
Net investment in plant and equipment	$20, 303, 531	$20, 964, 323	3. 25
Message revenues:			
Domestic [1]	$1, 901, 113	$1, 830, 865	(3. 70)
Transoceanic	$21, 974, 835	$21, 599, 495	(1. 71)
Marine	$1, 400, 484	$1, 529, 491	9. 24
Total operating revenues	$29, 887, 139	$30, 582, 922	2. 33
Operating expenses, depreciation and other operating revenue deductions	$25, 258, 232	$26, 563, 787	5. 17
Net operating revenues	$4, 628, 907	$4, 019, 135	(13. 17)
Provision for Federal income taxes	$2, 450, 080	$2, 434, 414	(. 66)
Net income	$2, 577, 215	$2, 314, 585	(10. 19)
Dividends declared	$10, 000	$503, 000	4, 930. 00
Number of revenue messages handled:			
Domestic [2]	57, 957	57, 706	(. 28)
Transoceanic	10, 980, 288	10, 956, 917	(. 21)
Marine	958, 473	1, 039, 681	8. 48
Number of employees at end of October	5, 472	5, 949	8. 7
Total compensation for the year	$20, 082, 510	$22, 295. 352	11. 02

[1] Includes revenues from the domestic transmission of transoceanic and marine messages, and revenues from domestic classification messages (primarily Canadian and Mexican).
[2] Represents domestic classification messages (primarily Canadian and Mexican).

Ocean-cable carriers (including cable operations of the Western Union Telegraph Co.)

Item	1951	1952	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$88, 497, 874	$89, 170, 714	0. 76
Depreciation and amortization reserve	$55, 419, 954	$55, 957, 080	. 97
Net investment in plant and equipment	$33, 077, 920	$33, 213, 634	. 41
Message revenues:			
Domestic [1]	$187, 605	$182, 616	(2. 66)
Transoceanic	$21, 002, 729	$19, 773, 917	(5. 85)
Total operating revenues	$27, 061, 680	$27, 022, 455	(. 14)
Operating expenses, depreciation, and other operating revenue deductions	$23, 829, 399	$24, 993. 651	4. 89
Net operating revenues	$3, 232, 281	$2, 028, 804	(37. 23)
Provision for Federal income taxes	$1. 053, 000		
Net income	$1, 919, 012	$2, 078, 484	6. 64
Dividends declared	$353, 468		
Number of revenue messages handled:			
Domestic [2]	79, 037	81, 897	3. 62
Transoceanic	9, 903, 807	9, 599, 431	(3. 07)
Number of employees at end of October	5, 453	5, 591	2. 53
Total compensation for the year	$13, 037, 247	$13, 759, 322	5. 54

[1] Includes revenues from the domestic transmission of transoceanic messages, and revenues from domestic classification messages (primarily Canadian).
[2] Represents domestic classification messages (primarily Canadian).

International Telegraph Traffic

Reports of international telegraph traffic statistics received from cable and radiotelegraph carriers indicate that a total of 516,261,573 paid words were handled into and out of the United States during the calendar year 1952. In the outbound direction, a total of 258,393,146 paid words were transmitted, while 257,868,427 paid words were received in the inbound direction. The volume of international tele-

graph traffic exchanged between the United States and each of the principal countries of the world during 1952 is shown in the following table.

International telegraph (radio and cable) traffic in words, 1952 (includes traffic transiting the United States)

Country	Number of words		Country	Number of words	
	Outbound from the United States	Inbound to the United States		Outbound from the United States	Inbound to the United States
EUROPE, AFRICA, AND THE NEAR EAST			**WEST INDIES, CENTRAL, NORTH, AND SOUTH AMERICA—continued**		
Algeria	162,478	116,678	British Honduras	114,563	121,984
Arabia	933,249	1,011,923	Canada	7,689,192	9,556,888
Austria	1,432,081	1,619,491	Canal Zone	842,798	887,946
Belgian Congo	348,800	301,345	Chile	2,527,797	2,768,043
Belgium	4,698,405	4,051,689	Colombia	4,942,809	4,619,045
British East Africa	267,519	265,273	Costa Rica	784,119	668,028
British West Africa	233,843	203,262	Cuba	6,165,249	8,635,923
Czechoslovakia	550,659	524,619	Dominican Republic	1,204,514	1,203,749
Denmark	1,735,300	1,102,624	Ecuador	1,299,608	824,145
Egypt	1,381,306	1,519,756	Guatemala	1,180,598	1,314,664
Ethiopia	146,972	115,610	Haiti	746,510	714,783
Finland	646,148	740,258	Honduras Republic	733,707	651,991
France	14,562,901	13,329,952	Jamaica	839,703	695,079
French West Africa	125,605	67,010	Mexico	1,943,138	1,555,044
Germany	11,469,293	12,989,954	Netherlands West Indies	1,063,647	1,180,824
Greece	1,802,051	1,336,104	Nicaragua	746,301	664,299
Hungary	268,790	208,207	Other British West Indies [1]	163,707	108,086
Iceland	248,259	253,631	Panama	1,234,078	960,519
Iran	567,919	698,073	Paraguay	218,689	272,440
Iraq	264,547	176,077	Peru	2,262,778	1,854,001
Ireland	775,035	902,298	Puerto Rico	3,607,300	3,494,803
Israel	2,983,510	2,877,464	Salvador	818,632	693,205
Italy	9,671,415	7,894,853	Surinam	138,815	138,670
Lebanon	1,009,589	1,107,004	Trinidad	719,086	464,208
Liberia	486,255	611,893	Uruguay	2,060,255	1,828,924
Libya	108,470	64,427	Venezuela	6,427,349	7,547,772
Luxembourg	111,930	87,063	Virgin Islands	296,369	278,578
Morocco—French	678,457	639,633	All other places	154,425	82,444
Morocco—Tangier	593,821	497,521	Total	69,844,132	74,519,964
Netherlands	6,683,127	5,905,044			
Norway	2,769,600	2,174,411	**ASIA AND OCEANIA**		
Persian Gulf	360,363	484,762	Afghanistan	153,888	101,040
Poland	688,767	401,318	Australia	3,249,729	2,963,119
Portugal	1,507,887	945,164	Burma	615,352	197,472
Portuguese East Africa	105,082	102,707	Ceylon	534,208	396,180
Rhodesia	91,840	112,828	China (excluding Hongkong)	78,559	153,338
Roumania	102,825	63,348	Formosa	1,070,468	977,986
Spain	3,456,549	2,047,266	French Indo-China	217,513	230,671
Sweden	3,281,880	2,741,989	Guam	506,007	682,335
Switzerland	7,130,746	4,801,343	Hawaii	4,658,813	4,450,252
Syria	215,487	181,005	Hongkong	1,860,058	1,801,595
Transjordania	353,573	184,573	India	4,880,579	4,946,663
Trieste, Free Territory of	182,692	159,108	Indonesia	2,624,420	2,721,752
Tunisia	108,637	81,446	Japan	13,609,698	18,084,268
Turkey	1,127,080	839,002	Korea	310,298	457,724
Union of South Africa	2,504,665	2,629,429	Malaya, Federation of	1,475,257	1,506,544
U. S. S. R	5,169,132	2,271,381	New Zealand	1,098,235	952,471
United Kingdom	47,251,735	47,828,569	Okinawa	387,197	632,883
Yugoslavia	938,988	814,821	Pakistan	1,671,885	1,585,170
All other places	875,692	1,828,149	Philippines	4,889,396	5,804,391
Total	143,170,954	131,911,355	Thailand (Siam)	1,096,011	1,062,842
			All other places	271,643	252,336
WEST INDIES, CENTRAL, NORTH, AND SOUTH AMERICA			Total	45,259,214	49,961,032
Argentina	5,623,826	6,738,099			
Bahamas	810,748	925,396	Unknown destination or origin	118,846	1,476,076
Barbados	211,933	158,049			
Bermuda	941,562	931,243	Grand total	258,393,146	257,868,427
Bolivia	810,212	838,995			
Brazil	10,319,856	10,961,201			
British Guiana	179,959	180,894			

[1] Points not listed separately.

Safety and Special Radio Services

GENERAL

The Safety and Special Radio Services include most of the non-broadcast radio services and comprise by far the largest number of radio stations authorized by the Commission. They are utilized by a broad segment of the public—including individuals, industry, commerce, and state and local governments—in connection with the protection of life and property, industrial and agricultural production, transportation, and civil aid and defense.

There are four general classes of these services:

Safety services—Marine, Aeronautical, Police, Fire, Forestry-Conservation, Highway Maintenance, Special Emergency, and State Guard.

Industrial services—Power, Petroleum, Forest Products, Special Industrial, Low-power Industrial, Relay Press, Motion Picture, Agriculture, and Radiolocation-land.

Land Transportation services—Railroad, Urban Transit, Intercity Bus, Taxicab, Automobile Emergency, and Highway Truck.

Amateur, Disaster Communications, and Citizens services.

These services continue to expand, as indicated in the statistical tables at the end of this chapter. The number of their authorizations now exceeds 232,000, representing the use of nearly 585,000 transmitters.

More and wider usage of radio is being employed for safety and special purposes. Direct public benefits are received from increased efficiency in police and fire protection, safety in navigation by ships and aircraft, emergency calls for doctors, ambulances, tow trucks, etc. The public benefits indirectly through the ever increasing employment in industry and commerce of modern radio equipment. It has been found that the operating efficiency of industry, transportation, pipeline, power and other utilities can be increased through the use of radio, thus providing better service at lower cost.

Licensing and regulatory problems become more complex as additional transmitters are permitted to operate. The privilege to use radio in these services is not exclusive but is granted for shared use of frequencies on the basis of applicant's membership in an eligible

group. Hence, a high level of compliance with regulations governing operation of these stations is necessary. This places an increasing importance on the functions of enforcement on a nationwide scale.

MARINE RADIO SERVICES

Safety at Sea

The basic radio laws currently governing marine safety at sea are contained in (1) the International Convention for the Safety of Life at Sea, (2) Title III, Part II of the Communications Act, and (3) the Ship Act of 1910, as amended. These laws require the installation of radio equipment, and provide for qualified radio operators and other safety features. They apply respectively to (1) certain classes of ships engaged on international voyages and registered in countries signatory to the Safety Convention, (2) certain classes of United States vessels when navigated on the high seas (approximately 1,882 ships), and (3) a few vessels on the Great Lakes. In addition, vessels of countries not parties to the Safety Convention are subject to Title III, Part II of the Communications Act when leaving United States ports.

The International Convention for the Safety of Life at Sea, which was negotiated in London in 1948, became effective November 19, 1952. In order to translate requirements of the new convention into rules for the guidance of industry and to facilitate Commission administration, the Commission on October 23, 1952, adopted brief temporary rules reflecting the additional minimum, nondeferrable requirements. This was an expedient due to the lack of sufficient staff to prepare in advance appropriately detailed rules. The use of the abbreviated temporary rules necessitated numerous subsequent interpretations.

Since November 19, 1952 some progress has been made in providing certain detailed rules. Thus, on December 3, 1952, detailed rules applicable to nonportable and portable compulsory lifeboat radio equipment were adopted. Thereafter, two types of portable lifeboat radio equipment, developed by the electronics industry in accordance with these rules, were type-approved by the Commission. Each consists of a single portable unit weighing not over 60 pounds, capable of floating after being dropped into the sea. Power is secured from a hand-driven generator. The unit contains a two-frequency (500 kilocycles and 8,364 kilocycles) radiotelegraph transmitter, an automatic keyer to permit transmission of the international radiotelegraph distress signal by a person unfamiliar with the International Morse Code, a dual frequency range radiotelegraph receiver, and an antenna system usable in any lifeboat regardless of whether or not a sailing mast is available to support it.

Title III, Part II of the Communications Act.—On March 5, 1953, the Commission submitted to Congress proposed amendments to this section. They were made in the interests of eliminating inconsistencies between the act and the new Safety Convention and to facilitate the administration of both laws. As of June 30, 1953, these proposals had not yet been introduced as bills.

Ship Act of 1910.—During the year the Commission proposed that Congress repeal the Ship Act as of November 13, 1954. On May 20, 1953, such a bill (S1947) was introduced. This proposal resulted from the conclusion of a treaty (Agreement for the Promotion of Safety on the Great Lakes by Means of Radio) with Canada, which will come into force on November 13, 1954. Under the terms of the agreement, radiotelephone safety is provided for several hundred vessels navigating the lakes. A study has been initiated, but not concluded, of legislation which might be necessary to implement this agreement. A parallel study has also been commenced to determine what related rules should be promulgated by the Commission but, because of lack of personnel, no substantial progress has been made.

Exemptions from compulsory safety requirements.—The Commission is authorized by the International Convention for the Safety of Life at Sea and section 352 (b) of the Communications Act to, within prescribed limits, grant exemptions from ship radio installation requirements to certain vessels or classes of vessels. Under this authority it renewed previously granted blanket exemption for one year to all passenger vessels of 15 gross tons or under when navigated not more than 20 nautical miles from the nearest land or more than 200 nautical miles between two consecutive ports; to all passenger vessels of less than 100 gross tons when navigated within certain prescribed areas along the United States coasts; and to a number of individual vessels, most of which were to cover a single voyage.

Individual applications for exemption received during the year numbered 48, of which 35 were granted. Only two vessels of more than 1,600 gross tons were granted original exemptions covering extended periods of navigation. One was a passenger vessel on very short voyages between Wilmington, Calif., and Catalina Island, Calif.; and the other was a cargo vessel specially constructed to use the New York State Barge Canal, which will be navigated on short coastwise voyages along the Atlantic Coast for a 3-month period each year. Both exemptions stipulated that a radiotelephone installation be carried and a radiotelephone watch be maintained.

Distress studies.—Studies of distress communication, made pursuant to section 4 (o) of the Communications Act, are used to strengthen the rules of the Commission to promote use of marine radio for safety of life and property. The international radiotelegraph

distress signal (SOS) was used throughout the world 273 times during the year. This was by or in behalf of 206 foreign ships, 23 United States ships, 37 foreign aircraft and 7 United States aircraft.

A telegraph alarm signal, transmitted before the distress signal, actuates autoalarms on vessels not maintaining continuous listening watch (generally cargo ships which carry only one operator), thus alerting the operator to receive the subsequent distress message. The effectiveness of this device was demonstrated in numerous distress cases during the year. One alarm signal sent by a coast station at Amagansett, N. Y., for the SS *Archimede* in distress in mid-Atlantic, sounded autoalarms on 82 ships within a radius of a thousand miles.

Radiotelephone automatic alarm.—Reports indicate that France and the United Kingdom have been actively engaged in the study program established by the International Radio Consultative Committee (CCIR) in 1951 for the purpose of determining the suitability of a provisionally adopted radiotelephone automatic alarm signal on the basis of thorough tests. By contrast, neither our Government nor industry has found it possible to participate to more than a limited extent. In view of the forthcoming seventh meeting of the CCIR to be held in the fall of 1953 at London, it would appear that adoption of a worldwide radiotelephone alarm signal will be considered without benefit of suitable practical tests in the western hemisphere.

Radio Aids to Navigation

Shore-based radar stations are being developed to assist in the safety piloting of ships entering, leaving, or mooring within harbors. Since the Coast Guard has the responsibility of providing and supervising public aids to marine navigation, the establishment of these private aids is effected only with its concurrence. Very high frequency maritime radiotelephone systems are being used developmentally by these radar stations.

Authorizations were renewed for operation on a developmental basis of shore-based radar stations in the harbors of Long Beach, San Francisco, and Los Angeles, Calif., and a new station at Port Angeles, Wash., was authorized. A station at New York, N. Y., was discontinued during the year. Two shore radar stations were authorized for use in the Gulf of Mexico for the navigation of vessels in connection with oil-well drilling operation.

As of June 30, 1953, approximately 2,262 United States ships were authorized to use radar.

General Marine Radio Communication Systems

Two-way communication between coast stations and ship stations using radiotelegraph or radiotelephone accounts for the great bulk

of frequency utilization in the maritime mobile service. Such communication may be public correspondence or for business or for ship operational purposes. Frequencies involved range widely throughout the radio spectrum covering service over distances of a few miles up to several thousands of miles. Thus, these stations may be in overlapping categories. However, the following figures (as of June 30, 1953) reflect some of the more important categories:

Utilizing frequencies in the 2–3 megacycle band for telephony:	
Public coast	47
Limited coast	4
Ship	34,800
Utilizing very high frequencies for telephony:	
Public coast	21
Limited coast	82
Public ship	1,360
Limited ship	690
Utilizing high frequencies for long distance telephony:	
Public coast	5
Utilizing various frequencies for telegraphy:	
Public coast	32

One of the most significant factors affecting maritime stations during recent years has been the substantial progress made in implementing the Atlantic City Table of Frequency Allocations below 27 megacycles. This has been carried on in accordance with principles, schedules and plans set forth in the Geneva (1951) Agreement. Because of the variety of frequencies employed in the maritime service, the impact of changes in frequency assignments has been felt very heavily by the maritime stations. However, with the cooperation of various licensees, many frequencies have been released for use by other services in accordance with Atlantic City allocations while the maritime services, on the other hand, have activated many of their new frequencies.

As far as the Maritime Radio Services are concerned, the 22 megacycle band has been completely implemented as well as lower frequency telegraph bands; the newly allocated 2 megacycle telegraph band has been established for use on a day-only basis; the 5 and 11 megacycle bands have been relinquished; regulatory steps have been completed for inaugurating on September 1, 1953, on a worldwide basis, the new high frequency ship telegraph calling bands and abandonment of the old calling frequencies by October 1, 1953; a plan has been adopted for assignment of new and relinquishment of old high frequency coast and ship telephone frequencies; and a plan of assignment of high frequency coast telegraph frequencies has been promulgated.

In connection with this implementation program, the first overall revision of 2 megacycle maritime telephone frequencies since 1934 has been promulgated as proposed rule making. This is of major importance since it promises to relieve somewhat the severe congestion existing in this band in which the great bulk of ship stations conduct radiotelephone operations. Another important consequence will be the complete establishment of the frequency 2182 kilocycles as the radiotelephone distress and calling frequency in the 2 megacycle band. The proposal also designates an intership frequency (2830 kilocycles) exclusively for the Mississippi River, Gulf, and Caribbean areas; another intership frequency (2738 kilocycles) for the Atlantic and Pacific coasts, and a third intership frequency (2638 kilocycles) for nationwide usage.

Maritime Fixed Services

Stations in the martime fixed service are classed as marine fixed, marine control, marine repeater, marine relay, and receiver test stations.

Sixty-nine marine fixed stations are licensed. They communicate on ship radiotelephone frequencies, being normally located in coastal waters, and are authorized to communicate with public coast stations primarily for safety purposes. This class of station is intended to meet the communication needs of the petroleum industry in off-shore oil well drilling operations.

Four marine control and one marine repeater station have been authorized in this service. Operation of these stations is in the 72–76 megacycle band and they function in connection with the operation of coast stations.

Alaska Fixed Public and Maritime Mobile Services

Alaskan communities depend largely on radiotelephone and radiotelegraph communication for safety and business purposes because of the scarcity of wire line facilities. Special frequencies are allocated for communication between communities in Alaska, by the Alaska Communication System (ACS) and between coast and ship stations. The main intra-Alaska communication trunk lines are operated by ACS under the Department of National Defense. The ACS routes message traffic to all parts of the world. The Commission maintains liaison with it in coordinating communications facilities in Alaska to serve the public interest.

Revisions contemplated of Part 14 of the Rules Governing Radio Stations in Alaska dealing with the fixed public and maritime mobile

services. This project has been delayed because the limited Commission staff must give priority to more pressing work.

The Commission has partially implemented the Geneva frequency allocations for Alaska. This includes point-to-point operation on low frequencies in the fixed service, coastal telegraph in the medium frequency band, and replacement of two radiotelephone frequencies for point-to-point coast and ship communication. In addition, provision is made for assignment of a 2 megacycle coastal telegraph frequency for Alaska in accordance with the Geneva Agreement.

At the close of the fiscal year there were, exclusive of Government stations, 447 point-to-point telephone stations and 69 point-to-point telegraph stations operating in the fixed public service in Alaska. In addition, 10 public coast stations employing telegraphy and 358 public coast stations employing telephony are authorized.

Radio Technical Commission for Marine Services

The Radio Technical Commission for Marine Services (RTCM) was organized in 1947 so that Government and industrial agencies with marine electronic interests have a joint voice in determining the program and operations by which technical policies are recommended. The RTCM is a nonprofit organization and is supported by financial contributions from industry members and services from the Government. The Commission furnishes an electronics engineer as Executive Secretary for the RTCM.

Six special committees of RTCM are in operation:

Special Committee 16 is studying the need for a commercially adaptable and positive all-weather marine identification device to aid in the reduction of marine casualties and to facilitate the safe movement of vessels in congested and restrictive areas. This committee is giving primary consideration to the use of such a device by and between vessels equipped with marine radar and radio communication.

Special Committee 17 is studying the technical requirements for compulsory radiotelephone installations. The study, when approved by the RTCM, will contain recommendations for the efficient, practical and expeditious implementation of the requirements which must be met by Government and industry in carrying out the terms of the Safety of Life at Sea Convention.

Special Committee 18 was formed for the purpose of recommending a system of channel designators for maritime mobile channels. Its function is to provide a simple and standardized method of identifying the various radiotelephone channels and thereby eliminate the need of referring to channels by the frequency or frequencies used.

Special Committee 19 was organized to determine the nature and potential value of an effective maritime radiotelephone system for short range intercommunication for use by all types of military and nonmilitary vessels to meet the needs of ship operators.

Special Committee 21 was established for the purpose of studying ways and means to improve the present shipboard direction finder marine radiobeacon (285–325 kilocycle) system.

Special Committee 22 is studying the problem of providing world-wide common working frequencies for the maritime telephone service. The RTCM recommendation may furnish the basis for the United States proposal for the next Extraordinary Administrative Radio Conference.

AERONAUTICAL RADIO SERVICES

General

The Aeronautical Radio Services provide the necessary radio facilities for communication essential in connection with aircraft operation and safety of life and property in the air. These facilities consist of Aircraft radio stations, Aeronautical Land and Aeronautical Fixed stations, Airdrome Control stations, Aeronautical Mobile Utility stations, Aeronautical Advisory stations, Flying School stations, Flight Test stations, Aeronautical Public Service stations, Civil Air Patrol land and mobile stations, and Navigational Aid stations comprising radio beacons, radio ranges, radar services, direction finding systems, traffic control operations, approach and instrument landing systems, radio altimeters, and distance measuring devices.

Aviation Organizations and Conferences

The Commission has continued its participation in the various interagency coordinating and policy groups, both on a domestic and international scale, in order to deal with the many new problems which are occurring as a result of increasing telecommunications developments. The most important of these groups are the Air Coordinating Committee (ACC), the Radio Technical Commission for Aeronautics (RTCA), and the International Civil Aviation Organization (ICAO).

The ACC recommends United States policy on aviation to the President, and acts as a vehicle for coordinating aviation matters between the various departments of the Government and industry. The Commission is active in the ACC through its membership on the Technical Division and the following subcommittees of that division. Aeronautical Communications and Electronic Aids; Airspace—Rules

of the Air and Air Traffic Control; Search and Rescue; and Airmen Qualifications.

In addition, the Commission is represented on the Air Traffic Control and Navigational Panel which was established by the ACC on recommendation of the Congressional Aviation Policy Board and the President's Air Policy Commission, for the purpose of guiding the program for providing all-weather air navigation and traffic control facilities as well as a national air defense system.

The Commission is a member of the Radio Technical Commission for Aeronautics, which is a cooperative association of Government and industry aeronautical telecommunication agencies. The RTCA conducts studies of aeronautical telecommunications problems and related matters for the purpose of providing guidance to, and coordinating the efforts of, all organizations concerned. The Commission participates in meetings of the RTCA Executive Committee and serves on several of its special technical subcommittees. During the year it was active in connection with the following problems under consideration by the RTCA:

Implementation of the very high frequency utilization plan and review of transition period communication requirements;

High altitude grid plan for very high frequency omnidirectional radio range and distance measuring equipment (VOR/DME) frequency pairing;

Minimum performance standards for airborne electronic equipment for the transition common system;

Amended program for implementation of the common system of air navigation traffic control;

Evaluation of the necessity for VOR test signals; and

Helicopter air navigation communications and traffic control.

The International Civil Aviation Organization was established in 1944 for the purpose of developing standards, and to recommend practices for international civil aviation. During the fiscal year, the Commission (*a*) assisted in the preparation of the United States Navigation Conference which was held in Montreal; (*b*) assisted in preparing for and participated in the ICAO European-Mediterranean Frequency Planning Special Meeting, Paris; and (*c*) assisted in preparing for and participated in the ICAO Southeast Asia-South Pacific Regional Air Navigation Conference, Melbourne.

The Extraordinary Administrative Radio Conference (EARC) of the International Telecommunications Union (ITU) Geneva, 1951 concluded an agreement which allocated exclusive frequencies for the Aeronautical Mobile Route (R) service. During 1952 and continuing through the fiscal 1953, the Commission has participated in frequency planning and the implementation of this agreement.

Aircraft Radio Stations

At the end of the fiscal year there were more than 30,000 authorized aircraft radio stations, which represents an increase in the number of such stations over that of 1952. Of this figure nearly 28,000 were installed aboard private aircraft.

Aeronautical Land and Fixed Radio Stations

These stations provide non-Government radio communication service necessary for the safe, expeditious, and economical operation of aircraft. Aeronautical land stations are used to communicate between the ground and aircraft in flight. In accordance with Civil Air Regulations, domestic air carriers are required to maintain ground-air-ground communication at terminals and at such other points as may be deemed necessary by the Government to insure satisfactory communication over the entire certificated routes. Such a system is independent of radio facilities provided by Government agencies.

Aeronautical fixed stations are authorized for point-to-point communication to enable operators of airlines to conduct their business more efficiently. The use of these stations is authorized in the United States only where there are no land line facilities available; however, in international operations and in Alaska aeronautical fixed stations provide the primary service.

At the close of fiscal 1953 there were 1,343 authorized aeronautical land and aeronautical fixed stations, which is an increase of 160 such stations over fiscal 1952.

Civil Air Patrol Radio Stations

These stations provide the necessary communication for Civil Air Patrol activities and emergencies pertaining to the protection of life and property. Air shows, missing aircraft search missions, training missions, and communications systems at encampments, bases, and meetings are examples of their activities. To further Civil Air Patrol activities, the United States Air Force has made certain frequencies available for assignment to the CAP.

At the end of fiscal 1953 there were 6,620 authorized land and mobile CAP radio stations as compared with only 798 the year previous.

Airdrome Control Stations

This type of station provides communication between an airdrome control tower and arriving and departing aircraft for the purpose of regulating the separation of aircraft to avoid collision and for main-

taining an efficient flow of traffic into and out of an airport. An airdrome control station also communicates with aeronautical mobile utility stations aboard essential vehicles of an airport.

Airdrome control stations, for the most part, are operated by the Civil Aeronautics Administration; however, at the end of the fiscal year 1953 there were 47 such stations authorized by the Commission.

Aeronautical Mobile Utility Stations

This class of station is installed aboard crash, maintenance, fire and other vehicles which operate on an airdrome in order that the airdrome control operators may direct the movements of such vehicles as necessary.

At the end of 1953 there were outstanding 124 aeronautical mobile utility stations licenses.

Aeronautical Navigational Aid Radio Stations

These stations transmit special radio signals for the purpose of enabling an aircraft to determine its position with reference to the navigational facility involved. Included are radio beacons, radio direction finders, radio ranges, localizers, glide paths, marker beacons, and ground control approach stations.

This service, for the most part, is operated by the Civil Aeronautics Administration; however, 226 of these facilities are licensed by the Commission and installed at locations not served by the CAA.

Flying School Radio Stations

Flying school radio stations aboard aircraft and on the ground are used for communicating instructions to flight students or pilots while actually operating an aircraft.

There were 12 such licensed stations at the end of the year.

Flight Test Radio Stations

A flight test radio station is a station aboard an aircraft or on the ground used for the transmission of communications in connection with the test of aircraft or major components of an aircraft.

As of June 30, 1953, licensed flight test radio stations numbered 101.

Aeronautical Advisory Radio Stations

These ground radio stations provide advisory communication service to aircraft pertaining to the condition of runways, types of fuel

available, wind conditions, available weather information or other information which may be necessary in connection with their safe and expeditious operation.

They may also be used for communicating with private aircraft engaged in organized civil defense activities in event of enemy attack. Further, these stations may, on a secondary basis, communicate with private aircraft engaged in organized civil defense preparations for possible enemy attack.

At the end of fiscal 1953 there were 327 aeronautical advisory radio stations.

Aeronautical Public Service Radio Stations

The public service type of aircraft station has been provided for public correspondence between private individuals aboard aircraft in flight and persons on the ground, and affords communication similar to those available by use of the public telephone. These stations connect to the land line telephone system through the facilities of public coast stations. This service has increased each year largely due to the fact that operators of the "executive" type aircraft consider telephone communications to be essential in their businesses.

There are now 380 such stations.

PUBLIC SAFETY RADIO SERVICES

The Public Safety Radio Services comprise six separate services, namely: Police, Fire, Forestry-Conservation, Highway Maintenance, Special Emergency, and State Guard.

The name of each service is indicative of its use; that is, police radio stations are for communication relating directly to public safety and to the official business of police departments; fire departments, for communication incidental to suppression of fires, generally in urban areas; while forestry-conservation radio stations are employed in connection with the detection and suppression of forest fires and for conservation work. The terms "State Guard" and "Highway Maintenance" likewise describe the use for which these stations are intended. Special emergency radio has a variety of uses incident to emergency.

Police Radio Service

The Police Radio Service had its official beginning in 1928 when the Federal Radio Commission allocated 8 frequencies between 1700 and 2300 kilocycles for police communication. Licenses for such sta-

tions do not appear to have been granted, however, until in 1930, and for a time only a few of the larger cities manifested an interest in radio for police communication. Since then, there has been a constantly increasing demand for police radio facilities and now almost every hamlet in the United States has radio-equipped scout or patrol cars. Many port cities have police radio units installed in harbor patrol boats; other licensees have installed police radio stations in airplanes. The result is that police radio stations now operate on the ground, in the air, and on the water.

Licenses in the Police Radio Service are available to states, counties, cities, towns, and other instrumentalities of local government which maintain organized police departments.

The normal police radio station consists of a base station, usually located at police headquarters, and a group of radio-equipped cars. The radio-equipped cars may include not only official police cars but also ambulances and emergency vehicles used to clear highways of obstructions, etc. The base stations may communicate with each other, thus providing the police departments with a means of setting up extensive road blocks and otherwise cooperating with each other. This type of operation is conducted by voice communication.

There is police need for the dissemination of a large volume of information regarding wanted persons, stolen automobiles and inquiries regarding individuals. This type of communication is speeded by radiotelegraph circuits and wire line teletype. To provide this service, zone and interzone radio stations are used in many localities. The interzone station serves a group of zone stations and intercommunicates with other interzone stations. While there are several zone and interzone stations in the eastern part of the country, the greater part are distributed throughout the midwest with another concentration along the west coast.

As of June 30, 1953, 8,005 police stations held radio licenses.

Prior to 1948, the frequency band 72–76 megacycles was available for base and mobile radio stations in the police and other public safety radio services. However, pursuant to formal rule-making proceedings concluded May 5, 1948, the Commission allocated that frequency band exclusively to fixed operation and ordered licensees of base and mobile stations to vacate it within five years.

Relinquishment of that frequency band for base-mobile operation was accomplished with one exception. The city of Philadelphia, Pa., requested that its several base police radio stations be permitted to continue to operate on the frequency 74.06 megacycles. It alleged that interference would not be caused to television reception by reason of such operation since TV channels 4 and 5 are not allocated for use in the Philadelphia area, and that the cost of making the required

frequency change would be about $336,000. In view of the hardship shown, the Commission granted the petition to the extent that an additional 2 years were allowed for the city to make the required frequency change.

Fire Radio Service

The Fire Radio Service is available to fire departments and other organizations, including volunteer fire departments, responsible for fire protection in urban and suburban areas. The usual installation consists of a base station with an associated group of radio-equipped vehicles. In addition, many departments keep a number of lightweight transceivers (combination transmitters and receivers) which are carried by hand in the fire area and even into burning buildings. Instructions and requests for specific help can be transmitted between personnel at the fire to nearby mobile station for further relay to the base or headquarters station. This service has increased greatly since the eligibility requirements were expanded to include non-government organizations such as volunteer fire departments.

At the close of the year, the total number of fire radio stations was 1,134.

Forestry-Conservation Radio Service

This service is used primarily in rural areas incidental to the detection and suppression of forest fires, and to facilitate work performed in the preservation of timber, game, and other natural resources. Almost all stations operated in this service are licensed to State governments. However, a few stations are operated by private organizations responsible for the care of privately owned forest areas.

The usual forestry radiocommunication system consists of a chain of base stations, most of which are located in fire observation towers and area headquarters buildings, together with many radio units installed on trucks, bulldozers, plows, tankers and other fire suppression vehicles, as well as small hand sets carried by the fire fighters.

Due to the isolation of forest fires, considerable difficulty is encountered in reaching the scene. To cope with this situation, the usual practice is to parachute men and equipment, including a portable transceiver, in the immediate area. Here an on-the-spot observation is made and, if the fire has burned beyond control, a request for additional help can be sent by means of the portable radio which was dropped with the other gear.

There were 2,425 forestry-conservation stations licensed at the year's end.

Highway Maintenance Radio Service

This service is available to instrumentalities of government such as States, cities, and counties for use by their highway departments. Radio communication by highway departments has many advantages in connection with the clearing of obstructions from highways and the prompt marking of road hazards such as bridge washouts, falling stones, and other unexpected road impediments. Another advantage is the saving in money that can be realized by the more efficient dispatching of heavy, expensive road-construction equipment and crews through the use of radio.

Effective June 22, 1953, the Commission amended section 10.404 of the Highway Maintenance Radio Service Rules by the addition of a new paragraph (*c*) to require licensees in that service, which employ a frequency or frequencies shared with the Special Emergency Radio Service, to conduct listening tests before transmitting, and to refrain from transmitting until a reasonable determination is made that harmful interference will not be caused to communication in progress on the frequency. At the same time section 10.405 (*c*), which limited licensees in the Highway Maintenance Radio Service (except States) to use of only one frequency, was amended to permit, upon a satisfactory showing of need, use of more than one frequency.

This service totaled 877 stations.

Special Emergency Radio Service

Licensing in the Public Safety Radio Services is limited, almost exclusively, to instrumentalities of State or municipal government. However, authority to operate in the Special Emergency Radio Service may be granted to any person or organization able to meet the statutory citizenship requirements and to show special conditions requiring use of radiocommunication in emergencies. Eligibles in this service include organizations established for relief purposes in emergencies which have a disaster communication plan, such as the American Red Cross; physicians and veterinarians practicing in rural areas; ambulance services and rescue organizations; beach patrols responsible for life saving activities; school bus operators in rural areas; and communications common carriers desiring standby facilities for use in an emergency when wire lines fail or for use incidental to emergency repair of public communication facilities.

During the past year the Commission revised, substantially, its rules relating to the Special Emergency Radio Service. These changes were made in formal rule-making proceedings (docket 10174) which became effective March 27, 1953. These amendments set forth eligibility requirements in respect to each class; define the class and num-

ber of stations each eligible may operate; describe permissible communications, and detail other particulars concerning the use which may be made of stations by each eligible group.

Among significant changes made was the clarification of the eligibility of physicians by changing the term "remote area" to "rural area" and defining rural area as one outside of a population center of 2,500 or more persons; deletion of the requirement that other communication facilities not be available as a prerequisite for eligibility of rural area physicians, veterinarians, and school bus operators; provision for communications common carriers to utilize this service incidental to emergency repair of public communications facilities; and provision for the secondary use of certain ship telephone frequencies by isolated area special emergency fixed stations where appropriate arrangements can be made with a public coast station. In addition, provision was made for use of emergency standby facilities by private as well as common carrier communication circuit operators during periods of failure of the normal communication circuits.

The number of stations authorized in this service on June 30, 1953, was 1,072, an increase of 402 during the year.

State Guard Radio Service

This service is available to State governments which create state guard organizations to replace the local National Guard when the latter is called into Federal service. To date, only two States—Texas and Connecticut—have obtained licenses in this service. They cover 118 stations.

Civil Defense

Many city and state governmental organizations are obtaining licenses for additional facilities to meet increased civil defense requirements. The Public Safety Radio Services, in conjunction with the Disaster Communications Service and the Radio Amateur Civil Emergency Service, must be ready to furnish critical civil defense communication in the event of enemy attack. Preparation by many State and city governments includes appropriation of funds, which in some cases are matched by the allotment of money by the Federal Civil Defense Administration, to buy radio equipment such as auxiliary base stations, emergency power supplies, and extra mobile units. Present civil defense planning contemplates the assignment of civil defense duties to the different public safety radio services in case of attack.

Licensees in the various Public Safety Radio Services, except the Special Emergency Radio Service, have organized voluntary national,

regional and local committees to assist in the planning and utilization of radio facilities and to aid applicants in planning their radio systems. Frequencies allocated to the public safety services are available only upon a shared basis; hence, close cooperation among licensees is required for orderly and efficient operation. The Commission maintains close liaison with these committees and, annually, sends representatives to their principal conferences and meetings. Many mutual problems of the Commission and the licensees are thus resolved without recourse to hearings and other formal proceedings.

AMATEUR RADIO SERVICE

General

The Amateur Radio Service is a means by which interested persons may engage in nonprofessional radio communication and experimentation as a hobby. It is one of the oldest radio services and has served as a training ground for future electronics and communications experts, and the discovery of many new electronic techniques had its origin in amateur experimentation. Many of the nation's leading authorities on radio trace the beginning of their careers to operation in the amateur service.

In order to participate in amateur activity it is necessary to qualify for an amateur operator license and to obtain a station license. The applicant must be a citizen of the United States and must demonstrate ability to send and receive the International Morse Code, and knowledge of radio theory, operation, laws, treaties and regulations applicable to the amateur service. Depending upon the applicant's knowledge and ability and the operating privileges desired, five classes of operator licenses ranging from the Novice to the Extra are available by examination.

Amateurs engage in experimentation; they design and construct equipment, and communicate with other amateurs all over the world. This, and the frequent and extensive communication service amateurs have provided in nearly every natural disaster, more than justifies the privileges conferred upon them in licenses granted by the Commission.

At the end of the fiscal year there were some 111,389 amateur radio station licenses and 108,951 amateur operator licenses in effect. The number of amateur station licenses is slightly higher than the number of amateur operator licenses because many operators are the licensee of more than one amateur station, either as trustee-licensee of one used by an amateur radio club or a military unit, or as owner of personal stations at more than one address.

The popularity of the Novice class operator license, which is the most elementary type of amateur operator license available, is re-

flected by the fact that 9,386 such licenses were issued in a year. In the same period 3,652 Technician class licenses were issued. The number of Extra class licenses at the close of the year was over 1,300.

Despite an enviable record of self-policing on the part of the amateurs, it was necessary for the Commission to issue a number of citations relating primarily to frequency deviations or other infractions of rules. The Commission suspended the licenses of 4 amateurs involved in more serious violations of rules and revoked 2 licenses.

Radio Amateur Civil Emergency Service

The most important change in the amateur rules during the year was the establishment of the Radio Amateur Civil Emergency Service (RACES) on August 15, 1952. This service will enable radio amateurs to provide radio communication for civil defense purposes on a local, regional, and national basis during the present national emergency. The planning for this service was coordinated with Government, military, and civil defense agencies.

The RACES rules are substantially the same as those proposed by the Commission on December 19, 1951. They do not change the existing amateur rules, but are additions thereto. Stations operating in that service will utilize certain frequencies in the bands regularly allocated the amateur service. Public announcement of these selected frequencies was made simultaneously by the Federal Civil Defense Administration and the Commission on January 17, 1951. Under these rules, amateurs holding operator and station licenses (other than Novice or Technician) may apply to the Commission for authority to operate in the RACES. However, such applications must be in accordance with the provisions of the RACES rules and the proposed operation be under and in accordance with an approved civil defense plan.

A station in the RACES may consist of one or more transmitters, fixed or mobile. A network would consist of a combination of stations operating in a given area under the same communication plan in conjunction with a single control station. Local networks are organized by the civil defense authority of the area concerned and are under the immediate direction of the Civil Defense Radio Officer. Stations in this service communicate with each other and with stations in other services, including Government stations. Communications may relate to any phase of civil defense work including practice tests and drills, safety of life, preservation of property, maintenance of law and order, or related emergency matters.

Unless the present national emergency intensifies to the extent that normal amateur communication must be suspended, operation of stations in the RACES must be on a shared basis with normal amateur operation on the same or adjacent frequencies. However, the Commission expects that all amateurs will extend full cooperation to the civil defense effort and will respect any appropriate request to suspend operation on a particular frequency or frequency band during the progress of civil defense drills in cases where interference might otherwise be caused to civil defense communication.

The first authorizations in the RACES were issued to radio amateurs in the District of Columbia on March 6, 1953, and the communications plan approved for the District of Columbia was the first such plan received by the Commission in appropriate form. At the close of the fiscal year the Commission had issued 99 RACES licenses authorizing operation in accordance with 12 approved communications plans. Two applications were pending.

Other Amateur Rule Changes

Several other changes were made in the amateur rules during the year. The geographical divisions of the United States into areas in which the 1800–2000 kc frequency band can be utilized by radio amateurs were modified to provide more satisfactory sharing of frequencies in that band with the Loran system of radionavigation.

Radiotelephone privileges were provided in the 3.5 and 14 megacycle amateur radiotelephone bands for all classes of amateur radio operators except Novice and Technician. For more than two decades operation in these radiotelephone bands, because of possibilities of interference to other operation, was restricted to holders of the highest class of amateur operator license. However, modern equipment and techniques are such that the restriction is no longer justified as a precaution against interference.

Radiotelephony was authorized in the 7200–7300 kilocycle portion of the frequency band 7000–7300 kilocycles, which heretofore has been reserved exclusively for A1 (radiotelegraph) emission. Provision was also made for radioteleprinter operation in the so-called cw portion of the 3, 5, 7, and 14 megacycle frequency bands. Radiotelephony and radioteleprinter operation likewise was provided for in the new amateur frequency band 21,000–21,450 kilocycles. Station identification procedure was simplified, and additional frequency space provided for the Novice operator in the frequency bands 7000–7300 kilocycles and in the new 21,000–21,450 kilocycle band. The

rules governing operation in emergencies were modified by specifying procedure for the expeditious declaration of a state of communications emergency in any critical area, and for clearing normal amateur operation from the frequencies selected for the emergency communication.

Following the receipt of a petition, which in effect requested that radio amateurs operating aboard ship outside the territorial limits of the United States be permitted to use the new 21,000–21,450 kilocycle frequency band in addition to frequencies already available for that purpose, the Commission on May 13, 1953, proposed rules to that effect.

Also pending are three petitions which request confinement of single side band voice operation to a small portion of the 3.5–4.0 megacycle band; allocation of 3.75–3.80 megacycle exclusively to mobile voice operation; expansion of voice privileges to include the 14.30–14.35 and 28.25–28.50 megacycle segments of the 14 and 28 megacycle amateur bands; provision for the use of type AØ emission in the 52.5–54.0 megacycle segment of the 50 megacycle amateur band, and provision for Novice operation, including voice, in the 51.0–53.0 megacycle segment.

Amateur-TV Interference

Interference to the reception of television broadcasting continues to be a matter of mutual concern to the Commission and to amateurs. The Commission is continuing study with a view to clarifying individual responsibilities in cases where the operation of amateur stations cause interference to TV reception; however, definite standards have not yet been adopted.

The Commission's field engineers, individual amateurs and amateur committees have accomplished outstanding results in clearing many interference cases. Upon investigation, a great number of cases attributed to amateur operation have been found to be due to other causes. In a majority of cases where the interference came from the operation of an amateur station, the fault was found to rest with the inherent sensitivity of TV receivers to frequencies outside the TV channels. Usually, simple filtering and shielding applied to the TV receiver has eliminated the interference. In most cases where the radiation of spurious and harmonic emissions by an amateur transmitter in the TV channels has caused interference, the amateurs have been able to eliminate such interference satisfactorily. In only a small percentage of such cases has it been necessary to enforce corrective action.

Public Service of Amateurs

In keeping with their record of public service in prior years, the radio amateurs again rendered outstanding aid during a number of disasters during the past year. Some 60 amateur stations handled communications on August 30 and 31, 1952, as a result of damage caused to communication facilities by a hurricane which struck the Carolina coast. Over 100 amateur stations provided emergency communication following the earthquake in the southern California area on the early morning of July 21, 1952. Late in November 1952, a 22-inch snowstorm fell in Kentucky, Virginia, and Tennessee. More than a half dozen cities in eastern Tennessee were without communications with the outside world except for amateur radio. Some 200 radio amateurs handled a large number of messages for Government agencies, wire services, power companies, and state and local authorities, including many personal messages for individuals.

Fourteen amateur stations handled telephone and telegraph communications when southwestern Minnesota, particularly Fairmont, Minn., was crippled by a severe sleet storm followed by a blizzard on January 14, 1953. On March 28, 1953, 100 amateurs handled traffic and emergency communications in Maine during severe floods. On May 11, 1953, Waco, Tex., and vicinity was lashed by a tornado. Radio amateurs in the area did yeoman duty clearing outgoing traffic and in bringing aid to the stricken area.

Amateur Operation Boon to Physically Handicapped

The value of amateur radio to physically handicapped persons is an important consideration. The Commission receives many reports of its therapeutic and morale building influence in such cases. Blind persons find amateur radio a satisfying diversion, and the Commission has licensed a considerable number of such amateurs. Amateurs confined to beds or wheelchairs are able to converse with other amateurs in far places, handle messages for third parties, and even participate in amateur civil defense activities.

DISASTER COMMUNICATIONS SERVICE

The Disaster Communications Service is designed to provide essential radio communication in connection with disasters or other incidents which involve loss of normally available communication facilities or which require temporary establishment of supplemental facilities. The frequency band allocated to this service—1750 to 1800

kilocycles—was set aside pursuant to a proposal made in the Commission's Report of Proposed Frequency Allocations Below 25,000 Kilocycles of May 21, 1945, although the service was not actually established until March 21, 1951.

Any person eligible to hold a radio station license is eligible for a license in the Disaster Communications Service, provided that the station will constitute an element of a bona fide communications network organized, or to be organized, and operated in accordance with a locally or regionally coordinated disaster communications plan. United States Government stations may also operate in this service if authorized to do so by their controlling agencies.

When there is no impending or actual disaster, stations in this service may communicate only with respect to drills and practice sessions and conduct necessary equipment tests. When there is an emergency or disaster, they may be used for all communication necessary or essential to relief work, including the transmission of personal messages for individuals directly affected.

For the most part, applications submitted and disaster communications plans filed during the past year related to use of these stations for civil defense purposes.

As of June 30, 1953, 191 disaster communications stations had been licensed.

INDUSTRIAL AND LAND TRANSPORTATION RADIO SERVICES

The Industrial and Land Transportation Radio Services provide for the use of radio by various commercial and industrial enterprises which have a need for their own private radio communications systems. These systems represent a comparatively new industrial tool, the popularity of which is spreading rapidly. Today radio is used to coordinate and speed the movement of materials and men in steel mills, in coal mines, on railroads, trucks and buses; it is used to help discover oil on land and under offshore waters; and then used to speed the flow of oil and gas through pipelines. In short, it has a place in almost every phase of industry.

In order to simplify the administration of these services, frequencies are allocated and eligibility is determined on an industry-wide basis. All frequencies are shared, and to qualify one need show only that he is engaged in the particular type of industrial operation for which frequencies have been provided. This permits the handling of many more applications than would be possible if individual determinations had to be made in every case as is done in the common carrier

and broadcast fields. However, although all frequencies are available on a shared basis only, care must be taken in making assignments so that interference between users will be minimized. To this end, many of these industries have set up frequency advisory committees. These committees have made substantial contributions by guiding and supplying applicants with information relative to the selection of frequencies.

Channel-Splitting

The ever increasing demand for two-way radio communication is taxing the capacity of the radio spectrum. As soon as a radio service receives public acceptance, the inevitable problem of too many users for too few channels arises. This makes it necessary to seek an answer to the problem of how to increase the utilization of the frequencies available. A recent development that offers considerable promise in alleviating some of the congestion is known as channel-splitting. The net result of channel-splitting would be to provide more channels in the same amount of space.

At the present time, the Commission has under consideration a plan that is being worked out jointly with industry looking toward inaugurating a channel-splitting program during the coming year. The great problem here is how a changeover can be made, especially in the more crowded parts of the spectrum, without too rapid obsolescence of equipment already in use. In addition, the Commission has initiated a frequency utilization study looking toward a revaluation of the frequency requirements of these radio services. The results may indicate that some adjustments are necessary among the present classes of users.

Microwave

Of increasing importance are the frequencies above 890 megacycles which are available for point-to-point communication. These are known as microwaves and they are especially well suited for those systems which require special circuits between specific points. Because of their line of sight characteristics, they can be directed much the same way as a spotlight. These channels are wider than standard radio circuits and more intelligence can be transmitted over them. Because of this, a single multichannel microwave system may provide a licensee with a private phone system capable of handling a dozen or more simultaneous conversations, several teletype and facsimile circuits and the remote control of unattended industrial equipment.

Thus far the principal users have been the so-called right-of-way industries such as public utilities, pipelines, and railroads.

There are still many things to learn about transmissions in this portion of the spectrum and no one can speculate with certainty concerning their future but already microwave relays have shown that they will play a vital part in meeting the communication needs of our nation in peace or in war. Their ability to withstand the storms and icing that have plagued pole-supported wire lines is a major reason for believing that the thousands of miles of microwave relays now in service and being constructed will take their place alongside wire, cable, and coaxial systems as a conveyor of the world's messages.

Other Developments

Another recent development which promises to alleviate some of the spectrum congestion is the use of frequencies in the vicinity of 450 megacycles. Experimentation has proved that frequencies of this order are extremely well adapted for mobile communications in urban areas. Since it is in these areas where much of the congestion occurs, it is believed that some relief at least can be achieved here. To further encourage the use and development of this band, the Commission recently rearranged the frequencies available to the various services in order to provide greater flexibility in making assignments.

The Commission is faced with perplexing problem in the Industrial and Land Transportation Services relating to the use of frequencies in the band 72–76 megacycles. These frequencies have been used to provide numerous public safety and industrial point-to-point circuits which are generally links in a mobile radio communications system. They are particularly valuable because they are the only frequencies available for domestic communication between fixed points that do not require line of sight transmission paths. However, the 72 to 76 megacycle band is adjacent to television channels 4 and 5. This creates a serious interference potential which, with the recent rapid growth of TV broadcasting, is becoming more acute. The Commission has proposed rule making looking towards a solution which will reasonably protect TV reception on the one hand and permit continued use of these vital communication circuits on the other. Unless a satisfactory solution can be found, the efficiency of many of these mobile systems, particularly those operating in mountainous terrain, will deteriorate.

At the year's close there were more than 17,000 authorizations in the Industrial Radio Services and nearly 10,000 in the Land Transportation Radio Services.

CITIZENS RADIO SERVICE

The Citizens Radio Service provides for the use of radio by any person who is not eligible in any of the other established radio services. Its facilities may be used for private or personal radiocommunication, radio signaling, control of objects or devices by radio, and for other purposes not specifically prohibited by the regulations.

The Commission has continued a policy of encouraging the development and use of the Citizens Radio Service which, due to the absence of readily available equipment, had failed to expand until recently. In the year past, however, this service has experienced a phenomenal growth due in part to the availability of commercial equipment designed for operation in the land mobile bands adjacent to the citizens band, and in part to the widespread acceptance and use of the recently added 27.255 megacycle frequency which is available for, among other things, the control of objects such as model planes, etc.

To further encourage the development and manufacture of low-cost transmitting equipment for use in this service, the Commission recently proposed to relax the technical standards applicable to the low-powered equipment of the "walkie-talkie" type.

Citizens radio authorizations now approach 4,000.

ENFORCEMENT UNIT

The Enforcement Unit, in addition to centralizing enforcement and compliance activities of the Safety and Special Radio Services Bureau, acts as legal adviser to the chief of that bureau on special legal, policy, and legislative problems. In the previous year the time of this unit was about equally divided between enforcement matters and special problems. During this year considerably more than half of its time had to be devoted to the latter, because of the variety of new issues arising under the Communications Act Amendments of 1952.

Steps continued to be taken to further revise the internal enforcement procedures for more effective compliance. These were highlighted by delegations of authority to the bureau chief to act on certain enforcement matters which previously had to be disposed of by the Commission en banc. Also, revisions of enforcement procedures applicable to license revocation and cease and desist proceedings became necessary in order to meet the Communications Act amendments.

The imposition of monetary forfeitures under title III, part II of the act continued, as in the previous years, to be an important part of enforcement activities. The Commission is empowered, upon appli-

cation, to remit or mitigate the forfeitures incurred. A total of $4,750 was collected. The prompt application of these penalties in improving the general level of compliance is more important than the sum collected.

APPLICATION PROCESSING

Since application processing activities in the Safety and Special Radio Services were consolidated into one division during fiscal 1951, considerable progress has been made toward standardization and simplification of filing and handling applications. A new renewal form (FCC Form 405–A) and associated procedures have been in use for over a year. Renewals in these services are now issued within 5 to 10 days of receipt, except where it is necessary to delay issuance until 30 days before expiration in accordance with section 307 (d) of the act. This form is filled in completely by the applicant from information on his current license, notarized, and upon approval by the Commission, the certificate of renewal is validated and returned to the applicant for attachment to his license. New FCC Forms 400 and 400–A for applications in the Public Safety, Industrial, and Land Transportation services have been in use for more than 5 months. These are combined application and authorization forms which are completed by the applicant and, if in order, are approved by the Commission without the necessity of preparing authorization documents.

An increased use of form letters, application return "check-off" letters, and bulletins explaining the several safety and special services has resulted in less manually prepared correspondence and quicker replies to the public. Most inquiries which are not of a highly specialized nature are now being answered by the newly established Public Reference Room by means of such printed material, thus removing the load from the application processing groups for each of the services.

STATISTICS

Number of Stations in Safety and Special Radio Services

Stations in the Safety and Special Radio Services (exclusive of experimental, which are treated in a separate chapter) exceeded 232,000 at the close of the fiscal year. This represents a net increase of about 20,000 during the year. The numbers of authorized stations in the various services are shown below:

Class of station	June 30, 1952	June 30, 1953	Increase or (decrease)
Aeronautical Services:			
Carrier aircraft	1,921	2,190	269
Private aircraft	27,678	27,945	267
Public service aircraft	364	380	16
Aeronautical and fixed	1,183	1,313	160
Civil air patrol	798	6,620	5,822
Airdrome control	59	47	(12)
Aeronautical navigational	166	226	60
Flight test	100	101	1
Flying school	20	12	(8)
Aeronautical utility mobile	105	124	19
Aeronautical advisory	209	327	118
Total	32,603	39,315	6,712
Marine Services:			
Ship	32,229	36,889	4,660
Ship radar	1,958	2,282	324
Coast	107	196	89
Marine utility		10	10
Alaskan coastal	379	368	(11)
Alaskan fixed public	568	516	(52)
Maritime radiolocation service	22	20	(2)
Maritime fixed service	64	76	11
Other marine services	173	0	(173)
Total	35,500	40,357	4,857
Public Safety Services:			
Police	7,008	8,005	997
Fire	764	1,134	370
Forestry-conservation	2,070	2,425	355
Highway maintenance	555	877	322
Special emergency	670	1,072	402
State guard	76	118	42
Total	11,143	13,631	2,488
Land Transportation Services:			
Railroad	757	928	171
Urban transit	110	101	(9)
Inter-city bus	34	68	34
Taxicab	3,639	4,018	379
Automobile emergency	146	227	81
Highway truck	341	580	239
Citizens	1,401	[1] 3,829	2,428
Total	6,428	9,751	3,323
Industrial Services:			
Power	6,065	6,809	744
Petroleum	3,787	4,540	753
Forest products	685	877	192
Special industrial	2,760	4,563	1,803
Low power industrial	259	419	160
Relay press	51	54	3
Motion picture	23	23	
Agriculture	9	9	
Radio location—land	41	84	43
Total	13,680	17,378	3,698
Amateur and Disaster Services:			
Amateur	113,092	111,389	(1,703)
Disaster	71	191	120
RACES		99	99
Total	113,163	111,679	(1,484)
Grand totals	212,517	232,111	19,594

[1] Includes 1,651 authorizations issued by Field offices through Mar. 31, 1953.

NOTE.—For the purpose of the above table, each separate license, construction permit, or combination construction permit and license is counted as one station. For example, a station might include 1 base transmitter and 65 mobile transmitters.

Applications Received in Safety and Special Radio Services

Almost 146,000 applications for stations in the Safety and Special Radio Services were received during 1953. This represents an increase of over 4,000 applications compared with the previous year. The number of applications received in each service is shown below:

Class of station	Received 1952	Received 1953	Increase or (decrease)
Aeronautical Services:			
Aircraft	18,252	16,527	(1,725)
Ground	1,260	2,808	1,548
Civil air patrol	2,501	7,548	5,047
Total	22,013	26,883	4,870
Marine Services:			
Ship	16,893	16,819	(74)
Ship radar	1,084	1,136	52
Coast	113	458	345
Marine utility		10	10
Alaskan coastal	255	680	425
Alaskan fixed public	318	829	511
Maritime radio location service	26	25	(1)
Maritime fixed service	161	57	(104)
Other marine services	165	42	(123)
Total	19,015	20,056	1,041
Public Safety Services:			
Police	6,823	5,650	(1,173)
Fire	881	1,193	312
Forestry conservation	1,548	1,223	(325)
Highway maintenance	571	780	209
Special emergency	910	1,256	346
State guard	140	136	(4)
Total	10,873	10,238	(635)
Land Transportation Services:			
Railroad	870	856	(14)
Urban transit	105	78	(27)
Intercity bus	70	86	16
Taxicab	4,414	3,871	(543)
Automobile emergency	220	229	9
Highway truck	591	673	82
Citizens	246	[1] 2,347	2,101
Total	6,516	8,140	1,624
Industrial Services:			
Power	4,786	4,167	(619)
Petroleum	3,671	3,659	(12)
Forest products	800	700	(100)
Special industrial	4,039	4,768	729
Low power industrial	383	452	69
Relay press	54	22	(32)
Motion picture	14	24	10
Agriculture	19	39	20
Radio location—land	105	148	43
Total	13,871	13,979	108
Amateur and Disaster Services:			
Amateur	69,175	66,018	(3,157)
Disaster	90	249	159
RACES		141	141
Total	69,265	66,408	(2,857)
Grand total	141,553	145,704	4,151

[1] Includes 1,651 applications received by field offices through Mar. 31, 1953.

Number of Transmitters in Safety and Special Radio Services

Approximately 585,000 transmitters were authorized to operate in the Safety and Special Radio Services on March 1, 1953. Of these,

152,000 land and fixed stations represent an increase of 15,000, and 433,000 mobile units represent an increase of about 80,000 or a total increase of 95,000 transmitters during a 1 year and 2 months period. A tabulation by service and class of station follows:

Class of station	Land or fixed station transmitters	Mobile station transmitters	Total transmitters
Aeronautical Services:			
Aircraft		32,447	32,447
Ground	2,145	504	2,649
Civil air patrol	4,000	5,000	9,000
Total	6,145	37,951	44,096
Marine Services:			
Ship		35,410	35,410
Ship radar		2,200	2,200
Coast	196		196
Marine utility	2	19	21
Alaskan coastal	367		367
Alaskan fixed public	514		514
Maritime radiolocation	20		20
Maritime fixed	75		75
Total	1,174	37,629	38,803
Public Safety Services:			
Police	5,838	91,600	97,438
Fire	901	15,784	16,585
Forestry-conservation	2,125	14,041	16,166
Highway maintenance	623	6,472	7,095
Special emergency	827	3,483	4,310
State guard	92	169	261
Total	10,306	131,549	141,855
Land Transportation Services:			
Railroad	735	10,092	10,827
Urban transit	77	1,798	1,875
Intercity bus	47	572	619
Taxicab [1]	3,848	[1] 84,115	[1] 87,963
Automobile emergency	193	2,141	2,334
Highway truck	377	4,764	5,141
Citizens		7,032	7,032
Total	5,277	[1] 110,514	[1] 115,791
Industrial Services:			
Power	5,068	56,845	61,913
Petroleum	3,808	17,996	21,804
Forest products	573	6,649	7,222
Special industrial	2,524	27,800	30,324
Low power industrial		4,821	4,821
Relay press	26	653	679
Motion picture	10	185	195
Agriculture	10		10
Radiolocation	55	75	130
Total	12,074	115,024	127,098
Amateur and Disaster Services:			
Amateur	116,697		116,697
Disaster communications	205	252	457
RACES [2]			
Total	116,902	252	117,154
Grand total	151,878	432,919	584,797

[1] Taxicab mobile transmitters were shown in error as 122,037 in the Eighteenth Annual Report, Fiscal Year 1952. The figure should have been approximately 74,000. Corresponding figures of the 1952 report should be reduced as follows:
Land Transportation mobile transmitters, from 140,156 to 92,000.
Grand total, mobile transmitters, from 399,962 to 352,000.
Total transmitters, Taxicab service, from 125,354 to 77,000.
Total Land Transportation transmitters, from 144,458 to 96,000.
Grand total, all transmitters, from 537,649 to 490,000.

[2] Radio Amateur Civil Emergency Service, established Aug. 15, 1952; no transmitter estimate available.

Broadcast Services

TELEVISION (TV) BROADCAST SERVICE

TV Expansion

The fiscal year witnessed a tremendous expansion in television broadcasting. The Commission on April 11, 1952, adopted its Sixth Report and Order which concluded comprehensive rule-making proceedings and lifted the "freeze" on the authorization of additional TV stations. Processing of TV applications was resumed on July 1, 1952 under a priority system designed to bring TV programs promptly to major cities and surrounding areas without TV service and, at the same time, to provide local TV stations in cities without them. Compared with the 108 TV stations authorized as of July 1, 1952, one year later saw this number increase nearly five-fold—to a total of 500.

Auxiliary and experimental TV broadcast stations are dealt with elsewhere in this chapter.

In addition to the 12 existing VHF (Very High Frequency) channels, the Commission's Sixth Report and Order added 70 UHF (Ultra High Frequency) channels for TV broadcasting. (VHF channels are numbered 2 to 13; UHF, 14 to 83.) Of the 2,053 TV assignments made by that order to 1,291 communities, more than two-thirds were UHF. Nearly two-thirds, or 256, of the grants during the year were for UHF stations, and 142 for VHF stations. The first commercial UHF station began operation in Portland, Oregon, in September 1952, bringing that area its first TV service.

This TV milestone signifies the importance of UHF stations in bringing new or additional TV service to millions of people who could not be served by stations on the small number of VHF channels available. New TV receivers usually provide for UHF reception as well as VHF, and other VHF-only sets can be used for UHF reception by modifying them or by using a UHF converter. Many makes of UHF converters and special UHF antennas are now on the market.

By the end of the fiscal year, some 90 of the newly authorized TV stations had commenced operation and many areas were receiving video service for the first time. About half of the new stations were UHF, and most of the new stations—both VHF and UHF—began operation with low-powered equipment on an interim basis while awaiting delivery of additional equipment.

The Commission's Sixth Report and Order required 30 of the existing 108 TV stations to change VHF channels as a part of the new TV assignment plan, and a majority of the 30 stations had made these shifts by the end of the fiscal year. Many of these 108 stations enlarged their service areas by increases in power or by using higher antennas, or both.

Noncommercial Educational TV

The Commission's final television report provided for noncommercial educational TV stations, and made channel assignments to 242 communities, including 46 "primarily educational centers," for the exclusive use of such stations. A separate processing procedure was established for the consideration of applications by educational interests on those channels.

In a Memorandum Opinion issued July 13, 1951, the Commission upheld its right to reserve channels for noncommercial educational use and to make assignments to specific communities accordingly. On May 11, 1953 it reaffirmed that such reservations continue "indefinitely," again pointing out that, because educational institutions require more time than commercial interests to prepare for TV operation, a reservation of channels is necessary; and, while such reservation should not be for an excessively long period and should be surveyed from time to time, "it places no limit whatever on the duration of the assignment of channels reserved for noncommercial educational operation."

Up to June 30, 1953, the Commission had granted construction permits for 17 noncommercial educational TV stations. One of this number—KUHT, in Houston, Tex.—was the first to begin operation. The others were planning to go on the air as quickly as possible. At that time applications for 29 additional noncommercial educational TV stations were pending.

By the end of fiscal 1953, the number of TV channels reserved for noncommercial educational use had increased to 245.

(The "Noncommercial Educational FM Broadcast Service" section of this report deals with noncommercial educational stations operating with frequency modulation.)

Processing Procedure

With the lifting of the TV "freeze", the Commission adopted a "temporary processing procedure" to handle the flood of applications. This procedure, in general, established two processing lines. Group A comprised applications for stations in cities without operating

TV stations and more than 40 miles from the nearest operating TV station. Group B comprised applications for stations in cities with TV stations in operation or less than 40 miles from an operating station. Group B was further subdivided into several subgroups, with a priority afforded to communities where all the VHF channels were in operation and UHF channels only remained available. Within each group and subgroup, cities were arranged by order of population. The procedure provided that group A and group B applications would be processed simultaneously in separate processing lines. The Commission prepared and published a list of cities arranged in the order of these priorities on the basis of the stations on the air at the time the TV "freeze" was lifted.

When TV application processing was resumed, more than 700 applications were on file and many others followed. In order to cope with this problem and to permit the authorization of new TV stations as rapidly as possible, the staff processing the applications was enlarged. Lawyers, engineers, accountants, and clerical personnel were drafted from other Commission units and given intensive coaching in TV processing work.

The first group of applications was granted on July 11, 1952, when permits were issued for 18 TV stations in various cities. That the methods employed permitted fast action on the TV backlog is indicated by the fact that by March 1953 the Commission had become current in the processing of uncontested TV applications that were in proper form; thereafter the processing of new applications continued on a current basis.

As expected, the major delay in processing involved the group of hundreds of competitive cases requiring hearings before the best qualified applicants could be determined. Nearly all of the Commission's limited number of hearing examiners were assigned to TV, at the expense of AM broadcasting and other matters on the hearing docket. While hearing procedures naturally are time-consuming as compared with uncontested application processing, measures were taken to shorten hearing records and to reduce the time required for completion of hearing cases. (See Broadcast Hearings in this chapter.)

In many instances, competitors for TV assignments have merged their interests and thus made possible early action by the Commission on the single application remaining. In several instances, two rival applicants have resolved their problems by requesting shared-time operation permitted by the Commission's rules. In another instance, the Commission permitted the joint ownership of a TV station by parties having interests in two AM stations in the same community,

where it appeared that adequate steps were taken so that operation of the AM stations would remain on an independent and competitive basis.

During the year the Commission instituted several basic changes in the processing procedures concerning TV applications and comparative hearings. On August 6, 1952, it stated that "for the time being the order in which the hearings are being scheduled is in accordance with the order of priorities set forth in the temporary processing procedure now being followed by the Commission in connection with the initial consideration of television applications." In designating TV applications for hearing and in setting hearing dates since that time, the Commission has employed the priorities set out in the temporary processing procedure. In October 1952, this procedure was amended to provide for the processing of competing applications, in order of priority, consistent with the flow of the hearing schedule.

In view of the fact that the Commission was current at the end of the fiscal year in the processing of "in the clear" TV applications, and in view of the fact that the temporary processing procedure had become more or less obsolete for processing mutually exclusive applications because of the number of new stations going on the air, the Commission was preparing a revised processing procedure which would take these changed conditions into account.

Color TV

At the close of the fiscal year proposals had been made or were impending for adoption of a new and "compatible" color TV standards advanced by the National Television System Committee (NTSC), representative of the TV industry.

The present rules for color TV transmission were adopted by the Commission in 1950. However, equipment for this "field sequential system" is not now being produced and there are no such color broadcasts.

This system is "incompatible" in the sense that existing black-and-white sets can not receive its color transmissions in monochrome without adaptation. In adopting this system as the best proposed at that time, the Commission stated that if a satisfactory compatible color system had been available it would have been advisable to adopt it. It recognized the need for further experimentation and research and, in 1951, specified the steps that would be required of the proponents of an improved color system.

In 1950 the Radio-Television Manufacturers Association directed the NTSC to develop new and compatible color TV specifications. The NTSC is a voluntary association of engineers and scientists inter-

ested in the advancement of TV, and its members include representatives of many companies engaged in the manufacture of TV equipment.

The Commission has been kept advised of the progress of NTSC in this field by means of various reports submitted to the Commission and by attendance at demonstrations of its proposed "simultaneous" system. The Commission has also granted numerous authorizations for on-the-air testing.

(See Introductory chapter for notation of subsequent events.)

For color transmission, a special color receiver is necessary, or a number of changes would have to be made in the black-and-white receiver. Most important would be replacement of the present tube with a color tube.

Table of TV Assignments

Among other things, the Sixth Report and Order adopted rules and standards and a nationwide table of TV assignments. In order to permit uninterrupted processing of applications for new stations in accordance with this table, and in order to provide the Commission with experience in implementing it, a rule was adopted as part of the report which precluded any petitions for rule making to amend the table for a period of one year with certain express exceptions. These exceptions were for communities not listed in the table nor within 15 miles of a listed community, and where the petitioner sought a first commercial or noncommercial educational channel in a listed city. In all cases the petitions were limited to assignments which could be made without any other changes in the table or "drop-in" (new) assignments.

During the 1-year waiting period, about 50 changes were made in the table including the addition of 13 "drop-in" assignments, 3 of which were noncommercial educational assignments. Most of the other changes were corrections of deficiencies in the assignment spacings in order to conform with the separation rules governing stations and assignments. At the end of the year there were pending approximately 12 petitions for rule making to amend the table.

"Satellite" and "Booster" TV Stations

Experiments with "satellite" and "booster" TV stations as a means of relaying TV service to places beyond the normal range of existing TV stations are discussed in the Experimental Television Stations section of this chapter.

TV "Community Antenna Systems"

The rapid development of so-called community antenna systems to bring TV programs to weak signal areas poses interference problems and the question whether such services constitutes common carrier or some other operation which comes within the Commission's jurisdiction. These antenna do not transmit on the air, but pick up programs and send them by coaxial cable to the homes of subscribers. (See other reference in chapters on Common Carriers and Field Engineering and Monitoring.)

Share-time TV Stations

Commission rules permit shared-time operation on the same channel by two TV stations in the same area. In a number of cases two competing applicants have reached an agreement under which they have obtained authorizations for two stations to divide time on the same channel. The resultant operations present problems for the Commission since channel-sharing stations must maintain separate and independent operations.

Subscription TV

An important problem is presented by current proposals with respect to subscription or "pay-as-you-see" television. Several types of subscription systems have been the subject of experimentation under Commission authorization. They differ in both the techniques employed for sending "scrambled" pictures to decoding receivers in the homes of subscribers and the methods of collecting fees for the program.

In addition to the basic policy question whether the authorization of a subscription TV service would serve the public interest, substantial legal questions must be determined, particularly, whether such a specialized service is "broadcasting" within the meaning of that term as defined in the Communications Act, or common carrier or some other special radio service not coming within either the broadcasting or common carrier categories. Also, there is the Engineering problem of where such a service could be squeezed into the crowded radio spectrum.

STANDARD (AM) BROADCAST SERVICE

Notwithstanding the increased interest in television, the use of the standard broadcast band continued to grow. As in recent years, most

of the new AM authorizations were to small communities which had no previous local radio service.

The AM broadcast service netted 164 additional authorizations during the year, making a total of 2,584 at the year's close.

An important rule-making proceeding affecting AM proposes a new ground conductivity map of the United States based upon an analysis of thousands of measurements of the signal strength of AM stations during the past 15 years (see chapter on Research and Laboratory).

Under provisions of the 1952 amendments to the Communications Act, the Commission now formally notifies an applicant of any deficiencies in his application before taking action. By this means, many AM applications have been amended to make authorization possible where, under past procedure, the original applications would have been designated for hearing.

North American Regional Broadcasting Agreement

This treaty, which is intended to regulate the assignment and operation of AM broadcast stations in the North American Region in such a manner as to minimize interference, was signed on November 14, 1950, by representatives from all countries of the region except Mexico and Haiti. The new agreement was negotiated to replace the Interim Agreement, which extended and modified the provisions of the First North American Regional Broadcasting Agreement. The Interim Agreement expired on March 29, 1949, after Cuba refused to agree to its further extension. Subsequently, Cuba made a number of new station assignments and changes in existing assignments which would not have been permitted under the terms of the expired treaty, and which resulted in serious interference to stations in the United States. The other North American countries, by more or less informal agreement, continued to conduct their radio relations in general accordance with the terms of the first NARBA.

The new agreement provides for the adjustment of differences between Cuba and the United States, and upon its entry into force the interference now being caused by Cuban stations should be substantially reduced. Mainly because of the inability of other countries to satisfy its requirements for additional clear channels, Mexico refused to sign.

To become effective, the NARBA requires ratification by three of its major adherents. Cuba ratified it in December 1951. In this country the signed document was submitted by the President to the United States in February 1951, where it was referred to the Committee on Foreign Relations. Through two sessions of the Congress the pressure

of other business precluded action by this committee looking toward ratification of the agreement.

However, during the past session a subcommittee of the Foreign Relations Committee was created to consider the question of NARBA ratification, and at the year's end had scheduled hearings on the subject.

Since the expiration of the Interim Agreement, the Commission has been following a policy, formalized in October 1951, of avoiding actions which might endanger the implementation of the new NARBA, and has thus not made station assignments under conditions inconsistent with the treaty provisions.

540 kilocycles.—As a result of an agreement reached at the Extraordinary Administrative Radio Conference, Geneva 1951, the frequency 540 kilocycles, first added to the broadcast band by the Atlantic City Convention of 1947, became available for broadcast use in region 2 as of December 1, 1952. Rule changes necessary to open 540 kilocycles to applicants in the United States were duly accomplished and the Commission has before it a number of applications for use of this frequency. The classification of the channel is established in the 1950 NARBA, which gives Canada priority for clear channel use. However, the United States can utilize the frequency with stations having powers up to 50 kilowatts, provided that adequate protection is afforded the Canadian priority.

Clear channels.—There are now 12 times as many United States stations assigned to Canadian clear channels as in January 1945. Of the present total of United States facilities on these channels nearly four-fifths are daytime stations. A number of the newer stations operate with powers of 25 kilowatts or more. While these United States assignments were made in accordance with the engineering standards of the NARBA, Canada has of late become deeply concerned with interference caused by certain of these stations to its own clear channel stations. This interference has occurred principally in the early morning or late afternoon, and results from the persistence or early onset of skywave signal transmission, a factor not specifically provided for in the NARBA allocation standards.

At the request of the Canadian Government, meetings were held in February 1953 between its representatives and representatives of the Commission and of the Department of State. These meetings laid the foundation for a bilateral agreement which, supplementing the NARBA standards for clear channel protection, would specify permissible limits for power radiated during the early morning and late afternoon hours toward the common border by any United States or Canadian station operating on a clear channel on which the other country enjoyed priority. The proposed agreement is not generally

retroactive, and its provisions would apply to new assignments on these channels. Provision is made for intergovernmental clearance of assignments not satisfying the requirements of the agreement.

On April 8, 1953, the Commission outlined the features of the proposed agreement and requested comments thereon. These comments are being studied by the Commission before taking further action.

Daytime Skywave Interference

Closely related to the clear channel problem is the matter of daytime skywave interference, since many daytime-only-stations operating on clear channels interfere with the dominant stations during the early morning and early evening hours.

In early 1947 the Commission instituted a hearing to determine whether rules governing daytime skywave transmissions of AM stations should be promulgated (docket 8333). Because of their relationship, the Commission later that year consolidated the skywave and clear channel proceedings (docket 6741). Meanwhile, it was found necessary to defer action upon applications for new or increased daytime facilities on clear channels.

Delay in United States ratification of the North American Regional Broadcasting Agreement (NARBA), which would establish, among other things, specified protection from interference for clear channel operation, impelled the Commission on August 10, 1953 to sever the two proceedings, preparatory to rendering a separate decision in the matter of daytime skywave interference.

Proposed Revision of "10% Rule"

On May 13, 1953, the Commission proposed relaxing certain rules governing the assignment of particular classes of broadcast stations in the AM band.

Under present requirements dealing with efficient use of the frequency, a station in the designated classes may be assigned if the population residing in the area between the normally protected contour and the contour in which objectionable interference will be received does not exceed approximately 10 percent of the population of its actual primary service area (so-called 10% rule).

The proposed change would permit assignment if, as an alternative to the above 10 percent criterion, either of the following two conditions were met: (a) provide the community with its first local AM station; and (b) provide the first primary service to 25 percent more of its primary service area.

275623—53——8

FREQUENCY MODULATION (FM) BROADCAST SERVICE

During the year, in addition to new commercial FM broadcast station authorizations, 2 noncommercial educational FM broadcast stations changed frequencies from the educational FM band to the commercial portion of the band. Many of the new commercial grants went to licensees of AM stations. Fourteen new stations were authorized in the six southern States of Alabama, Florida, Georgia, North Carolina, South Carolina, and Tennessee. The freedom from static interference makes FM particularly advantageous in the southern part of the country. The nighttime interference which limits the coverage of many AM stations has also caused some AM licensees to turn to FM to obtain nighttime coverage.

There were 601 commercial FM broadcast stations authorized at the end of the year, or 47 less than the year previous. Most of the deletions were because the stations were losing money; some FM operators desired to enter the TV field.

A number of FM stations specialize in good music programing. These stations find that they have a small but devoted audience for such programing. Many of these listeners build high-fidelity receiving installations in order to realize the full range of FM transmissions. Many of the stations featuring good music publish monthly program booklets. These are purchased on a yearly subscription basis by the listeners. Such subscriptions give the stations an indication as to the number of their listeners.

"Functional Music", "Storecasting" and "Transit Radio"

As a means of obtaining additional revenue, various commercial FM stations are engaging in supplemental services known as "functional music", "storecasting", and "transit radio". In the functional music operation, an FM licensee undertakes to supply background music programs to commercial establishments having special receiving apparatus which, when activated by a supersonic signal, eliminates the spoken material. In storecasting and transit radio, the programing is designed to reach store customers and transit passengers in public vehicles, respectively, with the supersonic signal employed to increase the sound level of the spoken material.

These specialized operations are under Commission study in connection with the overall FM situation. Determination is required as to several legal and policy questions—whether such operations are "broadcasting" within the meaning of the Communications Act, whether they meet the Commission's rules, and whether they are in the public interest.

Noncommercial Educational FM Broadcast Service

The noncommercial educational FM broadcast service continues to expand but at a rather slow pace. There were 14 new grants for stations in this service during the past year.

One of the new authorizations was for a station in Honolulu, Hawaii. Just as the first commercial FM authorization was granted in the Hawaiian Islands this past year, this was the first noncommercial educational FM station authorization in the islands and was the only outstanding authorization for a station in this service in any of the territories or island possessions of the United States.

Of the total of 116 stations now authorized in this service, 49 use transmitters with power ratings of 10 watts or less; the remainder employ transmitters ranging in power from 250 watts to 50 kilowatts. One of the 10-watt stations which began operation during the year is using a directional antenna system to better cover the desired service area.

EXPERIMENTAL BROADCAST SERVICES

The experimental broadcast services provide means whereby stations may be licensed to conduct research and experimentation that promises substantial contribution to the advancement of the broadcasting art. There are three classes of stations in this service: (1) Experimental television stations, which delve principally into research involving television transmission; (2) Facsimile broadcast stations, concerned with the development of equipment or techniques for the transmission of fixed images with a view to their reception in a permanent form; and, (3) Developmental broadcast stations, devoted to experimentation in the aural broadcasting field.

Experimental Television Stations

During the past year the tempo of experimentation in the television broadcast field has steadily increased. Manufacturers of TV broadcast transmitters and antennas have utilized experimental facilities to develop and test new and improved equipment. Experimentation with color TV has continued apace and authorizations have been issued to a number of TV broadcast stations to conduct tests of the NTSC (National Television System Committee) specifications. Proponents of subscription television continued to experiment with various systems of "scrambling" the transmissions.

The lifting of the TV "freeze" and the inauguration of TV service in many new areas emphasized the problem of those places which lie

beyond the normal reception range of existing TV stations and which lack the population density necessary to make the market attractive to prospective TV broadcasters. The Commission has authorized several experimental operations which are expected to provide valuable engineering data with respect to the technical problems posed by the operation of low-powered "slave" stations. Two basic systems are being explored, viz: "satellite" stations which are actually low-powered TV transmitters but which employ no cameras or other studio facilities for the local production of programs and derive their program material by retransmitting, on a separate channel, the signals of TV broadcast stations; and "booster" stations, which intercept the signals of a TV broadcast station, amplify them, and retransmit the signals on the channel on which they were received. The data obtained by these experimental stations will enable the Commission to determine whether or not either or both systems provide answers to the problem of unserved areas.

Experimental Facsimile Broadcast Stations

FM broadcast stations may transmit facsimile either on a simplex or multiplex basis. (Simplex facsimile can be transmitted only when no aural program is being broadcast; multiplex facsimile can be transmitted at the same time an aural program is being broadcast.) A station used exclusively for the transmission of facsimile material for reception by the general public would be considered to be a facsimile broadcast station. During the past year no experimental facsimile broadcasting was conducted and very little interest was shown in the transmission of facsimile over FM broadcast stations. A few FM broadcast stations are authorized to transmit facsimile.

Developmental Broadcast Stations

This service has remained more or less dormant during the past year. Operation has been confined to the testing of aural broadcast transmitters and antennas by manufacturers of broadcast equipment. Some interest has been expressed in the operation of an FM broadcast "satellite" station to solve a terrain "shadowing" problem, but no operating authority has as yet been requested.

AUXILIARY BROADCAST SERVICES

The auxiliary broadcast services provide for the licensing of radio transmitting apparatus that is used by broadcast stations for such supplemental use as the pickup and relaying of programs or events that occur outside of a regular studio, i. e., parades, fairs, sporting

events, conventions, and newsworthy occurrences. Transmitters may also be licensed to provide a program circuit between the studio and transmitter of a broadcast station and, in the case of television, may be used for intercity relaying of video programs, thus making possible network broadcasting in areas where common carrier intercity TV transmission facilities have not yet been constructed.

Five basic classes of stations are licensed in the broadcast auxiliary services: remote pickup broadcast, aural broadcast STL (studio-transmitter links), television pickup, television STL, and television intercity relay stations.

Remote Pickup Broadcast Stations

Remote pickup broadcast stations are operated by broadcast station licensees for on-the-spot coverage of events that occur outside a regular studio. They are used primarily by aural broadcast stations—AM and FM—but may be used by TV stations to relay the aural portion of such programs where the visual portion is relayed by means of TV pickup stations. Portable or mobile equipment is employed ranging in power from a fraction-of-a-watt "handitalkie" that can be carried in one hand to transmitters of a hundred watts or more installed in automotive vehicles, boats, or aircraft and capable of transmitting signals over relatively long distances. Most of this equipment is self-powered and can be used to provide emergency communication facilities in the event of disruption of normal circuits resulting from floods, storms, or other disasters. Extensive use of remote pickup facilities was made during the 1952 political conventions and the subsequent inauguration ceremonies, giving the listening public the most comprehensive coverage of these occasions yet achieved.

Aural Broadcast STL Stations

Aural broadcast STL (studio-transmitter link) stations make it possible for AM or FM broadcast station licensees to locate their transmitters at favorable sites even though wire-line circuits are not available or practical at such locations. They are used to provide a radio circuit for the transmission of program material from the studio to the transmitter. During the past year this service has grown apace with the aural broadcast services.

Television Pickup Stations

Television pickup stations are the visual pickup equivalent of remote pickup stations in the aural broadcast field. They provide a means

whereby TV stations are not limited to sources of program material at places which have a physical wire connection to the broadcast station. Because such wire circuits must use a special kind of cable (known as coaxial cable) to carry video programs, and such special circuits are not generally available, TV broadcasters rely more heavily on their pickup stations than do aural broadcasters. The past year has seen a rapid growth in this service and it is expected that this growth will continue as more and more new TV stations commence operation.

Television STL Stations

Television STL (studio-transmitter link) stations are used to provide a program circuit between the studio and transmitter of a TV broadcast station. Both the visual and aural portions of such programs may be transmitted on a common microwave channel by means of multiplexing, or separate transmitters may be employed. The use of such radio circuits permits locating the TV transmitter on mountain tops or other desirable sites so as to provide wider coverage where the installation of special coaxial cable circuits is impractical. With the rapid expansion of TV broadcasting this service has greatly increased.

Television Intercity Relay Stations

For frequency conservation the Commission requires that intercity transmission of TV programs for network television broadcasting be handled by communication common carriers as is the case in aural broadcasting. However, it is recognized that common carriers are not able to construct the special facilities required for TV transmission as rapidly as they might be needed. Therefore, provision is made in the Commission's rules for the operation of private intercity relay systems by TV broadcasters on an interim basis pending the availability of adequate common carrier facilities. Although the common carriers have greatly expanded their TV relay facilities, there are many places not so served. This service is expected to continue to expand until the common carriers are able to catch up with the demands for TV intercity relay service.

Remote Control Operation of Broadcast Stations

The Commission amended its rules and regulations during the year to permit the operation of AM and FM broadcast stations using nondirectional antenna systems and operating with transmitter powers of 10 kilowatts or less by holders of operator licenses other than radio-

telephone first class and the remote control of such stations. Approximately 2,000 comments were received from individual operators, labor unions, trade schools, individual broadcast stations, associations of broadcasters, and national networks.

Factors such as the marked improvement and reliability of transmitter equipment, the satisfactory utilization of lesser grade operators during World War II and on a temporary basis at a number of broadcast stations since January 1951, the successful operation by nontechnical personnel of many electronic devices of a complex nature upon which the safety of life and property is often dependent, and the extensive reliance of stations on their chief engineers for significant repair work, were considered by the Commission in reaching its decision.

The amended rules became effective April 15, 1953, and by the end of the year there were granted authorizations for remote control to 35 FM broadcast stations and to 102 AM authorizations for remote operation using wire lines for control and telemetering purposes. In the cases of the radio controlled remote operations, multiplex techniques at both the remote control position and the transmitter were used for transmitting the control and telemetering information.

A number of stations are constructing their own remote control equipment while others are purchasing manufactured equipment. The initial investment in such equipment can in most cases be recovered in a short time through savings in salaries of personnel. Remote control further permits the use of transmitter sites otherwise impractical to use and is especially advantageous to those FM stations with transmitter installations placed on mountain tops to obtain good coverage. Many such stations found it difficult to recruit personnel willing to stand transmitter watches at such remote sites and also found in cases of bad winter weather that the sites were practically inaccessible and operators might be marooned there for days at a time.

BROADCAST HEARINGS

The Commission took several steps intended to simplify and expedite the general broadcast hearing procedure.

It amended its rules to require all competing applications for the same facility to be on file at least 30 days prior to the scheduled hearing instead of the previous 20-day "cut-off" period.

It also specified that broadcast hearings start with a hearing conference between the hearing examiner (or other presiding officer) and representatives of parties to the proceeding looking toward agreement on matters respecting the conduct of the hearing. The parties are required to state all the matters which they will rely upon in the

hearing. The hearing examiner then issues an order setting forth these matters, and the proof to be adduced by the parties is limited by the order unless modified for cause shown. The hearing conference idea had previously been followed, but as a "pre-hearing" conference.

These changes were prompted largely by complications occasioned by Section 309 (b) of the Communications Act, as amended in July 1952. This section requires that applicants who face a hearing be notified to that effect and be given an opportunity to reply prior to the actual designation for hearing.

The changed procedure develops and sharpens the major issues sufficiently in advance of the oral testimony to curtail much of the time spent in the course of the hearing. In this fashion the hearings are expedited, yet comply with the letter and spirit of the recent amendment of the Communications Act.

In addition, findings are now made on the basic qualifications of the applicants (legal, financial, technical, etc.) before designating them for hearing on comparative qualifications. In most instances this has eliminated lengthy testimony on matters upon which no actual controversy exists.

Policy was also established for completing each TV case designated for hearing even if the competitive applicant or the cause for the hearing is removed, instead of taking the surviving application from hearing and returning it to the processing line for administrative action. This has resulted in a number of applicants merging their interests and thus eliminating hearings and speeding TV service to the public.

Rules affecting the taking of depositions in broadcast hearings were changed to eliminate the filing of petitions by parties and an order by the Commission or the Motions Commissioner before depositions could be taken. The rules now provide for the taking of depositions on reasonable notice and more flexibility with regard to the persons whose depositions are taken.

The Commission substituted a certificate of service in broadcast cases for the old method of proving service by an affidavit. This method of proof of service has been operating successfully.

Commission counsel in the past generally declined to enter into stipulations in hearings on the ground that they could not be a party to an agreement which dispensed with proof involving any matter put in issue by the Commission. Since most matters in an application were put in issue, all of them usually had to be proved. This was not too burdensome in AM and FM hearings, but with the advent of TV hearings it was an almost endless proposition. Broadcast Bureau counsel were accordingly authorized to enter into stipulations of uncontested facts which were verified by oath. This has contributed to shortening the hearing procedure.

BROADCAST RULE CHANGES

In addition to the significant revision of the rules reported elsewhere in this chapter, there were other major rule changes in the broadcast service.

A number of rule changes were adopted for AM, FM, and TV which removed obsolete sections, simplified others, and brought many sections up to date in accordance with new practices and policies.

Rules governing practice and procedure were amended to provide for (1) continuing in effect licenses of stations engaged in activities of a continuing nature without further Commission action pending determination of their renewal applications, and (2) temporary extension of licenses of stations engaged in activities of a noncontinuing nature pending action on their renewal applications.

The Commission finalized its rule-making proposal of June 8, 1951, which precludes further assignments of Class IV standard (AM) broadcast stations on regional channels to prevent any further increase of the interference level to the degradation of the service on those channels. The 20 (mostly 250 watt) Class IV stations now operating on regional channels were not required to change frequency or power. All such stations are not protected against interference from Class III stations, which also use regional channels.

The Commission revised and brought up to date several of its application forms. It consolidated into one form (FCC Form 323) its Annual and Interim Ownership Reports of Broadcast Stations now submitted on separate forms (323—Annual Ownership Report, and 323–A—Interim Ownership Report). The consolidated form spells out what information is required, simplifies the process of filing and, by the nature of the information requested, emphasizes the necessity of obtaining Commission consent prior to any change in ownership that involves a transfer of control or an assignment of license.

As a means of facilitating the issuance of papers incident to the grants of renewals and modifications of licenses, the Commission adopted a short form Certificate of Renewal of Station License (FCC Form 359).

In the 1952 annual report mention was made of modification of the rules covering the filing of the "Annual Financial Report of Networks and Licenses of Broadcast Stations" (FCC Form 324) to specify single copy instead of the duplicate filing previously required. During the past year, after a conference with the industry advisory committee, this report form was further simplified by eliminating several schedules and modifying others to materially lessen the burden on those preparing the report.

STATISTICS

Broadcast Authorizations

There was a net gain of nearly 700 broadcast authorizations during the year. Television authorizations rose from 108 to 500 (including 17 noncommercial educational grants) as a result of the first year of processing following the lifting of the "freeze." The 2,584 AM authorizations were 164 more than the year previous. Commercial FM authorizations decreased from 648 to 601, but noncommercial educational FM added 12. A breakdown of authorizations for the different broadcast services follows:

Class of broadcast station	June 30, 1952	June 30, 1953	Increase or (decrease)
Commercial standard (AM)	2,420	2,584	164
Commercial television (TV)	108	483	375
Noncommercial educational TV		17	17
Auxiliary TV	221	259	38
Commercial frequency modulation (FM)	648	601	(−47)
Noncommercial educational FM	104	116	12
Remote pickup	1,175	1,305	130
Studio transmitter link	44	47	3
Developmental	2	1	(−1)
Total	4,722	5,413	691

These figures do not include international broadcast stations, which are in a state of flux.

There is no separate facsimile broadcast service, but commercial FM stations can engage in facsimile operation and there is provision for facsimile experimentation.

Growth of Broadcasting

The number of authorized and licensed commercial AM, FM, and TV broadcast stations at the close of each fiscal year for the past 11 years is shown in the following table:

	AM		FM		TV		Total	
	Authorized	Licensed	Authorized	Licensed	Authorized	Licensed	Authorized	Licensed
1943	912	911	48	37	6	6	966	954
1944	924	912	52	45	9	6	985	963
1945	955	931	53	46	25	6	1,033	983
1946	1,215	961	456	48	30	6	1,701	1,015
1947	1,795	1,298	918	48	66	6	2,779	1,352
1948	2,034	1,693	1,020	142	109	7	3,163	1,842
1949	2,179	1,963	865	377	117	13	3,161	2,353
1950	2,303	2,118	732	493	109	47	3,144	2,658
1951	2,385	2,248	659	534	109	81	3,153	2,863
1952	2,420	2,333	648	582	108	96	3,176	3,011
1953	2,584	2,439	601	551	483	101	3,668	3,091

Broadcast Authorization Deletions

Commercial broadcast station deletions in fiscal 1953 numbered 108 as compared with 72 in 1952 and 161 in 1951. FM deletions rose from 36 in 1952 to 79 in 1953. The 23 AM deletions in 1953 were 2 less than the year previous. There were 6 TV deletions in the past year; 1 in 1952. Monthly figures for 1953 were:

Month	AM	FM	TV	Monthly total
1952				
July	1	4	0	5
August	1	5	0	6
September	1	4	0	5
October	4	5	0	9
November	3	3	0	6
December	2	12	0	14
1953				
January	2	5	0	7
February	0	1	0	1
March	3	5	0	8
April	2	12	1	15
May	2	11	1	14
June	2	12	4	18
Year's total	23	79	6	108

Broadcast Applications

Of nearly 7,000 broadcast applications received during the year, nearly half were for AM, more than 1,200 were for TV, and slightly more than 700 for FM. There were 655 applications for new TV stations as compared with 198 for AM and 45 for FM.

	Pending June 30, 1952	Received	Disposed	Pending June 30, 1953
AM				
New stations	323	198	271	250
Change in facilities [1]	214	141	170	185
Renewals	281	1,355	1,294	342
License	48	346	324	70
Transfers	72	442	462	52
Miscellaneous	59	725	708	76
Total	997	3,207	3,229	975
FM [2]				
New stations	11	45	45	11
Change in facilities [1]	30	118	115	33
Renewals	88	291	327	52
License	24	83	97	10
Transfers	18	83	89	12
Miscellaneous	15	98	110	3
Total	186	718	783	121
TV [2]				
New stations	717	655	771	601
Change in facilities [1]	73	113	165	21
Renewals	40	98	101	37
License	7	2	5	4
Transfers	12	51	54	9
Miscellaneous	6	302	240	68
Total	855	1,221	1,336	740
All other				
New stations	66	287	317	36
Change in facilities [1]	48	101	141	8
Renewals	193	864	865	192
License	71	285	273	83
Transfers	67	191	241	17
Miscellaneous	7	106	108	5
Total	452	1,834	1,945	341
Grand total	2,490	6,980	7,293	2,177

[1] Includes changes in power, frequency, directional antenna, hours of operation, and location.
[2] Includes noncommercial educational.

Broadcast Receiving Sets

The Commission does not license or otherwise regulate broadcast receiving sets. Industry estimates that more than 110,000,000 receivers are in use. Many are capable of dual reception. Thus, about 25,000,000 can receive TV and 10,000,000 can receive FM. Radio homes approximate nearly 45,000,000, with about 75,000,000 sets. Sets in automobiles exceed 26,000,000, with about 9,000.000 other sets in business establishments, etc.

Networks

The Commission does not license networks as such; only individual stations. However, stations are subject to chain broadcasting regulations, adopted by the Commission in 1941 to promote competition in broadcasting. There are national, regional and state networks. The major networks are those of American Broadcasting-Paramount Theaters, Inc.; Columbia Broadcasting System, Inc.; Mutual Broadcasting System, Inc.; National Broadcasting Co., and DuMont Television Network.

Broadcast Industry Financial Data

In the calendar year 1952, the grand total revenues of the broadcasting industry (radio and television) reached nearly $800 million, the highest on record. Total revenues, which comprise revenues derived from the sale of time, talent, and program materials to advertisers, were reported at $793.9 million. Radio revenues increased from $450.4 million in 1951 to $469.7 million in 1952, while aggregate TV revenues of $324.2 million in 1952 were 37.5 percent greater than the $235.7 million for 1951.

Broadcasting profits of $115.6 million in 1952 were 16.6 percent greater than those of 1951. The industry reported a profit from television broadcast operations of $55.5 million, one-third higher than in 1951. Earnings from radio broadcast operations increased by 4.5 percent from $57.5 million in 1951 to $60.1 million in 1952. All profit figures are before payment of Federal income tax.

The following tables show the comparative calendar year 1951–52 radio and television financial data for the radio and television broadcast industries:

All networks [1] and stations, 1951–52

Item	1951	1952	Percent increase in 1952
	Millions	*Millions*	
Total broadcast revenues	$686.1	$793.9	15.7
Radio [2]	450.4	469.7	4.3
Television	235.7	324.2	37.5
Total broadcast expenses	587.0	678.3	15.6
Radio	392.9	409.6	4.3
Television	194.1	268.7	38.4
Broadcast income (before Federal income tax)	99.1	115.6	16.6
Radio	57.5	60.1	4.5
Television	41.6	55.5	33.4

[1] Networks engaging in joint radio-TV operations have indicated that certain overhead expenses not readily allocable between radio and television have been charged to radio. To the extent that this occurred, the above figures may understate radio income and overstate television income.
[2] Radio includes AM and FM broadcasting.

NOTE.—The 4 nationwide radio networks (ABC, CBS, MBS, and NBC) owned and operated a total of 18 stations and the 3 regional radio networks (Don Lee, Texas State, and Yankee) owned and operated a total of 7 stations in 1951 and 1952. As a result of ownership changes in 1952, however, operation of three such stations are included only for that part of 1952 during which the stations were network-owned and operated. The three stations are included in "All other stations" for the remainder of the year. The 4 TV networks (ABC, CBS, DuMont, and NBC) owned and operated a total of 15 stations in 1951 and 1952.

Nationwide networks only,[1] 1951–52

(Including owned and operated stations)

Item	1951	1952	Percent increase (or decrease) in 1952
Revenues:	*Millions*	*Millions*	
Radio	$99.0	$95.8	(3.2)
Television	128.4	180.2	40.3
Total	227.4	276.0	21.4
Expenses:			
Radio	89.5	85.6	(4.4)
Television	117.4	170.3	45.1
Total	206.9	255.9	23.7
Income (before Federal income tax):			
Radio [2]	9.5	10.2	7.4
Television [2]	11.0	9.9	(10.0)
Total	20.5	20.1	(2.0)

( ) Denotes loss.
[1] Radio includes AM and FM broadcasting.
[2] Radio includes AM and FM broadcasting.

NOTE.—The 4 nationwide radio networks (ABC, CBS, MBS, and NBC) owned and operated a total of 18 stations in 1951 and 1952. As a result of ownership changes in 1952, however, operation of two such stations are included only for that part of 1952 during which the stations were network-owned and operated. The two stations are included in "All other stations" for the remainder of the year. The 4 TV networks (ABC, CBS, DuMont, and NBC) owned and operated a total of 15 stations in 1951 and 1952.

FM broadcast revenues, expenses, and income, 1951–52

Item	1951		1952	
	Number of stations	Amount	Number of stations	Amount
FM broadcast revenues				
FM stations operated by:		*Millions*		*Millions*
AM licensees:				
Reporting no FM revenues [1]	381		406	
Reporting FM revenues	179	$1.8	149	$1.5
Non-AM licensees	66	1.2	56	1.1
Total FM stations	626	3.0	611	2.6
FM broadcast expenses				
FM stations operated by non-AM licensees	66	3.0	56	2.1
Industry total		(1)		(1)
Total FM broadcast income (before Federal income tax)				
FM stations operated by non-AM licensees	66	(1.8)	56	(1.0)
Industry total		(1)		(1)

( ) Denotes loss.

[1] In view of the difficulty in a joint AM–FM operation in allocating FM operation expense separately from AM station operation expense, licensees of such stations were not required to report FM station expense separately. As a result, FM industry totals for expense and income are not available. AM–FM licenses, however, were requested to report separately the revenues, if any, attributable to FM station operation if such data were readily available. In only a few instances did AM–FM licensees state they were unable to segregate the FM revenues.

TV broadcast revenues, income and investment, 1952

[In thousands]

Item	4 networks and their 15 owned and operated stations	93 other stations [1]	Industry total
Revenue from network time sales	$101,484	$36,014	$137,498
Revenues from sale of time to national and regional advertisers and sponsors	21,781	58,264	80,045
Revenues from sale of time to local advertisers and sponsors	16,623	48,228	64,851
Total revenues from time sales	139,888	142,506	282,394
Commissions paid to representatives, etc	27,509	18,923	46,432
Incidental broadcast revenues:			
Revenues from sale of talent, etc	47,504	8,700	56,204
Furnishing material or service	10,352	7,580	17,932
Other incidental revenues	9,969	3,527	13,496
Total broadcast revenues	180,204	143,390	323,594
Total broadcast expenses	170,301	97,601	267,902
Total broadcast income (before Federal income tax)	9,903	45,789	55,692
Investment in tangible broadcast property:			
Original cost	61,019	63,110	124,129
Depreciation to date	14,589	24,739	39,328
Depreciated cost	46,430	38,371	84,801

[1] Excludes 14 stations which commenced operations during 1952, having TV broadcast revenues, expenses, and loss of $620,247, $824,314 and ($195,067) respectively.

Radio [1] broadcast revenues, income and investment, 1951–52

[In thousands]

Item	4 nationwide networks and their 18 stations [2]		3 regional networks and their 7 stations [2]		All other stations [3]		Industry total	
	1951	1952	1951	1952	1951	1952	1951	1952
Total broadcast revenues	$99,045	$95,824	$4,983	$4,796	$345,197	$367,972	$449,226	$468,592
Total broadcast expenses	89,517	85,590	4,417	3,807	296,041	318,119	389,975	407,516
Total broadcast income (before Federal income tax)	9,528	10,234	566	989	49,156	49,853	59,251	61,076
Investment in tangible broadcast property:								
Original cost	29,533	28,241	1,097	976	[4] 224,100	238,124	254,731	267,341
Depreciation to date	16,446	15,375	984	862	87,504	100,394	104,934	116,631
Depreciated cost	13,087	12,866	113	114	136,596	137,730	149,797	150,710

[1] Excludes independently operated FM stations, 66 in 1951 and 56 in 1952.
[2] Includes the operations of 25 network-owned stations in both years. As a result of ownership changes in 1952, however, operation of three such stations are included only for that part of 1952 during which the stations were network-owned and operated. The three stations are included in "All other stations" for the remainder of the year.
[3] Includes 2,175 stations in 1951 and 2,299 stations in 1952.
[4] Data available from 2,161 stations in 1951 and 2,289 stations in 1952.

Field Engineering and Monitoring

GENERAL

The twofold purpose of Commission field engineering and monitoring is to provide service to industry, the public and Government, and to enforce radio laws, treaties and regulations. There is no substitute for this grass roots representation and fact development.

The Field Engineering and Monitoring Bureau has a Field Operating Division which supervises 9 regional offices, 24 district offices, 6 suboffices, 3 ship offices and 18 monitoring stations; also three staff divisions which advise and set standards in monitoring, inspection and examination, and field engineering work.

The Bureau's scope of operations includes:

Inspection of radio stations of all types and serving notices for discovered discrepancies;

Conducting radio operator examinations and issuing operator licenses to those found qualified;

Monitoring the radio spectrum to assure that stations operate on their assigned frequencies with satisfactory signal quality;

Doing special monitoring for military and civilian Government agencies;

Locating and closing unauthorized transmitters;

Investigating complaints of interference to various radio services;

Obtaining and correlating technical data for Commission use; and

Furnishing direction finding "fixes" to aircraft and ships which are lost or otherwise in distress.

The Bureau additionally processes data concerning new or modified antenna construction to insure that no hazard to air navigation will result, and administers Parts 15 and 18 of the Commission's rules and regulations pertaining, respectively, to restricted radiation devices and industrial, scientific, and medical equipment.

MONITORING

Monitoring Stations and Facilities

The Bay St. Louis, Miss., secondary monitoring station was closed early in the fiscal year for economy reasons. The monitoring network

continued to operate with 11 primary and 7 secondary stations, including 1 in Hawaii and 2 in Alaska. (See list in appendix to this report.)

These stations have high frequency direction finders which were rebuilt and modified for remote operation during the year. Exceptions are the stations at Lexington and Anchorage which are to be relocated. Seven monitoring stations are also equipped with low frequency direction finders: namely, Kingsville, Laurel, Livermore, Millis, Portland, Santa Ana, and Fort Lauderdale. All of this type are also operated from the monitoring position and are "remote controlled" in design.

For $2,550 paid to the General Services Administration in January 1953, the Commission acquired the Spokane monitoring station property formerly used for an Army radio station. The purchase required special congressional appropriation and presidential approval.

In December 1952 the Commission completed an interchange of property with the Oregon Highway Commission which was necessitated by the routing of an express highway near the Portland monitoring station. Although no funds were involved, it required a special congressional authorization to exchange these tracts.

Monitoring Participation in Defense Projects

Military agencies found need for the services of the Commission's monitoring stations, particularly in several projects wherein direction finding and monitoring from widespread points were necessary. A sum of $56,650 was transferred to the Commission by two separate branches of the military for these services. This made duplicate installation unnecessary and furthered the undertaking. Expenditures were almost entirely for personal services.

Monitoring Surveys

The Commission was asked to perform 37 monitoring surveys relating to problems of international frequency usage and allocations. Some involved only one frequency and a few days work by one monitoring station, but most required the entire network for periodic observation of frequencies for considerable periods of time. One such survey necessitated observations by 18 monitoring stations over a 3-month period; covered 360 frequencies and totaled 4,680 monitoring hours.

Monitoring Data for ITU

The United States participates along with many other countries in furnishing data concerning frequency usage and band occupancy to

the International Frequency Registration Board (IFRB) of the International Telecommunication Union (ITU). The United States Centralizing Office for Monitoring (provided for by the 1947 Atlantic City conference) is vested in the Field Engineering and Monitoring Bureau of the Commission. As far as is known, the Commission's monitoring stations are the only United States source of this data being furnished the IFRB. During the year, reports of 5,100 monitoring observations were submitted.

Monitoring for Interference

Resolution of an interference problem frequently requires monitoring on a large geographical scale. Requests for such service came from sources listed below:

	Fiscal year 1952	Fiscal year 1953
United States Army	124	125
United States Air Force	292	300
United States Navy	112	40
United States Coast Guard	88	78
Civil Aeronautics Administration	188	125
Other Government agencies	89	30
Law enforcement agencies	37	15
Commercial air lines	519	256
Commercial concerns	458	410
Foreign Governments	10	35
Miscellaneous		400
Total	1,917	1,714

As an example of an interference case solved by monitoring:

On March 3, 1953, a large communications company in New York reported to the Commission that it was experiencing severe interference to one of its stations from what appeared to be a broadcast station at Leopoldville in the Belgian Congo. The international frequency list showed a station listed on the complained of frequency at Leopoldville. However, monitoring observations proved that a European broadcast station was responsible and the matter was resolved.

Other Monitoring Cases

While interference figures in the majority of cases handled, special monitoring is required to determine illegal radio operation, locate clandestine radio stations, and obtain information in other matters. Such cases handled last year totaled 448 as compared with 828 for 1952. This reduction is due to personnel curtailment and the priority of special assignments.

Direction Finding

Long-range direction finder bearings are very useful and at times absolutely necessary to identify strange transmissions. Should the station be illegal or clandestine, then bearings are required to locate it. Bearings are also the only practical way to trace the source of radio interference of otherwise unidentifiable nature, such as spurious radiation, unmodulated carriers, and experimental or complex types of emissions. Some of these emissions are unintentional but nevertheless constitute serious interference until they are located and suppressed.

The monitoring stations obtained a total of 80,208 bearings in 1953 compared with 83,196 the year previous. As part of Commission participation in the Air Sea Search and Rescue program, the direction finder network obtained 2,170 bearings on lost or disabled aircraft or seacraft. There were 130 requests for this type of assistance compared with 138 for 1952.

One of the interesting lost plane cases is summarized below:

On May 2, 1953, the United States Coast Guard requested Commission aid in obtaining a fix on a Navy plane en route from Bermuda to Norfolk. The plane was handicapped by compass trouble and had turned back toward Bermuda. Monitoring control furnished five fixes to the Coast Guard. An Air Force plane and a Coast Guard plane then made visual contact with the distressed plane and escorted it to a safe landing in Bermuda. According to the Coast Guard: "The prompt accurate fixes furnished in the case of lost aircraft Navy 7461 aided largely in successful conclusion of intercept and escort. Your assistance greatly appreciated."

Additional Monitoring Statistics

Item	Fiscal year 1952	Fiscal year 1953
Bearings obtained	83,196	80,208
Alerts, unknown or suspicious signals discovered	7,167	6,500
Identification cards made	56,823	56,950
Cases referred to other agencies for investigation	35	33
Unlicensed stations monitored	114	105
Citations served (monitoring)	10,139	8,762

INVESTIGATIONS

Investigative Facilities

At 31 of the Commission's field offices and monitoring stations there are stationed one or more radio direction finding cars equipped for locating unauthorized radio stations and for tracking down sources

of interference to radio reception. In most instances the search or investigation is initiated as the result of reports or complaints from the public, Commission licensees and military or other Government agencies. An important function of these mobile units is to complete the job of running down illegal stations and interference sources localized to a particular area by the Commission's fixed long-range monitoring stations.

Interference

During fiscal 1953, the number of interference complaints requiring investigation was 21,749, an increase of 11,625 over the 10,124 received in 1952. AM, FM, and TV broadcasting accounted for 19,932 complaints with TV cases predominating.

This increase in interference complaints made it impossible for the limited field investigative staff to give prompt or complete attention to every case. Priority was given those causing interference to safety services, such as aviation, and to others involving illegal radio activity.

The continued progress made in organizing Commission-sponsored local citizens interference committees has proved very helpful to TV viewers in combating interference. There are now 293 cooperating committees functioning in 282 communities, with additional committees continuing to be established. American radio operators, TV set owners, manufacturers' representatives, and others thus work together to solve TV interference problems on a local level.

Attempts to receive television in weak signal areas, particularly in communities located in valleys where rooftop antennas give unsatisfactory reception, have led to creation and growth of "community antenna systems". In such a system TV signals are picked up by an antenna on a high tower or atop a nearby mountain, and then carried by coaxial cable to subscribers' TV receivers. About 200 such systems are now in use, with at least one installation using over 100 miles of cable to serve over 1,500 subscribers. Unfortunately, many of these wired TV systems have radiated and caused interference.

Operation of industrial, scientific, and medical equipment utilizing radio frequency energy continued to cause interference to safety services as well as to TV and other radio reception. While most of the interference originated with equipment manufactured six or more years ago, some of it was caused by newer equipment, usually due to failure to take certain necessary interference prevention precautions at the time of installation. In 1953 there were 619 cases involving interference by such equipment compared with 641 in 1952.

The following is an example of interference caused by such equipment:

Long-range radio bearing from the Commission's monitoring stations showed that interference complained of by the Los Angeles Police Department was originating in the general vicinity of Chehalis, Wash. A mobile unit dispatched from Seattle promptly found the radiation to be coming from an industrial radio frequency heater in a factory at Chehalis, 900 miles from the city in which it was disrupting police communications.

With the increasing number of radio receivers in use, not only are there more listeners to complain of interference, but at the same time there are more receivers which, unknown to their owners, are continuously radiating a signal capable of causing interference to other receivers as well as to safety communication services. One instance of continuous interference to TV neighborhood reception was traced to a console type shortwave receiver which had accidentally been left on for 5 weeks—the console being so covered with vases, flowers, books, magazines, ashtrays, and doilies that its original function had been forgotten.

During the year there were 1,498 cases of interference from electrical equipment other than radio. Because of personnel limitations, investigations of complaints were limited primarily to cases involving interference from radio stations and from equipment utilizing radio frequency energy and, in particular, where interference to a radio safety service was involved.

The following case illustrates the potential seriousness of even simple electrical interference:

In May 1953 interference caused to International Airport, East Boston, Massachusetts, was traced to a partly broken 4400-volt power cable inside a metal conduit on a high line pole 2½ miles from the airport.

Investigation of Unlicensed Stations

Mobile investigative units located and closed 92 illegal stations in 1953 as compared with 114 in 1952. This decrease is due in part to greater awareness of the likelihood of apprehension, and to the increased number of interference cases handled. Some illegal operation involved the transmission of race results. However, track and police officials are more vigilant to prevent this practice.

One illegal broadcast station purporting to operate at Sonora, Mexico, was actually transmitting from near Long Beach, California. Although the station moved operations during the investigation, it was finally located by mobile monitoring units. The operator was arrested, later convicted, and fined.

COMMERCIAL RADIO OPERATORS

Radio stations of all classes licensed by the Commission are, in the main, required by law to be operated by radio operators also licensed by the Commission. The grade of license required is determined by the complexity of the station and the degree to which the station's operations are vital to safety of life and property. The Commission has waived the licensed operator requirements for operation of certain types of stations.

Radio operator licenses are issued in a variety of grades to meet the operating requirements of the various radio services and stations. They are issued only to citizens of the United States.

Operator Examinations and Authorizations

Radio operator license examinations continued to be given at 91 examination points at quarterly, semi-annual or annual intervals throughout the United States and its territories. The places and times of these examinations are published in an official examination schedule obtainable from any of the district engineering field offices listed in the appendix to this report.

A substantial increase was noted in the number of amateur radio operator examinations given during the year. A total of 44,685 such examinations were conducted in 1953 as compared with 35,389 in 1952. (See section of chapter on Safety and Special Radio Services which deals with amateurs.) The increase was due to popularity of the new Novice class license and the role of amateur radio in the military service.

Commercial radio operator licenses and authorizations totaling 176,169 were issued in 1953 as compared with 179,928 in 1952. This represents a decrease of about 2.1 percent and brought the total of outstanding commercial licenses of all classes to approximately 730,136 at the close of the year.

Comparative figures by grades of licenses follow:

Class of license	June 30, 1952	June 30, 1953	Increase or (decrease)
Radiotelegraph:			
First class	5,244	5,477	233
Second class	9,248	9,694	446
Third class [1]	1,694	1,930	236
Temporary limited: Second class	617	644	27
Radiotelephone:			
First class	44,537	47,221	2,684
Second class	27,672	30,297	2,225
Third class	8,953	13,218	4,265
Restricted radiotelephone operator permit	463,607	525,685	62,078
Aircraft radiotelephone operator authorizations	117,564	95,970	(−21,594)
Total	679,136	730,136	51,000

[1] Includes restricted radiotelegraph operator permits.

INSPECTIONS

Broadcast Station Inspections

Among the duties performed by Commission field engineers is that of inspecting radio station equipment in all classes in the broadcast services. Various phases of technical operation of the station are observed, and records of past technical operations are reviewed to ascertain whether the stations are operated efficiently and in compliance with technical rules and standards and the terms of the operating authorization. Inspections help insure that an adequate technical service is rendered to the listening and viewing public and that the station's towers do not create a hazard to air navigation as a result of improper antenna marking or lighting and, further, to prevent interference to other broadcast stations through improper technical adjustments.

Broadcast station inspections totaling 881 were performed during 1953, while 532 were accomplished in 1952. Discrepancies observed during these inspections totaled 366 in 1953, compared with 232 in 1952. The ratio of violations to inspections is roughly comparable for both years.

Ship Station Inspections

The safety of life and property at sea requires marine radio equipment to be both accurate and reliable. Periodic inspections of ship radio equipment, therefore, are made by Commission engineers in accordance with provisions of the Communications Act and the Safety of Life at Sea Convention. These inspections assure that the equipment is adequately installed, protected, and maintained in a state of effectiveness and readiness for emergency operation and that qualified operators are in charge of the installation at all times.

Inspections were made during the past 2 years as follows:

Number of ship inspections	1952	1953
United States ships	7,901	5,923
Foreign ships	2,706	2,942
Total	10,607	8,865

Deficiencies requiring corrections were noted as follows:

Number of deficiency notices served	1952	1953
United States ships	5,778	3,564
Foreign ships	1,032	1,243
Total	6,810	4,807

Deficiencies which were corrected by stations during inspection do not result in the issuance of formal notices. The number of the corrected deficiencies is shown below:

Violations cleared during inspections	1952	1953
United States ships	3,531	2,844
Foreign ships	495	554
Total	4,026	3,398

During the year the Commission inaugurated a program of assistance to owners and operators of small business or pleasure marine craft, furnishing squadrons, flotillas, yacht clubs, and individual small boat owners with informative pamphlets to assist them in achieving greater usefulness in the operation of their radio communication equipment. A further step in this effort culminated in an "enlarged self-education" program among organizations of small boat owners. Also, the Commission provided an unofficial "check off" sheet which is used by members to check their own installations, and the radio installations on boats of other members at their request. This helped to maintain equipment in an efficient operating condition and avoided, to a large extent, mutual radio interference among the small boat owners and operators.

Inspections of Other Radio Stations

During the year inspections of other than broadcast and ship radio stations totaled 7,134, while 8,926 inspections were made in 1952. Discrepancies of a technical nature totaling 2,393 were disclosed in 1952, while 1,360 were discovered in 1953.

In this category, too, the number of radio station inspections was of necessity drastically curtailed due to reduced personnel and budgetary travel limitations.

The Commission continued its "self-inspection" program inaugurated in 1951 in the case of several classes of other-than-ship stations. A special "check off sheet" assisted them, through their own efforts, to maintain their equipment in an efficient manner and, at the same time, relieved the Commission of the need of more frequent inspections.

FIELD ENGINEERING FACILITIES

A problem of major importance was brought about by the provisions of the Atlantic City conference of 1947 pertaining to more stringent frequency tolerances for many classes of stations. These pro-

visions became effective this year. However, the operating frequency of many of the stations cannot be checked at the monitoring station because of low power, distance from the monitoring stations, or propagation characteristics of the frequency used. This necessitates the use of portable frequency measuring equipment which can be taken to the vicinity of the station to be measured. As a result of the more exacting frequency tolerances, the Commission has had to provide portable frequency measuring equipment with considerably greater accuracy than had been used in the past. This new portable frequency meter has a tolerance of 0.001 percent as compared with 0.01 percent for that previously available.

To keep abreast of the growing use of the higher frequency ranges, there is a continuing problem of providing new or improved facilities to the enforcement offices and monitoring stations for rule enforcement and for obtaining propagation and other data in connection with frequency allocation and with promulgation of new or revised rules and engineering standards. For example, an urgent need for additional UHF field intensity measuring equipment for use in determining the extent of radiation from ultra high frequency TV receivers was partially met by the purchase of a second UHF field intensity meter.

A new precision frequency standard was purchased for the Grand Island monitoring station. It will take the place of the obsolete frequency standard that has been in use for the past 22 years. Nine new automobiles were acquired as replacements for some of the 1941 and 1942 cars that are still being operated in the field fleet of investigative and inspection cars. Thirteen heavy-duty battery charging systems were provided for some of the newer investigative cars.

Progress has been made on a long-range plan to locate all of the monitoring stations on Government properties that are owned or controlled by the Commission. Liaison is maintained with the General Services Administration for purposes of reviewing its real estate listings of surplus property which might provide suitable sites for those monitoring stations that are still located on leased lands.

FIELD ENGINEERING PROJECTS

The program to provide all monitoring stations with remote-controlled long-range direction finders was accelerated. Beginning the year with 4 stations operating with this equipment, the number had increased to 14 as the year ended. Construction is under way at two additional stations.

This activity was a part of approximately 7,600 man-days spent on 108 field engineering projects, 50 of which were initiated during 1953,

while 58 other projects were carried over from previous years. These projects were distributed among the monitoring stations and field offices with the former accounting for nearly 80 percent of the project time, or about 6,000 man-days.

Field intensity recording and analysis projects relating to propagation studies were maintained at about the same level as in 1952. An extensive program of continuous recordings of VHF and UHF stations was carried out in cooperation with the Central Radio Propagation Laboratory of the Bureau of Standards. Including the long established recording of noise level and signal strength of AM broadcast stations, a total of 39 recorders were in continuous operation at various monitoring stations.

Engineering projects, as in other years, covered a variety of subjects. Some of these included investigation of interference to ship radiotelephone services from Loran stations transmitting on nearby frequencies, the use of pulse transmissions for direction finding purposes, field intensity measurements and recordings of community television systems, commercial carrier current installations and UHF television stations along with the field intensity measurements of radiation by UHF television receivers. Construction and development projects are under way for items such as a compact mobile monitoring receiver for the investigative cars and for new and improved adcock direction finder beams, structures and tuning units for the remote controlled direction finders.

MISCELLANEOUS RADIATION DEVICES

The Field Engineering and Monitoring Bureau is responsible for administering the Commission's rules concerning restricted radiation devices (part 15) and equipment operating in the industrial, scientific and medical service (part 18). Restricted radiation devices include such sources of radio-frequency energy as garage door openers, phonograph record players and carrier current systems. Industrial, scientific and medical equipment includes industrial heating equipment, medical diathermy machines, used for therapeutic purposes, welding devices, hair removing apparatus and other types of equipment using radio-frequency energy coming within the scope of part 18.

The end of the fiscal year marked the close of the period in which the operation of pre-July 1, 1947 diathermy and industrial heating equipment was permitted without compliance with the technical standards of part 18. After June 30, 1953 such equipment must comply with those standards. (See also Industrial, Scientific and Medical Service in chapter on Research and Laboratory.)

April 30, 1953 was also the end of the period in which pre-April 30, 1948 miscellaneous equipment was permitted without compliance with those standards. After that date the operation of all miscellaneous equipment must be in compliance with the rules and regulations. (See also Restricted and Incidental Radio Devices in chapter on Research and Laboratory.)

The final date for diathermy and industrial heating equipment was originally set as June 30, 1952 but, because of a shortage of critical materials, equipment and engineering services, the Commission extended the date to June 30, 1953. Thus a 6-year amortization period had been provided for the operators of diathermy and industrial heating equipment and a 5-year amortization period for operators of miscellaneous equipment.

A few operators of pre-July 1, 1947 diathermy and industrial heating equipment indicated a desire to operate such equipment beyond June 30, 1953, but in no instance did they indicate that necessary materials, equipment, and qualified engineers were not immediately available to effect compliance with the rules. Therefore, no extensions were granted.

Toward the end of the year a special effort was made to obtain compliance with part 18 by those operators of pre-July 1, 1947 industrial heating equipment who have failed to comply with the rules. Such operators were requested to do so without further delay or to discontinue operation. There were 13 such cases, and unless compliance is effected promptly injunction proceedings may be necessary. It is the policy of the Commission to seek action to eliminate objectionable interference through the cooperation of the responsible individual or organization. Where the responsible party indicates inability or unwillingness to take the requisite action, more formal proceedings may be instituted under the Communications Act.

The number of inquiries concerning the rules governing the operation of diathermy and industrial heating equipment decreased during the year, indicating that industry is now familiar with the requirements of part 18.

ANTENNA OBSTRUCTION MARKINGS

All radio transmitting towers licensed by the Commission are studied to avoid authorization of antennas which would be hazards to air navigation. Pursuant to the Communications Act stipulation that the Commission require painting and/or illumination of radio towers if and when in its judgment such towers constitute, or there is a reasonable possibility that they may constitute a menace to air navigation, the Commission promulgated part 17, Rules Concerning the Construc-

tion, Marking, and Lighting of Antenna Towers and their Supporting Structures.

The Antenna Survey Branch in the Engineering Division of the Field Engineering and Monitoring Bureau administers part 17. Its primary functions are to study the height and location of proposed antenna construction. Where necessary, tower proposals which violate the criteria set forth in subpart B of part 17 are referred to appropriate Regional Airspace Subcommittees (ASP) of the Air Coordinating Committee (ACC) for special aeronautical study by aviation interests in cooperation with the applicant. In this manner it is usually possible to effect a compromise and to prescribe, when necessary, appropriate obstruction markings.

Prior to fiscal 1953, the number of antenna proposals requiring Commission reference to the ASP for special aeronautical study amounted to approximately 25 per month or about 5 percent of all those processed by the Antenna Survey Branch. During 1953 the number approximately doubled as a consequence of the lifting of the TV "freeze" and the Commission's approval of new TV service which employs high antenna towers. The quantity of referrals to ASP would have been further increased but for a procedure mutually acceptable to the Commission and to the ASP, whereby an applicant may request an ASP regional subcommittee to make a preliminary study of an antenna proposal prior to the filing of the application, and receive a preliminary recommendation of which the Commission takes cognizance.

During the year, the Commission amended part 17 to provide standards of obstruction markings for towers up to 1,500 feet in height in accordance with recommendations of a joint Government-industry conference which studied the new hazard problem created by high TV antenna towers, whereas previous standards were for heights up to 500 feet. However, rulemaking covering standards for the obstruction marking of guy wires was deferred pending further study of practical methods whereby guy wires can be satisfactorily lighted.

New obstruction marking standards for high towers require 20 new separate lighting specifications, depending upon tower heights, in addition to the continuance of 20 existing specifications. To eliminate the requirement for 40 separate specification forms, a new specification sheet (FCC Form 715) was adopted March 30, 1953. This form incorporates by separate paragraphs all previously approved specifications. In the future, appropriate paragraphs of FCC Form 715 will be specified for all construction permits and licenses that require obstruction markings.

The charting of obstructions to air navigation is a function of the Coast and Geodetic Survey and it is becoming increasingly important in view of the construction of extremely high TV towers and the

great speed obtained by modern aircraft. It is the responsibility of that agency to furnish information to aviation interests through the medium of accurate, current and complete aeronautical charts. Part 17 was amended to request construction permittees whose antennas require obstruction markings to mail a post card report of completed antenna construction to the Coast and Geodetic Survey.

Antenna Statistics

Statistics of antenna construction proposals processed by the Antenna Survey Branch for the fiscal year, including the number referred to the Air Space Subcommittee for special aeronautical study, follow:

Services	Pending July 1, 1952	Received in ASB	Cleared by ASB	Pending June 30, 1953 [1]
Broadcast:				
AM	2	404	377	29
FM	2	71	66	7
TV	65	1,506	1,166	405
International	0	11	11	0
Experimental	1	10	11	0
Total broadcast	70	2,002	1,631	441
Safety and special	659	5,081	5,485	255
Common carrier	0	290	279	11
Total	729	7,373	7,395	707

[1] Totals in this column include totals respectively shown in last column of the next table.

Services	Pending at airspace July 1, 1952	Sent to airspace during year	Received from airspace during year	Pending at airspace June 30, 1953
Broadcast:				
AM	2	97	94	5
FM	0	11	11	0
TV	59	484	412	131
International	0	0	0	0
Experimental	1	0	1	0
Total broadcast	62	592	518	136
Safety and special	1	92	79	14
Common carrier	0	28	28	0
Total	63	712	625	150

Research and Laboratory

TECHNICAL RESEARCH DIVISION

General

The Technical Research Division deals with problems relating to wave propagation, technical standards, and allied subjects. In this connection, it obtains technical data from within the Commission or outside sources, inaugurates theoretical studies, participates in technical studies incident to international matters, coordinates the research work of the Commission with that of other Government agencies and industry, handles problems relating to the engineering standards and technical rules of the Commission, and administers the Experimental Radio Services.

The division continued its long-term radio wave propagation projects at about the same level but gave increased attention to the higher frequencies, especially UHF because of the availability of commercial TV operation there.

It continued collecting and analyzing basic radio propagation data for the use of the Commission and other Government agencies.

Progress was made on the equipment type approval and type acceptance program of the Commission with considerable work being done on uniform technical rules for the various services administered by the Commission.

There was considerable increase in the number of experimental service applications. A completely revised set of rules governing this service was adopted by the Commission.

The Chief of the division was Commission representative on Panel II of the Telecommunications Planning Committee. This panel is concerned with the coordination of the development and application of new and improved systems of communication. Associate membership was held in the Panel on Antennas and Propagation of the Research and Development Board of the Department of Defense. This served as a means of keeping informed of new developments sponsored by the military which might have an impact on frequency allocations and commercial communications.

Directional Antenna Performance Studies

There is in preparation a report concerning the actual performance characteristics of directional antennas in the standard broadcast band. One phase of this work culminated in a report dealing with the nature of variations between the theoretical and measured performance of directional arrays, whereas the second phase deals with practical methods of estimating the expected performance of directional arrays based on known theoretical array parameters.

Revision of Ground Conductivity Map

A revision was undertaken of the United States ground conductivity map published by the Commission in 1938 which was based on a relatively meager amount of field intensity measurements and was frequently found to be at variance with ground conductivity values established by later field intensity surveys. This task was completed in cooperation with the Bureau of Standards and is based on a vast amount of accumulated field intensity measurements made since the original publication.

Sunspot Cycle Recording

This work is a continuation of the previously inaugurated recording project of signals from a number of AM broadcast stations at the several monitoring installations of the Commission. Certain statistical techniques for establishing the dependence of the received sky-wave fields upon the several propagation parameters were developed. Some progress in applying these techniques to the processing of the available data was made. However, completion of the final phases has been delayed by other higher priority assignments.

Technical Consultation and Advice

A considerable amount of time has been devoted in rendering technical advice and consultation to the Commission and its staff on a variety of subjects such as radio wave propagation phenomena, antenna performance, equipment performance, etc. These activities took the form of special studies, attendance at hearings and numerous informal conferences.

To illustrate the wide diversity of technical problems handled for other divisions of the Commission mention should be made of a study performed for the Frequency Allocation and Treaty Division dealing with the determination of the optimum usable frequencies for ship to shore radiotelephone communication between a fleet of Mississippi

riverboats and their coast station terminals. Another project, undertaken for the Common Carrier Bureau, involved a VHF frequency allocation study for establishing a one-way radio paging service which involved the appraisal of propagation conditions, expected signal to noise ratios, receiver characteristics and other allied data.

Government-Industry Propagation Committees

The publication of information concerning VHF propagation resulting from the work of the Ad Hoc Committee over the period from October 1948 through April 1952 has stimulated interest not only in this country but also abroad. This work was, by necessity, limited to prediction by scientific methods of the extent of radio and TV broadcast service areas that would be provided by transmitters under different amounts of radiated power, different atmospheric conditions encountered in various geographic regions, different topographical conditions, and different heights of transmitter antenna towers. All of these factors have an important bearing on the distance by which two or more transmitters could be spaced and, consequently, on the number of stations that could be authorized.

With the rapid expansion of television, new problems are continually being encountered, and the facilities provided by high power transmitters operating in new frequency bands offer means by which refinements to more exacting tolerancs are being accomplished. Considering the material available at the time, the predictions contained in the Ad Hoc Committee reports have proven to be remarkably accurate. However, only a meager start has been made concerning the properties of UHF propagation as applied to high-power TV broadcasting.

In order to facilitate the resolution of new problems involving propagation, a Radio Propagation Advisory Committee was organized, composed of engineers from other Government agencies, from the industry, and consulting engineers who practice before the Commission. The committee has already developed information which indicates that considerable refinement is desired with respect to the methods of determining performance characteristics of TV transmitting antennas as specified in the Commission's rules.

Field Measurements of VHF and UHF Propagation

During the year urgently needed VHF and UHF field strength measurements were made of FM and TV broadcast stations. This was made possible through the loan of equipment and financial support by the Central Radio Propagation Laboratory of the National

275623—53——10

Bureau of Standards. At longer distances the signals are characterized by wide variations with time, and for this reason it is necessary to make continuous graphical recordings and calibrations with each set of equipment over a long period. Recordings were made of 34 stations during the year, the recorder charts were analyzed for each hour, and monthly data sheets were assembled for each station. Special studies were made in cases where unusual results were indicated by the measurements.

Special VHF Propagation Studies

Measurements were continued on certain aspects of VHF ionospheric transmissions involving the use of high-power transmitters for long-distance communication paths. These measurements are being analyzed to determine the extent to which interference may be caused by such transmissions.

Measurements concerning long-distance VHF propagation involve painstaking statistical work with large quantities of graphical material. In efforts to improve the accuracy of the measurements and to reduce the amount of time required to analyze them, many different systems were studied and new methods are being proposed.

Special investigations were carried out in connection with the presentation of technical evidence in the Commission's public hearings involving rulemaking procedures for various types of radio services utilizing frequencies above 30 megacycles and in hearings where questions arise concerning VHF propagation.

UHF Propagation

The advent of commercial UHF television provides the opportunity to obtain further information regarding UHF propagation. Several sets of equipment were completed for recording UHF field intensities and the results are being analyzed. Plans are being made for projects of field intensity recordings to obtain new information under different conditions so that the effects of distance, antenna height, and directivity, terrain, climate, season, etc., may be evaluated.

Experimental Radio Service

The Communications Act requires that the Commission "study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest". Accordingly, the Commission provides for the operation of experimental radio stations. Part 5, Rules and Regulations Govern-

ing Experimental Radio Services, became effective October 1, 1939, and has been modified from time to time as the demands of the experimental service required. During fiscal 1953 extensive revisions were adopted and a new part 5 of the rules became effective March 17, 1953. These rules were designed to encourage and promote all types of experimentation relating to the radio art.

The new rules provide for two classes of experimental stations, namely, Experimental Service (Research) and Experimental Service (Developmental). Experimental (Research) stations are for the use of persons engaged in fundamental or general research, experimentation and development of the radio art; or for the development, testing or calibration of radio equipment. Experimental (Developmental) stations are for the development of equipment, engineering data for techniques for an existing or proposed radio service. Class 3 authorizations, which were formerly available to individuals interested in conducting experimental programs on their own behalf, are no longer provided for in the rules.

There are two subclasses of Experimental (Research) stations. These are contract developmental and export developmental stations. The former classification includes experimental stations for developing equipment or techniques under contract with the departments of the United States Government. The other classification is for the development of equipment intended for export purposes and for eventual ownership and operation by stations under the jurisdiction of foreign governments.

The majority of Experimental (Research) stations, formerly known as Class I stations, are operated by manufacturers of equipment and by research and development organizations. These stations are engaged in development of new equipment and the improvement of existing equipment, the development of new techniques in the electronic art and fundamental studies involving radio propagation. Development work is being continued on narrow-band communication equipment which will effect a more efficient use of the radio spectrum. New and improved radio aids to navigation are being developed while other development work includes radiolocation equipment, and microwave communication equipment.

Continued experimental work is being done in ionospheric investigations and propagation studies on various frequency bands throughout the spectrum, particularly in the upper range where available information is meager. In the past frequencies above 30,000 megacycles have been considered unusable for radio purposes. Experimentation is now going forward on these frequencies.

The Commission's table of frequency allocations provides for the experimental use of frequencies throughout the radio spectrum, sub-

ject to the condition that harmful interference is not caused to services or stations to which the frequencies are regularly assigned.

Experimental (Research) stations are used extensively by manufacturers and sales engineers for the purpose of making field intensity or coverage surveys in areas where it is proposed to establish radio communication systems. The results of these surveys provide useful information for choosing the operating frequency, power, emission, and antenna location for optimum performance.

Applications for Experimental (Developmental) stations, formerly known as class 2 stations, include proposals for types of operation which are not recognized in the present rules. Since the establishment of the land mobile services on a regular basis, the number of stations of this type has decreased.

Class 3 authorizations are no longer granted. Because of the limited scope of experimentation permitted under this class of authorization, the Commission received few requests for such stations. The types of experimentation formerly permitted under class 3 authorization may now be conducted under the present research type of authorization or, for qualified persons, under the rules governing the Amateur and Citizens Radio Services.

Statistics covering the experimental radio services for fiscal 1953 are given below. These data show that approximately 20 percent more authorizations were handled in 1953 than in 1952.

Number of experimental radio stations

Class of station	June 30, 1952	June 30, 1953	Increase	
			Number	*Percent*
Class 1 (research)	322	384	62	19.2
Class 2 (developmental)	47	60	13	27.6
Total	369	444	75	20.3

Mobile and non-mobile transmitters

Class of station	Nonmobile units	Mobile units	Total transmitters	Increase over 1952	
				Number	*Percent*
Class 1 (research)	304	1,317	1,621	230	16.5
Class 2 (developmental)	17	156	173	27	18.5
Total	321	1,473	1,794	257	16.7

Experimental applications

Class of station	Received 1952	Received 1953	Increase	
			Number	*Percent*
Class 1 (research)	835	968	133	15.8
Class 2 (developmental)	80	87	7	8.3
Total	915	1,055	140	15.3

Restricted and Incidental Radiation Devices

In 1938 the Commission formulated certain rules to govern the operation of various types of low-power devices then used for remote control purposes. The separate licensing and detailed regulation of these devices was not considered to be administratively feasible at that time. Since then many low power techniques have been adapted to an ever-increasing variety of uses. Typical of these adaptations are carrier current broadcast stations, which employ carrier current for the distribution of programs essentially broadcast innature; community antenna systems, which amplify and distribute TV broadcast signals in areas of poor reception; industrial carrier current signaling systems; phonograph oscillators; garage door openers; etc.

Recognizing the inadequacy of the present part 15 with respect to the regulation of many thousands of low power communication devices and several million unintentional radiators such as ignition systems, electrical appliances, etc., the Commission has proposed rulemaking setting forth broad administrative and engineering factors to be considered in amending part 15. While much basic work has been done and many comments have been received, additional information will be necessary before a satisfactory solution can be found to the many problems concerning restricted and incidental radiation devices. (See also Miscellaneous Radiation Devices in chapter on Field Engineering and Monitoring.)

The Commission is continuing its efforts to encourage manufacturers to suppress radiation from TV and FM broadcast receivers. An industry report dated September 1952 indicated an improvement over previous years and it is believed that these efforts will effectively help to reduce the interference created by these devices. The Commission has been fortunate in enlisting the aid of various industry committees in studying the question of spurious radiation. This will aid the Commission in arriving at methods and standards for dealing with the practical problems which it faces in its regulatory functions.

Industrial, Scientific, and Medical Service

One of the limiting factors in the use of radio transmitting and receiving equipment is the existence of electrical interference which tends to prevent the satisfactory reception of radio signals. Such interference may be in the form of atmospheric background noise, or it may be the result of spurious and harmonic emission from various types of electrical and radio frequency generating equipment. Equipment generating radio frequency energy, but not designed for communication purposes, contributes a substantial portion of the interference to authorized radio services, and has often resulted in

destructive interference to radio communication systems. Such interference occurs not only to broadcast services, but frequently interrupts those services concerned with the safety of life and property.

To minimize the probability of interference from particular kinds of noncommunication equipment generating radio frequency energy, the Commission adopted, effective June 30, 1947, part 18 of its rules which relates to the Industrial, Scientific, and Medical Service.

Medical diathermy equipment includes any apparatus (other than surgical diathermy apparatus designed for intermittent operation with low power) which generates radio frequency energy for therapeutic purposes. Industrial heating equipment includes apparatus using radio frequency energy for the purpose of heating operations in manufacturing or production processes. Miscellaneous equipment includes apparatus, other than medical diathermy or industrial equipment, in which the action of the radio frequency energy generated is applied directly to the workload.

Specific frequency bands have been allocated for the operation of industrial, scientific, and medical equipment and part 18 sets forth the conditions under which such equipment may be operated without a license. The suppression of spurious and harmonic radiations on frequencies outside the allocated bands is required.

Interference problems arising from the operation of equipment governed by part 18 have been administered, first on a request-for-cooperation basis, and, in those cases where cooperation has not been satisfactorily accomplished, by the use of the enforcement provisions. In the administration of part 18, the Commission has been guided by a desire to provide interference-free communication and, at the same time, permit the necessary use of medical diathermy, industrial heating and miscellaneous equipment. The Commission's endeavor to eliminate interference by the cooperative efforts of the complainant and the equipment used has, in general, been well received.

The expansion of TV facilities and the further congestion of the frequency spectrum by other services has increased the number of interference cases reported. Thus far, the procedure set up for processing major complaints of interference to radio reception has been satisfactory. However, the growth of broadcasting, communication and safety services may lead to an increase in the number of difficult situations which can be resolved only by the use of stronger measures available under the Communications Act.

The Commission has held conferences with representatives of manufacturers and retailers of equipment regulated by part 18. These conferences have been helpful to both industry and the Commission in the solution of problems relative to equipment. Type approval certificates were issued covering 7 diathermy machines and 9 types of miscellaneous equipment.

The Commission has successively postponed the effective date of part 18 as it concerns arc welding equipment which uses radio frequency energy, until January 31, 1954. The Commission is working with industry to develop mutually satisfactory standards.

June 30, 1953, marked the end of the 6-year period for amortization of obsolete medical diathermy and industrial heating equipment. April 30, 1953, terminated a period of 5 years for most of the electronic apparatus classified as miscellaneous equipment. New types of miscellaneous equipment envisioned but not in general use at the time the rules were first adopted became subject to its provisions when they came into use.

During the year, rule-making was initiated to further simplify and clarify the rules with regard to the operation of miscellaneous equipment without a license from the Commission. Changes were made to provide a detailed procedure for the certification of industrial heating equipment when several units are being used at one location. The rules respecting medical diathermy equipment operated outside of the assigned frequency bands were amended to permit operation in an unshielded room.

Studies were made to keep the rules abreast of the ever-increasing number of devices used in this service, keeping in mind the limitations required to prevent interference to the increasingly sensitive receivers used in the various services. Seven additional type approval certificates for miscellaneous equipment were issued during the year.

Equipment Standards and Related Matters

Studies were conducted looking toward the solution of problems arising from rapid developments which require new or revised rules relating to definitions of technical terms, equipment standards, and similar matters.

These took the form of analysis of technical literature, representation at various conferences and demonstrations and consultations with Government and industry groups. Another important activity is participation in the work of the United States groups studying technical questions which the ITU has referred to the CCIR.

Of increasing importance is the technical preparation of new or revised rules covering standards, equipment performance requirements, spurious radiation limitations, interference prevention, etc. During the year it was proposed to establish a new policy governing assignments to operational fixed stations in the 72–76 megacycle band which would minimize interference to the reception of TV signals on channels 4 and 5.

It was also found necessary to require harmonic and other spurious emissions of TV transmitters to be reduced to a lower level than has

been the past practice. A temporary standard of such attenuation of 60 decibels was adopted. Further studies are expected to result in a requirement of additional attenuation, especially for high powered units.

Type Approval and Type Acceptance

Radio equipment used aboard ship has been type approved since the early days of radio. Monitoring equipment and transmitters used in aural broadcast stations have been similarly approved for many years. More recently, the Commission initiated a program to "type accept" (i. e., certify as acceptable for licensing) radio equipments used in other radio services. Type approval, as the term is now used, signifies that actual tests have been conducted by the Commission, either in its laboratory or at other locations under the supervision of Commission personnel. Type acceptance signifies that tests have been conducted not under Commission supervision but with data being reviewed by the Technical Research Division. Shipboard VHF radio equipment has been in the type accepted category for 2 years.

It is expected that the type acceptance program will be expanded to cover all services. Expansion of this program will reduce interference between stations due to the requirements for reduction of spurious emissions. A corollary to such type acceptance will be the issuance of lists of equipments which have been type accepted. Such lists will reduce the time required for processing applications in the various services involved. This year saw the issuance of a list of equipment acceptable for licensing in the land mobile radio services. This list contains technical data for some 700 transmitters built by 38 different manufacturers.

The major responsibility for type approval and type acceptance of transmitting equipment rests with the Technical Research Division. Actual tests of equipment for type approval (not type acceptance) are conducted by the Laboratory Division, with the actual approval and administrative work being handled by the Technical Research Division.

The following tabulation indicates the approximate number of applications handled and the number of equipment specifications filed during the year. It excludes consideration of approval of equipment used for industrial, scientific, and medical purposes which is noted elsewhere in this report.

	Type acceptance	Type approval	Specifications filed
Received	41	27	138
Issued	31	20	77
Pending	10	7	61

LABORATORY DIVISION

General

The Laboratory Division makes technical measurements and engineering investigations to aid the Commission in allocating frequency bands, establishing and revising engineering standards and regulatons for new as well as existing services, and drafting regulations covering noncommunications type of equipment employing radio-frequency energy which may interfere with the radio communication services. It maintains a laboratory near Laurel, Maryland.

Activities of the Laboratory Division embrace:

Investigation of various methods of transmission and reception to determine their utility and interference factors;

Tests of transmitters to determine whether interference signals are emitted on frequencies other than the assigned channel;

Tests of receivers to determine how close together the Commission might place stations without the listeners receiving several stations at the same time;

Tests of receivers to determine what interference they may produce in other nearby receivers either in the same service or in other services;

Tests of equipment such as apparatus involving safety at sea for reliability of operation;

Investigation of interference produced by noncommunication uses of radio-frequency energy;

Tests of frequency and modulation monitors for accuracy and reliability; and

Development of special monitoring equipment for use of Commission engineers in the field, and maintenance of the accuracy of measuring installations and equipments.

In general, the laboratory tests a type of equipment rather than individual units. Attempt is made to anticipate interference problems and have remedial measures taken prior to the manufacture and distribution of a large number of units.

In some instances type tests are required by the rules and regulations, and formal approval is given. In other cases the laboratory makes type tests not specifically required, in order that the Commission may be aware of the existing service and interference problems encountered in practical operation, so that either the allocation structure may be designed to fit the units available or the Commission may take other action leading to improved equipments which will permit more efficient use of the available radio frequencies.

Type testing also is required of certain noncommunications equipment which employs radio frequencies and may cause serious interference unless the frequencies are properly maintained and the harmonic and spurious emissions sufficiently restricted.

A summary of particular laboratory activities engaged in during the year follows:

Broadcasting

Most of the laboratory work in the broadcast field concerned tests as to receiver oscillator radiation and the various spurious responses of receivers, with especial emphasis as to impact of these problems on the implementation of the UHF television band. Studies were made of a number of proposed UHF tuners and receivers submitted by manufacturers. In order to obtain propagation data for the UHF band, the laboratory made field intensity recordings of 2 UHF–TV stations.

Changes were made in the laboratory's TV signal generator equipment to facilitate operations on both color and monochrome. Permanent facilities are being installed to permit examination of interference between several color signals and the examination of new TV systems or methods for transmission. Tests are also being conducted on proposed types of color receivers.

Nonbroadcast Services

Measurements were made of the selectivity, intermodulation, and other spurious responses of receivers used in other than broadcast services. The oscillator radiation of nonbroadcast receivers was tested and examination was made of the performance of deviation limiting devices now required in many transmitters to reduce interference on channels near the one in use. The art has progressed to the point where, with good equipment, consideration is being given to the implementation of closer channel spacings to provide more communication facilities.

At the present time, automatic equipment which responds to distress signals is required only on certain ships which are radiotelegraph-equipped. Through international conferences it has been agreed to extend this general type of protection to radiotelephone-equipped vessels. A number of units operating on the latest proposed type of signal have been designed and constructed at the laboratory, and tests on the new type signal are under way.

Lifeboat radio transmitter-receivers of 2 different types were tested and approved during the year.

Calibration of Installations and Apparatus

In its enforcement and investigation activities, the Field Engineering and Monitoring Bureau uses a large amount of testing and field intensity recording equipment. The Laboratory Division calibrates the signal generators, field intensity sets and other equipment used in the field.

Noncommunication Equipment

Industrial heating, medical diathermy, and other miscellaneous uses of radio-frequency energy for purposes other than communication have expanded to such an extent that the power used by this group exceeds the total transmitter power required for radio communication. Since such noncommunications equipment employs frequencies of the same order as used by the communications industry, severe interference may be expected unless these units are designed and operated properly. Some of these units use power far in excess of the 50-kilowatt maximum permitted AM broadcast stations. Devices in this category are covered by part 18 of the Commision's rules and regulations.

Medical diathermy apparatus which falls within this classification is type approved by the laboratory to insure that the frequency is maintained within one of the specified bands and that the harmonic and spurious radiations are within the prescribed limits. During the year 18 diathermy machines were submitted for test.

In addition, the laboratory made tests on 16 other devices employing radio-frequency energy and capable of causing interference.

The Laboratory Division is represented on the following committees which are working toward reduction of interference from receivers, industrial radio-frequency heating equipment, power lines, etc.: I. R. E. Industrial Electronics Committee; A. I. E. E. Subcommittee on Induction and Dielectric Heating; A. I. E. E. Subcommittee on Radiation Measurements above 300 Megacycles; I. R. E. Oscillator Radiation Subcommittee; A. S. A. Technical Subcommittee No. 1 of Committee C63; and CCIR Study Groups.

Frequency Allocation

GENERAL

A continuing study of the radio spectrum is essential in order that channels can be allocated and used in conformity with advancements in electronics and the rendition of maximum public service.

Frequencies in the various portions of the spectrum have different characteristics. For that reason, one group of frequencies may be useful to a particular service but not to others. Consequently, bands must be allocated to those services for which they are most suitable. In some instances these bands have to be subdivided to serve more specific purposes.

Further, the transmissions of radio stations are not limited by national boundaries. There must be coordination by different nations to minimize interference by stations of one country with those of other countries. Also, there must be international agreement on the designation of frequencies for the many radio services, and universal practice and procedure in their use.

INTERNATIONAL FREQUENCY ALLOCATION

The chief activity of the Commission in the international radio field has been concerned with carrying out domestically the provisions of the Geneva Agreement (1951), which was signed by some 65 countries at the close of the Extraordinary Administrative Radio Conference of the International Telecommunication Union (ITU). This program ties in with the Commission's objectives under section 1 of the Communications Act to make "* * * available, so far as possible, to all the people of the United States a rapid, efficient, nationwide, and worldwide * * * radio communication service with adequate facilities * * * for the purpose of the national defense, for the purpose of promoting safety of life and property through the use of wire and radio communication * * *".

Progress has been made for each of the six principal radio services in the high-frequency spectrum as follows:

Aeronautical mobile (R).—The Commission has cleared about 53 percent of the various frequencies in the aeronautical mobile R

(Route) bands which will be used by aeronautical and aircraft stations engaged in serving both domestic and international civil aviation. Additional clearances are being arranged on a continuing basis as rapidly as possible. Thus, the band 5500–5550 kilocycles has been converted from its Cairo allocation for ship telegraph to the Atlantic City allocation for aeronautical mobile (R) use. An entire 50 kilocycle band has been made available for the latter service in beginning the intricate "chain reaction" adjustments in the 5 megacycle band. The aeronautical mobile (R) plans for the North Atlantic and European-Mediterranean areas are being studied by the Commission with a view to clearing the service frequencies involved. Similar clearances will be effected for other areas based on plans adopted by the International Civil Aviation Organization (ICAO) for exclusive service-allocation of spectrum space to the aeronautical mobile (R) service as provided by the Atlantic City Radio Conference. In addition, 34 frequencies intended for assignment to domestic routes remain to be cleared.

Aeronautical mobile (OR).—The Commission does not at this time intend to license any stations in the aeronautical mobile OR (Off Route) service but it does recognize the importance of clearing these bands at the earliest date so that they may be brought into use by the stations concerned in accordance with the Geneva Agreement. Existing assignments made by the Commission on frequencies within the OR bands can be moved to their planned frequencies in accordance with the Geneva Agreement as soon as the latter frequencies are cleared with the exception of those fixed station assignments above 4 megacycles which are at the present time in the OR bands. Deletions from licenses have been made from 29 of the total 41 fixed assignments in the OR bands (71 percent). Solution to some of the remaining out-of-band problems are being considered by the licensees concerned, and additional progress in removing existing out-of-band fixed assignments will be reflected in actions now pending.

Amateur service.—All of the adjustments in the service-allocations for the amateur service envisaged by the Atlantic City Table of Frequency Allocations were made by the Commission early in 1952. These consist of the clearance and introduction of the new 21 megacycle amateur band (21,000–21,450 kilocycles) and the reallocation of 50 kilocycles of spectrum space at 14 megacycles (14,350–14,400 kilocycles) from the amateur to the fixed service. A considerable number of other countries also have made the new 21 megacycle band available to their amateur services. No additional action is required of the United States with respect to amateur frequencies.

Fixed service.—The fixed service presents a serious frequency problem. This service is allocated more spectrum space between 4 and 25

megacycles under the Atlantic City Allocation Table than all the other services combined. It represents our major use of the high-frequency spectrum.

Fixed stations provide rapid communication by telegraph, telephone, facsimile, radiophoto, and other transmissions to most of the principal countries of the world. Yet there is no international plan of time and frequency sharing for this vital radio service, nor will there be until agreement is reached by the various countries on the International Frequency List. Drafts of this list are being prepared by the International Frequency Registration Board (IFRB), based on the in-band fixed service occupancy now developing as the result of the Geneva Agreement procedures.

The traffic handled by our fixed stations is such as to make difficult, in certain cases, the discontinuance of frequency assignments which were in-band with respect to the Cairo (1938) allocations but which are now out-of-band under the Atlantic City (1947) allocations. However, the original 166 out-of-band assignments with respect to Atlantic City have been reduced to 52 (69 percent), and proposals are under consideration by the Commission and the licensees with respect to 35 of the remaining frequencies. Thus a solution either has been found or is imminent to 90 percent of the original total.

The Commission has assisted fixed licensees in adjusting their out-of-band operations so as to accommodate the traffic load on appropriate in-band fixed frequencies. These efforts are being intensified to eliminate the relatively few remaining out-of-band fixed frequency assignments in a manner satisfactory both to the licensees concerned and to the Commission.

In accordance with the Atlantic City allocations, the Cairo ship telegraph band 11,000–11,100 kilocycles has been relinquished by the maritime mobile service to the fixed service and the band 14,350–14,400 kilocycles has been converted from the amateur service to the fixed service. These actions were taken by the Commission to compensate, as far as possible, the net loss of spectrum space to the fixed service in the Atlantic City allocations as compared to the Cairo allocations.

HF broadcast service.—All high frequency broadcast stations licensed by the Commission are assigned frequencies within the Atlantic City broadcast bands. This completes the initial task of bringing the broadcast service within the Atlantic City allocations insofar as the Commission is concerned.

However, the Geneva Agreement provides that the International Frequency Registration Board adjust the Mexico City basic plan and the draft plans prepared by the Technical Plan Committee at Paris, and prepare such additional plans as are considered necessary to deal with seasons and phases of solar activity. These plans have not yet

been completed by the IFRB. The various countries will have to reach agreement on precise frequencies and hours for high frequency broadcast operation. At the present time there is no international channeling of the high frequency broadcast bands and no specifications as to hours of use for frequencies within those bands.

Maritime mobile service.—The Atlantic City Radio Regulations provide the martime mobile service with exclusive bands for each of 4 classes of stations—ship telephone, ship telegraph, coast telephone, and coast telegraph.

The Geneva Agreement anticipates the introduction of the ship telegraph bands in successive steps as follows: calling bands, cargo working bands, and passenger working bands. Introduction of these three families of subbands at 4, 6, 8, 12, and 16 megacycles, in the order listed, is to be followed by the introduction of the Atlantic City ship telephone bands. The Commission has completed all of the frequency changes envisaged by the Geneva Agreement for the entire spectrum between 20 and 27.5 megacycles.

The Geneva Agreement anticipates the introduction of coast telegraph and coast telephone assignments, one at a time as clearances can be effected.

The Commission has already established September 1, 1953, as the date for the introduction of the Atlantic City ship telegraph calling bands (4177–4187, 6265.6–6280.5, 8354–8374, 12,531–12,561, 16,708–16,748, and 22,220–22,270 kilocycles).

The Commission has not yet completed its part of the clearance of the cargo working bands and the passenger working bands for ship telegraph stations. Appropriate announcements will be made as these clearances occur and the shipping industry and affected licensees will be kept advised in a manner similar to that employed for the clearance and introduction of the calling bands. The present international target date for opening of the cargo working bands is March 1, 1954.

As regards coast telegraph stations, there are 127 assignments to be activated for the bands between 4 and 20 megacycles and 22 coast telegraph assignments in the 22 megacycle band, making a total of 149 assignments between 4 and 27.5 megacycles. As of June 30, 1953, 94 of these 149 assignments (or 63 percent) have been cleared and the licensees notified. Additional clearances are being arranged on a continuing basis, and licensees are kept informed of the status of clearances of interest to them.

In the matter of the maritime mobile radiotelephone service for public correspondence, a substantial portion of the frequency adjustments resulting from the Geneva Agreement has been made and service to ships is now provided on 57 percent of the ship assignments and 67 percent of the coast assignments.

NATIONAL FREQUENCY ALLOCATION

Many of the Commission actions during the past year concerning the allocation of frequencies on a national scale are directly or closely related to carrying out the obligations of the United States Government in its international commitments.

A list of the major of these domestic frequency allocation actions follows:

Made final a change in the allocation of frequencies in the bands between 76–88 and 98–108 megacycles so as to permit the common carrier fixed service to use these bands in the Territory of Hawaii only.

Amended Part 2 of its rules so as to permit non-Government radio stations to use frequencies below 25 megacycles which are not in accordance with the Commission's Table of Frequency Allocations where such use is necessary for coordination with Government stations.

Rearranged the frequency allocations in the 450–460 megacycle band to provide greater separation between the frequencies available for assignment to each of the services having allocations in that band.

Recognized theater television as an existing service (common carrier) and found no necessity to provide a separate allocation of frequencies for the exclusive use of this service. (See chapter on Common Carriers.)

Proposed the deletion of certain frequencies presently available to stations in the fixed Public Agricultural service.

Additionally and in connection with frequency changes described in "International Frequency Allocation," the Commission proposed or adopted many other modifications to its Table of Frequency Allocations to further bring it into conformity with the Atlantic City Table of Frequency Allocations, thus permitting a more effective and efficient utilization of the radio spectrum by stations in the various services.

INTERNATIONAL CONFERENCES AND MEETINGS

The Commission assisted in the United States preparation for and participation in 16 international conferences and meetings during the year. These were worldwide, regional or bilateral in nature. Most of the major conferences were convened under the auspices of the International Telecommunication Union (ITU) or the International Civil Aviation Organization (ICAO). Approximately 90 nations participate in the activities of the ITU and some 60 participate in the activities of the ICAO.

275623—53——11

The Commission furnished 3 delegation chairmen or vice-chairmen and 5 representatives to the following conferences and meetings:

Name	Place	Date
Discussions with British Post, Telegraph and Telephone on use of FM vs. AM on VHF range by Maritime Mobile Service.	London, Paris, and Geneva.	June 20–July 22, 1952.
ITU Conference for Revision of London Agreement, 1949	London	July 9–21, 1952.
ITU Plenipotentiary Conference	Buenos Aires	Oct. 2–Dec. 22, 1952.
ICAO European Mediterranean Special Frequency Meeting.	Paris	Oct. 28, 1952.
ICAO South East Asia-South Pacific Regional Air Navigation Meeting.	Melbourne	Jan. 13, 1953.
US–UK Meeting Concerning Distance Measuring Equipment.	Washington	Jan. 26, 1953.
CCIR Study Group XI—TV Questions Related to Single Side Band.	Stockholm	May 20–27, 1953.
CCIT 7th Plenary Meeting	Arnhem	May 26–June 3, 1953.

In addition, the Commission engaged in preparatory or follow-up work directly connected with the following conferences and meetings:

Name	Place	Date
URSI International Executive Committee	Sydney	Aug. 8, 1952.
URSI 10th General Assembly	do	Aug. 11–21, 1952.
CCIT Study Group 6 Vocabulary and Definitions	Geneva	Oct. 14, 1952.
CCIT Study Group 1 General Telegraphy	do	Oct. 14, 1952.
1st Air Navigation Conference	Montreal	Feb.–Mar. 1953.
CCIF Study Group on Trials Semi-Auto Phone Operations	Geneva	Mar. 1, 1953.
CCIF Study Group on Operating and Tariff Questions	do	Mar. 1, 1953.
ITU 8th Session of Administrative Council	do	May 2–June 1, 1953.
CCIF Sub-Study Group on Quality of Transmissions	Stockholm	June 1, 1953.

The following conferences and meetings are projected for the future:

Name	Place	Date
US-Mexico Meeting for Implementation Extraordinary Administrative Radio Conference.	Undetermined	Tentative—1953.
US-Canada Meeting for Implementation Extraordinary Administrative Radio Conference.	do	Tentative—1953.
ICAO 5th Communications Division Meeting	Montreal	October 1953.
ICAO 2nd African Indian Ocean Regional Air Navigation Meeting.	Canary Islands	November 1953.
URSI 11th General Assembly	Netherlands	1954.
ICAO 3d Caribbean Regional Air Navigation	Undetermined	1954.
ICAO Middle East Regional Air Navigation Meeting	do	Undetermined.
International HF Broadcast Conference	Buenos Aires	1954.
International Administrative Council	Geneva	1954.
ICAO South American Regional Air Navigation Meeting	Undetermined	1955.
ICAO South Atlantic Regional Air Navigation Meeting	do	1955.
International Telephone and Telegraph Conference	Buenos Aires	1955.
ICAO 4th European Mediterranean Regional Air Navigation Meeting.	Undetermined	1956.

COORDINATION AND NOTIFICATION

The Commission was active during the year in coordinating nationally the many changes necessary in frequency assignments to licensees

of the Commission and the Federal Government stations. Also, the IFRB of the ITU at Geneva was notified daily of all changes made by users of the radio spectrum in the United States and its territories as a result of the Geneva Agreement, in addition to the normal notifications of all radio frequency assignments to domestic stations which are capable of causing harmful interference internationally.

The number of international interference cases coming to the Commission's attention includes those due to normal use of the radio spectrum, plus those occurring because of the thousands of frequency changes which are being made all over the world. The total number during the year was 780, of which over 700 were resolved.

Infractions by foreign stations of the International Telecommunication Convention and Radio Regulations and of the radio provisions of the International Convention for the Safety of Life at Sea, detected by the Commission's monitoring stations and inspection offices, were screened and forwarded to the appropriate foreign administrations in accordance with internationally agreed procedures. During the year a total of 1,670 cases of treaty infractions were so reported. Most of these involved spurious emissions, harmonic radiations, off-frequency operation, or some other technically improper operation, all of which constituted sources of actual or potential interference to radio communication, or involved the safety of life and property in the air and on the sea.

The exchange of technical data concerning proposed frequency assignments in portions of the VHF and the UHF spectrum continued between the Commission and the Canadian Department of Transport. This informal procedure announced in 1950 permits an effective and efficient exchange of engineering comments on proposed United States and Canadian assignments in border areas. The effectiveness of this exchange has been demonstrated by the fact that insoluble cases of interference between stations of the two countries in these portions of the spectrum no longer occur. Approximately 640 letters on this subject were exchanged between the two countries during the year.

INTERDEPARTMENT RADIO ADVISORY COMMITTEE

Frequency assignments to United States Government radio stations are made by the President upon recommendation of the Interdepartment Radio Advisory Committee (IRAC), on which the Commission is represented. At the close of the year the administrative servicing of IRAC was transferred from the Commission to the Department of Commerce.

Appendix

FIELD OFFICES

Of the Commission's 64 field offices, 60 are engaged in engineering work through 9 regional offices, 24 district offices, 6 suboffices, 3 ship offices, and 18 monitoring stations of the Field Engineering and Monitoring Bureau. The other four offices are maintained by the Common Carrier Bureau.

A list of these offices follows:

Field Engineering and Monitoring Bureau

Regional Offices	*Headquarters*
North Atlantic	954 Federal Bldg., New York 14, N. Y.
South Atlantic	411 Federal Annex, Atlanta 3, Ga.
Gulf States	332 U. S. Appraisers Bldg., Houston 11, Tex.
South Pacific	323-A Customhouse, San Francisco 26, Calif.
North Pacific	801 Federal Office Bldg., Seattle 4, Wash.
Central States	832 U. S. Courthouse Bldg., Chicago 4, Ill.
Great Lakes	1029 New Federal Bldg., Detroit 26, Mich.
Hawaiian	P. O. Box 1142, Lanikai, Oahu, T. H.
Alaskan	52 Post Office and Courthouse, Anchorage, Alaska.

District Offices	*Address*
1	1600 Customhouse, Boston 9, Mass.
2	748 Federal Bldg., New York 14, N. Y.
3	1005 U. S. Customhouse, Philadelphia 6, Pa.
3	508 Old Town Bank Bldg., Baltimore 2, Md.
5	402 Federal Bldg., Norfolk 10, Va.; (ship office) 200 Post Office Bldg., Newport News, Va.
6	411 Federal Annex, Atlanta 3, Ga.; (suboffice) 214 Post Office Bldg., Savannah, Ga.
7	312 Federal Bldg., Miami 1, Fla.; (suboffice) 409-410 Post Office Bldg., Tampa 2, Fla.
8	400 Audubon Bldg., New Orleans 16, La.; (suboffice) 419 U. S. Courthouse and Customhouse, Mobile 10, Ala.
9	324 U. S. Appraisers Bldg., Houston 11, Tex.; (suboffice) 329 Post Office Bldg., Beaumont, Tex.; (ship office) 406 Post Office Bldg., Galveston, Tex.
10	500 U. S. Terminal Annex Bldg., Dallas 22, Tex.

District Offices	*Address*
11	539 U. S. Post Office and Courthouse Bldg., Los Angeles 12, Calif.; (suboffice) 15–C U. S. Customhouse, San Diego 1, Calif.; (ship office) 326 U. S. Post Office and Courthouse, San Pedro, Calif.
12	323-A Customhouse, San Francisco 26, Calif.
13	307 Fitzpatrick Bldg., Portland 5, Oreg.
14	801 Federal Office Bldg., Seattle 4, Wash.
15	521 New Customhouse, Denver 2, Colo.
16	208 Uptown Post Office and Federal Courts Bldg., St. Paul 2, Minn.
17	3200 Fidelity Bldg., Kansas City 6E, Mo.
18	826 U. S. Courthouse, Chicago 4, Ill.
19	1029 New Federal Bldg., Detroit 26, Mich.
20	328 Federal Bldg., Buffalo 3, N. Y.
21	502 Federal Bldg., Honolulu 1, T. H.
22	322–323 Federal Bldg., San Juan 13, P. R.
23	7–8 Shattuck Bldg., Juneau, Alaska; (suboffice) 53 U. S. Post Office and Courthouse Bldg., Anchorage, Alaska.
24	Briggs Bldg., 22nd & E Streets, N. W., Washington 25, D. C.

Primary Monitoring Stations	*Secondary Monitoring Stations*
Allegan, Mich.	Searsport, Maine
Grand Island, Nebr.	Spokane, Wash.
Kingsville, Tex.	Twin Falls, Idaho
Millis, Mass.	Fort Lauderdale, Fla.
Santa Ana, Calif.	Lexington, Ky.
Laurel, Md.	Muskogee, Okla.
Livermore, Calif.	Fairbanks, Alaska
Portland, Oreg.	
Powder Springs, Ga.	
Lanikai, Oahu, T. H.	
Anchorage, Alaska	

Common Carrier Bureau Field Offices

Atlanta, Ga., 738 Hurt Building
New York, N. Y., 90 Church Street
St. Louis, Mo., 815 Olive Street
San Francisco, Calif., 180 New Montgomery Street

PUBLICATIONS

The Commission's printed publications are not available from the Commission, but are sold by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at the prices indicated in the following list:

Title	*Price*
Communications Act of 1934, with amendments and index, revised to Jan. 1952	$0.25
Federal Communications Commission reports (bound volumes of decisions and orders exclusive of annual reports):	
Volume 3, July 1936 to February 1937	2.00
Volume 4, March 1937 to Nov. 15, 1937	1.50
Volume 5, Nov. 16, 1937, to June 30, 1938	1.50
Volume 6, July 1, 1938, to Feb. 28, 1939	1.50
Volume 7, March 1, 1939, to Feb. 29, 1940	1.50
Volume 8, March 1, 1940, to Aug. 1, 1941	1.50
Volume 11, July 1, 1945, to June 30, 1947	3.75
Volume 12, July 1, 1947, to June 30, 1948	3.50
Annual reports of the Commission:	
Thirteenth Annual Report—Fiscal year 1947	.25
Fourteenth Annual Report—Fiscal year 1948	.30
Fifteenth Annual Report—Fiscal year 1949	.35
Sixteenth Annual Report—Fiscal year 1950	.40
Seventeenth Annual Report—Fiscal year 1951	.40
Eighteenth Annual Report—Fiscal year 1952	.40
Nineteenth Annual Report—Fiscal year 1953	[1]
Statistics of the Communications Industry:	
For the year 1939	.25
For the year 1940	.20
For the year 1942	.35
For the year 1943	.30
For the year 1945	.50
For the year 1946	.55
For the year 1947	.75
For the year 1948:	
Secs. A and B	1.00
Sec. B (Broadcast only)	.35
For the year 1949:	
Secs. A and B	1.00
Sec. B (Broadcast only)	.25
For the year 1950 (Common Carrier only)	.50
For the year 1951 (Common Carrier only)	.40
Report on Public Service Responsibility of Broadcast Licensees (Blue Book), 1946	.35
The Safety and Special Radio Services—a Public Primer, 1950	.15
Telephone and Telegraph—a Public Primer, 1949	.10
An Economic Study of Standard Broadcasting, 1947	.40
Study Guide and Reference Material for Commercial Radio Operator Examinations, revised to Feb. 1, 1951	.35
Standards of Good Engineering Practice:	
Concerning Standard Broadcast Stations, revised to Oct. 30, 1947	1.25
Rules and Regulations:	
Part 0, Organization, Delegation of Authority, etc	[2]
Part 1, Practice and Procedure	[2]

[1] In the process of printing—available at Government Printing Office at a later date.
[2] Being revised—not available at present.

Title	*Price*
Rules and Regulations—Continued	
Part 2, Frequency Allocations and Radio Treaty Matters; General Rules and Regulations, revised to July 30, 1952	$0.25
Part 3, Radio Broadcast Services, revised to June 30, 1953	.50
Part 4, Experimental and Auxiliary Broadcast Services, revised to Oct. 30, 1950	.15
Part 5, Experimental Radio Services, revised to Mar. 17, 1953	.10
Part 6, Public Radiocommunication Services, revised to Apr. 27, 1949	.10
Part 7, Stations on Land in the Maritime Services, effective July 23, 1951	.20
Part 8, Stations on Shipboard in the Maritime Services, effective July 23, 1951	(1)
Part 9, Aviation Services, revised to July 14, 1953	.10
Part 10, Public Safety Radio Services, revised to Apr. 27, 1949	.15
Part 11, Industrial Radio Services, revised to July 29, 1953	.15
Part 12, Amateur Radio Service, revised to June 6, 1951	.10
Part 13, Commercial Radio Operators, revised to June 27, 1950	.05
Part 14, Radio Stations in Alaska (Other than Amateur and Broadcast), revised to Apr. 28, 1948	(1)
Part 15, Restricted Radiation Devices, recodified July 21, 1948	(1)
Part 16, Land Transportation Radio Services, revised to Jan. 7, 1953	.10
Part 17, Construction, Marking, and Lighting of Antenna Structures, revised to June 30, 1953	.05
Part 18, Industrial, Scientific, and Medical Service, revised to Jan. 25, 1950	(1)
Part 19, Citizens Radio Service, effective June 1, 1949	.10
Part 20, Disaster Communications Service, effective Mar. 21, 1951	.05
Part 31, Uniform System of Accounts for Class A and Class B Telephone Companies, revised to May 12, 1948	.40
Part 33, Uniform System of Accounts for Class C Telephone Companies, revised to May 12, 1948	.30
Part 34, Uniform System of Accounts for Radiotelegraph Carriers, revised to Oct. 14, 1949	.20
Part 35, Uniform System of Accounts for Wire-telegraph and Ocean-cable Carriers, revised to Oct. 14, 1949	.25
Part 41, Telegraph and Telephone Franks, revised to Dec. 4, 1947	.05
Part 43, Reports of Communication Common Carriers and Certain Affiliates, revised to Sept. 21, 1953	.05
Part 45, Preservation of Records of Telephone Carriers, effective Oct. 1, 1950	.10
Part 46, Preservation of Records of Wire-telegraph, Ocean-cable and Radiotelegraph Carriers, effective Oct. 1, 1950	.10
Part 51, Occupational Classification & Compensation of Employees of Class A and Class B Telephone Companies, effective Oct. 10, 1951	.05
Part 52, Classification of Wire-telegraph Employees, effective July 11, 1944	.05
Part 61, Tariffs, Rules Governing the Construction, Filing and Posting of Schedules of Charges for Interstate and Foreign Communications Service, revised to Aug. 1, 1946	.10

[1] Being revised—not available at present.
[2] Obtainable temporarily from the Federal Communications Commission without charge.

Title	Price
Rules and Regulations—Continued	
Part 62, Applications under Sec. 212 of the Act to Hold Interlocking Directorates, revised to May 23, 1944	$0.05
Part 63, Extension of Lines and Discontinuance of Service by Carriers, revised to Dec. 30, 1946	(1)
Part 64, Miscellaneous Rules Relating to Common Carriers, revised to July 16, 1948	.10

[1] Obtainable temporarily from the Federal Communications Commission without charge.

Purchasers of the Commission's Rules and Regulations are furnished a form by the Superintendent of Documents which, when filled out and forwarded to the Commission, entitles the purchaser to receive any future amendments to the part or parts purchased until a complete revision thereof is reprinted. AM and FM Standards of Good Engineering Practice and most of the rule parts are printed on 8- by 10½-inch pages and punched to fit standard three-ring binders. Standards with respect to television are now incorporated in part 3 of the broadcast rules.

The Commission is not able to supply lists of radio stations but, on request, will furnish a fact sheet about commercial sources of such lists, also one on commercial radio publications and services.

TREATIES AND OTHER INTERNATIONAL AGREEMENTS

For informational purposes, the applicable Federal laws, international treaties, agreements, and arrangements in force relating to electrical communication, and to which the United States is a party, are listed below.

(Unless otherwise indicated, copies of these documents may be obtained from the Government Printing Office, Washington 25, D. C.)

Date	Series [1]	Subject
1910		Ship Act of 1910 as amended July 23, 1912 (Those provisions relating to required radio-communication for ships navigating the Great Lakes).
1925	T. S. 724-A	Arrangements between the United States of America, Great Britain, Canada, and Newfoundland. Effected by exchange of notes September and October 1925, providing for the prevention of interference by ships off the coast of these countries with radio broadcasting. (Not available at the Government Printing Office.)
1928 and 1929	T. S. 767-A	Arrangement effected by exchange of notes between the United States of America and Dominion of Canada governing radio communications between Private Experimental Stations. Signed Oct. 2, 1928, Dec. 29, 1928, and Jan. 12, 1929.
1929	T. S. 777-A	Arrangement between the United States of America, Canada, Cuba, and Newfoundland relating to assignment of high frequencies on the North American continent effected by exchange of notes signed at Ottawa, Feb. 26 and 28, 1929. (Cuba ceased to be a party by virtue of notice to Canadian Government of Oct. 5, 1932, effective Oct. 5, 1933. Arrangement still in force with respect to United States of America, Canada, and Newfoundland). (Not available at the Government Printing Office.)
1934		Communications Act of 1934, as amended.

See footnotes at end of table.

Date	Series [1]	Subject
1934	E. A. S. 62	Radio communications between private experimental stations and between amateur stations. Arrangement between the United States of America and the Dominion of Canada (continuing arrangement effected by exchange of notes signed Oct. 2, 1928, Dec. 29, 1928, and Jan. 12, 1934). Effective May 4, 1934. (Not available at the Government Printing Office.)
1934	E. A. S. 66c	Radio communications between amateur stations on behalf of third parties. Arrangement between the United States of America and Peru Effective May 23, 1934.
1934	E. A. S. 72	Radio communications between amateur stations on behalf of third parties. Arrangement between the United States of America and Chile. Effected by exchange of notes signed Aug. 2 and 17, 1934.
1937	E. A. S. 109	Exchange of information concerning issuance of radio licenses. Agreement between the United States of America and Canada. Effected by exchange of notes signed Mar. 2 and 10, Aug. 17, Sept. 8 and 20, Oct. 9, 1937. This agreement was largely superseded by the notification procedure established in the NARBA (T. S. 777-A, T. S. 962, E. A. S. 227 and TIAS 1553) and under the Inter-American Radio Communications Convention (T. S. 938). (Not available at the Government Printing Office.)
1937	T. S. 938	Inter-American Radio Communications Convention between the United States of America and Other Powers. Signed at Habana, Dec. 13, 1937 (First Inter-American Conference). (Not available at the Government Printing Office.)
1937	T. S. 962	North American Regional Broadcast Agreement between the United States of America, Cuba, Dominican Republic, Haiti, and Mexico. Signed at Habana, Dec. 13, 1937. NOTE.—See E. A. S. 227 and TIAS 1553 which supplement this agreement. (Not available at the Government Printing Office.)
1938	E. A. S. 142	Radio Communications between Alaska and British Columbia. Agreement between the United States of America and Canada effected by exchange of notes June, July, August, September, October, November, and December 1938.
1938	E. A. S. 136	Radio Broadcasting Arrangement between the United States of America and Canada. Effected by exchange of notes signed Oct. 28 and Dec. 10, 1938. (Not available at the Government Printing Office.)
1938	T. S. 949	Regional Radio Convention between the United States of America (in behalf of the Canal Zone) and Other Powers. Signed at Guatemala City, Dec. 8, 1938. (Not available at the Government Printing Office.)
1939	E. A. S. 143	Use of Radio for Civil Aeronautical Services. Arrangement between the United States of America and Canada. Effective Feb. 20, 1939. (Not available at the Government Printing Office.)
1940	E. A. S. 196	Agreement between the United States of America and Mexico with regard to broadcasting. Effected by exchange of notes signed Aug. 24 and 28, 1940. Effective Mar. 29, 1941. (Not available at the Government Printing Office.)
1941	E. A. S. 227	Supplementary North American Regional Broadcasting Agreement signed at Washington, Jan. 30, 1941. (See T. S. 962 and TIAS 1553.) (Not available at the Government Printing Office.)
1944	E. A. S. 400	Agreement with Canada Regarding Construction and Operation of Radio Broadcasting Stations in Northwestern Canada. Effected by exchange of notes signed at Ottawa, Nov. 5 and 25, 1943, and Jan. 17, 1944. Agreement is to "cease with termination of war." (Not available at the Government Printing Office.)
1946	TIAS 1527	Agreement between the United States of America and Union of Soviet Socialist Republics on Organization of Commercial Radio Teletype Communication Channels. Signed at Moscow, May 24, 1946.
1946	TIAS 1553	North American Regional Broadcasting Interim Agreement between the United States of America and Other Governments (Modus Vivendi). Signed at Washington, Feb. 25, 1946. (See T. S. 962 and E. A. S. 227. Amended by TIAS 1802.)
1947	TIAS 1652	Telecommunication Standardization of Distance Measuring Equipment Agreement between the United States of America and the United Kingdom of Great Britain and Northern Ireland. Signed at Washington, Oct. 13, 1947.
1947	TIAS 1670	Interim Arrangement between the United States of America and Canada with respect to Mobile Radio Transmitting stations. Effected by exchange of notes signed at Washington, June 25 and Aug. 20, 1947.
1947	TIAS 1676	Agreement between the United States of America and the United Nations relative to headquarters of the U. N. Signed at Lake Success, June 26, 1947. Brought into force Nov. 21, 1947, by an exchange of notes between the United States Representative to the United Nations and the Secretary General of the U. N. (The provisions of this agreement were also made Public Law 357 of the 80th Cong., approved Aug. 4, 1947.)
1947	TIAS 1726	Agreement between the United States of America and Canada providing for frequency modulation broadcasting in channels in the r. f. band 88–108 Mc. Effected by exchange of notes signed at Washington, Jan. 8 and Oct. 15, 1947. (Not available at the Government Printing Office.)

See footnotes at end of table.

Date	Series [1]	Subject
1947	TIAS 1901	International Telecommunication Convention, Final Protocol and Radio Regulations. Signed at Atlantic City, N. J., Oct. 2, 1947, superseding the International Telecommunication Convention, Madrid, 1932. Radio Regulations effective Jan. 1, 1949, except for regulations enumerated in article 47. However, the effective date provisions of article 47 have been superseded by the provisions of the Agreement signed at the Extraordinary Administrative Radio Conference, Geneva, 1951 (see below). (This printing does not contain the Additional Radio Regulations, since the United States is not a party thereto. Copies of the final acts of the Atlantic City conference which include the Additional Radio Regulations are available only from the International Telecommunication Union, Geneva, Switzerland. (Not available at the Government Printing Office.)
1948	TIAS 1802	Radio Broadcasting. Engineering Standards Applicable to the Allocation of Standard Broadcasting Stations (540–1600 kc). Arrangement between the United States of America and Canada. Effective Apr. 1, 1948. (Not available at the Government Printing Office.)
1948	TIAS 2495	International Convention for the Safety of Life at Sea and annexed Regulations. Signed at London June 10, 1948. Entered into force: Nov. 19, 1952.
1949	TIAS 2175	Telegraph Regulations (Paris Revision, 1949), annexed to the International Telecommunication Convention (Atlantic City, 1947) and Final Protocol to the Telegraph Regulations. Signed at Paris, Aug. 5, 1949. Effective July 1, 1950. Instrument of ratification of the United States deposited with the International Telecommunication Union, Sept. 26, 1950.
1949	TIAS 2435	Telecommunications Agreement between the United States of America and Certain British Commonwealth Governments. Signed at London, Aug. 12, 1949. Effective Feb. 24, 1950.
1949	TIAS 2489	Inter-American Radio Agreement between the United States of America and Canada and other American Republics.[2] (Fourth Inter-American Radio Conference.) Signed at Washington, July 9, 1949. Entered into force: Apr. 13, 1952, subject to the provisions of Article 13.
1950	TIAS 2433	Radio communications between amateur stations on behalf of third parties. Arrangement between the United States of America and Ecuador. Effective Mar. 17, 1950.
1951	TIAS 2366	Agreement between the United States of America and Mexico which assigns television frequency channels to cities within 250 miles of the United States-Mexican border. Effected by exchange of notes dated Aug. 10, 1951, and Sept. 26, 1951.
1951	TIAS 2223	Radio communications between amateur stations on behalf of third parties. Agreement between the United States of America and Liberia. Effective Jan. 11, 1951.
1951	----------	Agreement signed at the Extraordinary Administrative Radio Conference to bring into force the Table of Frequency Allocations and other provisions of the Radio Regulations (Atlantic City, 1947) not yet in force. Signed at Geneva, Dec. 3, 1951. Entered into force: Mar. 1, 1952. (Not available at the Government Printing Office. Available from the International Telecommunication Union, Geneva, Switzerland.)
1951	TIAS 2259	Use of Facilities of Radio Ceylon. Agreement between the United States of America and Ceylon. Entered into force May 14, 1951.
1951	TIAS 2459	Agreement between the United States of America and Cuba concerning the Control of Electromagnetic Radiation. Entered into force Dec. 18, 1951.
1952	TIAS 2508	Treaty with Canada effective May 15, 1952, relating to Mutual Recognition by the United States of America and Canada of Certain Radio Station and Operator Licenses issued in either country.
1952	TIAS 2520	Radio communications between amateur stations on behalf of third parties. Agreement between the United States of America and Cuba, effective Apr. 14, 1952.
1952	TIAS 2548	United States of America and Denmark. Registration of Frequencies Used in Greenland by United States Authorities. Entered into force Apr. 4, 1952.
1952	TIAS 2594	Agreement between the United States of America and Canada which assigns television frequency channels to cities within 250 miles of the United States-Canadian border. Effected by exchange of notes dated April 23, 1952, and June 23, 1952. Entered into force June 23, 1952 (Not available at the Government Printing Office.)
1952	TIAS 2705	London Revision (1952) of the London Telecommunication Agreement (1949) between the United States of America and Canada and Certain British Commonwealth Governments. Entered into force Oct. 11, 1952. (Not available at the Government Printing Office.)

[1] T. S.—Treaty Series. E. A. S.—Executive Agreement Series. TIAS—Treaties and Other International Act Series.

[2] In addition, certain Resolutions and Recommendations were adopted by a number of countries, members of the International Telecommunication Union Region 2 at Washington, July 9, 1949. (Not available at the Government Printing Office. Available from the International Telecommunication Union, Geneva, Switzerland.)

In addition, the United States is bound by certain other treaties and agreements which are generally considered as superseded because certain of the contracting countries other than the United States did not become a party to subsequent treaties and agreements. The United States is, in such instances, bound to the original document with respect to our relations with those particular countries. These include the following:

Date	Series [1]	Subject
1912	T. S. 581	International Radiotelegraph Convention, Final Protocol and Service Regulations, signed at London, July 5, 1912. (Not available at the Government Printing Office.)
1927	T. S. 767	International Radiotelegraph Convention and General Regulations, signed at Washington, Nov. 25, 1927.
1929	T. S. 910	Safety of Life at Sea Convention, with Regulations, between the United States of America and Other Powers, signed at London, May 31, 1929.
1930	T. S. 921	Amendment to Regulation XIX of Annex 1 to the Safety of Life at Sea Convention, Dec. 31, 1930.
1932	T. S. 867	International Telecommunications Convention; General Radio Regulations annexed to the International Telecommunications Convention, signed at Madrid, Dec. 9, 1932. (Not available at the Government Printing Office.)
1937	E. A. S. 200	Inter-American Arrangement concerning Radio-communications and Annex. Signed at Habana, Dec. 13, 1937. This arrangement was replaced by Inter-American Agreement concerning Radio-communications signed at Santiago, Jan. 26, 1940 (E. A. S. 231). Countries which approved the 1937 arrangement but which have not yet approved the 1940 arrangement are Dominican Republic, Haiti, Mexico, Panama, and Peru. (Not available at the Government Printing Office.)
1938	T. S. 948	General Radio Regulations (Cairo Revision, 1938) and Final Radio Protocol (Cairo Revision, 1938) annexed to the International Telecommunications Convention of Madrid, 1932. Superseded by Radio Regulations annexed to the International Telecommunication Convention, Atlantic City, 1947.
1940	E. A. S. 231	Inter-American Radio Communications Agreement between the United States of America, Canada, and other American Republics. (Second Inter-American Radio Conference.) Signed at Santiago, Chile, Jan. 26, 1940.

[1] T. S.—Treaty Series. E. A. S.—Executive Agreement Series. TIAS—Treaties and Other International Act Series.

The following treaties, agreements, and arrangements have been signed by the United States and are included for informational purposes because of their importance or the imminence of their effective dates:

Date	Subject
1950	North American Regional Broadcasting Agreement between the United States of America, Canada, Cuba, Dominican Republic, United Kingdom of Great Britain and Northern Ireland for the Territories in the North American Region (Bahama Islands and Jamaica). Signed at Washington, D. C., on Nov. 15, 1950. Agreement will enter into force subsequent to ratification of at least three of these four countries, in accordance with Part III, paragraph I, of the Agreement: Canada, Cuba, Mexico, and the United States of America, subject to ratification procedure in the United States. (Not available at the Government Printing Office. Available through the International Telecommunication Union, Geneva, Switzerland.)
1952	Agreement between the United States of America and Canada for the purpose of promoting Safety on the Great Lakes by Means of Radio. The agreement applies to vessels of all countries as provided for in Article 3. Enters into force: Nov. 13, 1954. (Not available at the Government Printing Office.)

There are, in addition to the foregoing, certain treaties, agreements, or arrangements primarily concerned with matters other than the

use of radio but which affect the work of the Federal Communications Commission, insofar as they involve communications. Among the most important of these are the following:

Date	Series [1]	Subject
1944	TIAS 1591	International Civil Aviation Convention. Signed at Chicago, Dec. 7, 1944. Effective Apr. 4, 1947.
1946 to present		ICAO Regional Air Navigation Meetings, Communications Committee Final Reports.[2]
1946		ICAO Communication Division, Second Session, Montreal.[2]
1949		ICAO Communication Division, Third Session, Montreal.[2]
1951		ICAO Communication Division, Fourth Session, Montreal.[2]

[1] T. S.—Treaty Series. E. A. S.—Executive Agreement Series. TIAS—Treaties and Other International Act Series.

[2] Not available at the Government Printing Office. Available from the Secretary General of ICAO, International Aviation Building, 1080 University Street, Montreal, Canada.

○

FCC

Federal Communications Commission

20th annual report
Fiscal year ended June 30, 1954

With introductory summary and notations throughout of subsequent important developments.

UNITED STATES GOVERNMENT PRINTING OFFICE - WASHINGTON - 1955

COMMISSIONERS

Members of the Federal Communications Commission
(As of June 30, 1954)

ROSEL H. HYDE,[1] *Chairman*
(Term expires June 30, 1959)

EDWARD M. WEBSTER
(Term expires June 30, 1956)

GEORGE E. STERLING[2]
(Term expires June 30, 1957)

FRIEDA B. HENNOCK
(Term expires June 30, 1955)

ROBERT T. BARTLEY
(Term expires June 30, 1958)

JOHN C. DOERFER[3]
(Term expires June 30, 1961)

ROBERT E. LEE[4]
(Term expires June 30, 1960)

[1] Succeeded as Chairman October 4, 1954, by George C. McConnaughey.
[2] Resigned as of September 30, 1954; succeeded by George C. McConnaughey October 4, 1954.
[3] Reappointed June 4, 1954; confirmed June 29, 1954.
[4] Took office October 6, 1953; succeeded Paul A. Walker.

LETTER OF TRANSMITTAL

FEDERAL COMMUNICATIONS COMMISSION,
Washington 25, D. C., September 29, 1954.

To the Congress of the United States:

In compliance with section 4 (k) of the Communications Act of 1934, as amended in 1952, there is herewith submitted the annual report of the Federal Communications Commission for the fiscal year 1954.

This report is of particular interest because it marks the 20th anniversary of Government regulation of electrical communication services as coordinated in and exercised by this Commission.

Therefore, in addition to reporting on events of the year ending June 30, 1954, this report contains background historical reference and notations of subsequent important developments up to the time of going to press.

Biographical data with respect to persons taken into the employment of the Commission during the year, together with the names of persons who have left its employ during that period, are being transmitted as a nonprinted supplement to this report.

Respectfully,

ROSEL H. HYDE, *Chairman.*

Table of Contents

Introductory Summary

ANNIVERSARY HIGHLIGHTS

The 20th anniversary year of the Federal Communications Commission saw the Nation studded with and served by more than

700,000 radio transmitters,
50 million telephones, and
nearly 3½ million channel miles of telegraph circuitry.

Fifty different nonbroadcast services were serving the general public, business, industry, and individuals on the land, on the sea, and in the air. By major groups they comprised

46,000 marine stations with 44,000 transmitters,
40,000 aviation stations with 42,000 transmitters,
21,000 industrial stations with 146,000 transmitters,
15,000 public safety stations with 165,000 transmitters,
14,000 land transportation stations with 139,000 transmitters,
123,000 amateur stations with 116,000 transmitters; also
over 1,600 common carrier radio stations, and
nearly 600 experimental radio stations.

Eleven categories of broadcast station authorizations were nearing the 6,000 mark. Program service was being rendered by two types of aural stations plus an expanded video service to which compatible color had been added. The close of the fiscal year showed these broadcast authorization totals:

2,697 commercial AM stations
573 commercial TV stations
30 educational TV stations
569 commercial FM stations
123 educational FM stations
1,728 pickup, studio-transmitter links, and other auxiliary stations.

The Bell Telephone System handled a daily average of more than 153 million messages. It operated a national network of coaxial cable and microwave facilities, of which 5 million circuit-miles were radio. Over 80 percent of all Bell telephones were dial operated. More than

500 mobile radiotelephone systems were in operation. Radiotelephone service was provided to 111 overseas points. For the first time, international radiotelephony exceeded 1 million calls.

Western Union handled 162 million land-line messages during the year. Besides operating a regional microwave telegraph system, it had linked nearly 250 large branch offices in nonreperforator cities with its mechanical reperforator relay system, was serving more than 22,000 teleprinter installations and over 13,000 deskfax (facsimile) instruments. Through direct radio connections with 87 countries, and cable systems to Europe, and Central and South America, telegraph carriers were able to reach the world at large. International telegraph traffic amounted to 511 million paid words.

More than 962,000 radio operator authorizations of different classes were outstanding. The two categories numbered

nearly 850,000 commercial radio operators, and
more than 120,000 amateur radio operators.

The net result was that at the close of two decades the Commission had on its books more than 1,200,000 authorizations in the radio field alone.

* * *

Following are group summaries of the Commission's activities and the services it regulates which are detailed elsewhere in this report.

National Defense

Chief among the national defense activities of the Commission is administration of the CONELRAD (control of electromagnetic radiation) program. The purpose is to prevent radio transmissions being used to guide enemy aircraft in event of attack, also to harness radio stations to the defense effort.

CONELRAD has been applied to broadcast, aviation, and public safety stations, and arrangements are being made to extend it to all other radio services, and to radio facilities in our outlying possessions.

The Commission is also active in the coordinated effort of military and civilian Federal bodies and the communications industry to see that wire and radio media are integrated into the defense program, that essential circuits will be available under any eventuality and, further, that our vital communications facilities are adequately safeguarded.

On June 10, 1954, the Commission proposed to deny amateur or commercial radio operator licenses to members of subversive groups. Decision was still pending. Commission licenses have always been limited to citizens.

Frequency Allocation

In the international frequency allocation field, the Commission was concerned chiefly with carrying out domestically the provisions of the Geneva Agreement, in which 65 countries agreed on an orderly use of bands of frequencies for the different radio services on a worldwide basis. It continued to implement a subsequent Atlantic City conference with reference to the division and use of these frequencies in our own country. This involved extensive coordination with and notification to the other nations concerned.

The Commission assisted in the United States preparation for and participation in 13 international radio conferences and meetings during the year, was preparing for 5 additional conferences, and 25 others were scheduled.

Common Carrier Services

Telephone.—The 50-millionth telephone in this country was installed in the White House in November 1953. It was 1 of the 2,000,000 added in 1953. About 82 percent, or 41 million, of these telephones are operated by the Bell System. The number of domestic telephones now exceeds 51 million.

Bell's $1.4 billion construction during calendar 1953 included 234 wire line and 652 microwave radio grants by the Commission. Bell now provides more than 5 million telephone circuit-miles by microwave radio. It also operates more than 54,000 miles of broad-band channels, mostly by radio, in relaying programs to 300 TV stations. In addition, more than 500 mobile radiotelephone systems are in operation.

The public used more telephone service in 1953 than ever before. Bell daily averaged 147 million local and 6.3 million toll calls. It had revenues of $4.4 billion for 1953, up 9 percent over the previous year, and its consolidated net income was $479 million, an increase of 17.7 percent.

The Commission permitted several increases in telephone rates during the fiscal year to offset increasing costs of operation and to provide reasonable earnings. Effective October 1, 1953, Bell companies increased rates for interstate message toll service by $65 million a year, or 8 percent. On November 1, 1953, the Northwestern Bell Telephone Co. increased exchange rates by $900,000 a year in 13 border exchanges in Iowa which furnish interstate service. The Commission also permitted increases of about $200,000 a year to become effective July 1, 1954, on telephone service between the United States and Alaska. This increase accrues to the Alaska Communications System. The Commission prescribed depreciation rates for three Bell companies and revised depreciation rates for three other Bell companies. The effect is to reduce depreciation charges by $3 million a year.

Telegraph.—The Western Union Telegraph Co., the single domestic telegraph carrier, reported 162 million land-line messages in 1953 as compared to 160 million in 1952. Total land-line revenues increased to $208 million as compared to $184 million in 1952, with a large part of this increase resulting from the growth in private line service. Net earnings from all Western Union operations, both land line and cable, amounted to $14.5 million as compared to $1.7 million in 1952, when its earnings were depressed by a 2 months' strike.

Despite improvements in facilities and operations, the speed of handling telegrams was slightly slower in 1953 than in the previous year. As one means of improving service, the company is increasing direct connections with customers, and at the end of fiscal 1954 had 13,534 deskfax and 22, 586 teleprinter tieline installations.

Twelve hundred applications for reductions in hours or closures of telegraph offices were filed with the Commission in fiscal 1954 as compared to 1,953 applications in fiscal 1953.

On June 15, 1954, Western Union filed tariffs proposing general increases in telegraph rates which it estimated would amount to $10 million a year. The company claimed that this was necessary to offset increased wages and to restore declining earnings. After study, the Commission permitted the increase, effective July 15. On April 22, 1954, it authorized Western Union to increase rates for tickers used in leased facilities service.

International.—International telegraph carriers reported 511 million paid words in calendar 1953, which was 1 percent below the 1952 volume. Their total revenues for that year increased by 3.7 percent to $60 million. This reflected higher collection rates on inbound traffic and growth in leased circuits.

International radiotelephony, born in the 1920's, exceeded 1 million calls for the first time, which was an increase of 7.1 percent over the previous year.

At the close of fiscal 1954, telegraph service was provided direct to 87 countries and through them to the rest of the world.

Telephone service was available on 63 direct circuits and via both direct and indirect circuits to 111 foreign countries and overseas points.

The Commission is well along in its program to transfer operations of radio carriers to "in band" frequencies in accordance with frequency allocations in international agreements.

The United States Supreme Court remanded to the Commission the case covering applications of Mackay Radio and Telegraph Co. to establish radiotelegraph circuits to the Netherlands and Portugal in competition with existing service of RCA Communications, Inc. The Court held that the Commission should base its findings upon benefits

that would accrue from such competition rather than upon a view that a national policy favoring competition exists in this field. Further hearings were held and a decision was pending.

In March 1952, the Commission initiated an investigation into the matter of divestment by Western Union of its international telegraph operations as required by law. Hearings were concluded during fiscal 1954 and the matter was awaiting initial decision.

Safety and Special Radio Services

With more than 260,000 authorizations involving the use of over 650,000 transmitters, the Safety and Special Radio Services constitute the largest and most active group of radio-communication facilities in use today.

These services represent the employment of radio by ships afloat and by planes in the air, by police and fire departments, by electric and gas companies, by highway and forestry agencies, by railroad and streetcar systems, by ambulances, taxicabs, trucks, and buses, and by a host of other interests as well as by individuals.

This usage now extends from the cradle to the grave. There are radio facilities for calling doctors and ambulances to the homes of expectant mothers as well as other persons requiring emergency medical assistance, and for speeding milk and other essentials tc the newborn—even diaper pickup-and-delivery services. During life's span, radio protects public and personal safety and property, and is used for a myriad of business and individual purposes. At the omega of life, radio is utilized to dispatch vehicles in connection with death and burial, to the inclusion of directing the movement of funeral processions at large cemeteries.

Broadcast Services

In the overall broadcast field, the multiple ownership rules were amended to preclude direct or indirect common interest in more than 7 AM, 7 FM, and 7 TV commercial stations, and Congress was requested to change a 1952 amendment to the Communications Act which enables a "party in interest" not only to protest but also to hold up a new broadcast station grant. The Supreme Court upheld the right of the Commission to adopt rules to enforce the law's ban on the broadcast of lotteries, but invalidated that portion of the Commission's rules defining audience participation as a consideration.

Significant developments in the respective broadcast services were:

TV.—Compatible color standards were adopted on December 17, 1953. They permit color transmissions to be received in color on new sets manufactured for that purpose and in black and white on existing sets.

Both Congress and the Commission were concerned by problems of UHF operation and were studying the situation. Meanwhile, the Commission has increased the previous 5 commercial TV station maximum to 7, providing that at least 2 are UHF; is considering applications for UHF stations to duplicate the programs and so extend the coverage of parent stations; has proposed to bar a station from contracting with a network to keep stations in neighboring communities from receiving network programs; and has invited comments to a proposal that TV stations be permitted to operate their own intercity relay facilities in preference to using more costly common carrier facilities.

At the fiscal year end, of 573 existing commercial TV grants 233 were for UHF, of which latter number 137 had operating authorizations. However, of 87 TV grants canceled since the lifting of the freeze, 69 were for UHF.

The Commission was giving increased attention to problems presented by 300 operating community antenna TV systems and proposals for public subscription TV (pay-as-you-see) service.

Of 30 noncommercial educational TV authorizations, 6 stations were on the air (3 in VHF and 3 in UHF). As of June 30, 1954, no educational TV grant had yet been relinquished. Six educational channels were added during the year, making a total of 251 now reserved for education.

The license period of all TV stations was extended to 3 years, the same as for AM and FM stations.

AM.—Nearly 150 new AM stations were authorized, bringing their total to almost 2,700. Most of the new grants were for local low-powered daytime-only stations.

The North American Regional Broadcasting Agreement (NARBA), signed in 1950, still had not been ratified by the Senate. This delay has had an adverse affect on making new frequency assignments or modifying existing assignments. Negotiations were continuing with Mexico (a nonsignatory nation) looking toward a settlement of border broadcast problems.

The Commission's proceeding affecting "clear channel" AM operation remains dependent upon NARBA ratification. However, on March 11, 1954, the Commission proposed to give increased protection to clear-channel stations from mounting daytime skywave interference.

FM.—Though 22 new commercial FM grants were made, 54 authorizations were deleted, which resulted in a net loss of 32 such stations in the fiscal year. The number of commercial FM authorizations has declined steadily from its peak of 865 in 1949 to 569 at the close of fiscal 1954. Of the latter, however, 553 were in operation.

In an effort to help FM economically, the Commission has proposed that FM stations be permitted to render supplemental services, such

as "functional music," "storecasting" and "transit radio," in order to obtain additional revenue.

Noncommercial educational FM stations, on the other hand, have shown a steady increase over the past 6 years. Their authorizations jumped from 63 in 1949 to 123 in 1954. Of the latter, 117 were operating. Many use low power. Nine new educational FM station grants were made during the year.

Field Engineering and Monitoring

Through 24 district offices, augmented by 18 monitoring stations, the Commission policed traffic in the radio spectrum, gave bearings to ships and planes in distress, inspected all types of radio stations, located and closed unauthorized transmitters, investigated and helped remedy causes of major radio interference, gave radio operator examinations, and performed special technical work for the national defense and for international use as well as for the Commission.

Interference complaints decreased to about 18,000, due largely to the Commission's sponsorship of 370 TV interference committees which function in about 350 communities to handle this problem at the local level.

Fifty-two illegal radio stations were closed. This decrease is responsible in large measure to the growing awareness that illicit operation is speedily detected by FCC monitoring surveillance.

Because of budgetary and personnel limitations, fewer radio-station inspections could be made. However, the field staff did make nearly 10,500 such inspections—over 500 broadcast, 3,300 domestic and foreign ship, and 6,600 miscellaneous.

In studying proposed antennas for their possible obstruction to air navigation, nearly 7,900 such structures were cleared, of which number almost 1,300 were for TV and more than 5,900 were for nonbroadcast (including common carrier) operation.

Research

Control of manmade interference is one of the Commission's chief technical considerations. Rules are being tightened to minimize the disruption of radio communication by noncommunication equipment usng electrical energy for heating purposes, such as industrial, medical, and scientific devices.

These devices collectively now employ power far in excess of that required for all forms of radio communication. Their emissions can affect radio transmissions hundreds and even thousands of miles away. This uncontrolled energy is a particular menace to communication on which the safety of life and property depends, particularly that of the aviation, marine, police, and fire radio services.

318372—54——2

One means employed by the Commission is to pass upon such equipment before it is manufactured and put to use. This is done either by "type approval" of a submitted model which meets Commission laboratory tests, or by "type acceptance" based upon data furnished by the manufacturer. In this way, interference possibilities are minimized at the start.

Particular technical studies by the Commission involved VHF and UHF propagation, station overlap and allocation curves affecting TV; daytime skywave transmission and groundwave intensity curves relating to AM; skip distance and maximum usable frequencies for fixed services; and propagation in connection with aviation frequency shifts. These were in addition to continuing long-range projects, such as the sunspot cycle recording. A much-needed new ground conductivity map was issued as a result of work started last year.

Nearly 600 experimental radio authorizations were held by interests engaged in testing techniques and apparatus intended to better existing services or to develop new services.

Commission

These changes occurred in Commission membership during the year:

Commissioner Rosel H. Hyde, who had served as Chairman since April 18, 1953, under a 1-year Executive appointment, was, on April 19, 1954, designated by the Commission to act as Chairman pending Presidential action. (On September 25, 1954, President Eisenhower appointed George C. McConnaughey to be a member of the Commission, to succeed Commissioner George E. Sterling who resigned as of September 30, and also designated Mr. McConnaughey as Chairman for 1 year. Chairman McConnaughey took office October 4 thereafter.)

On October 6, 1953, Robert E. Lee succeeded Paul A. Walker, whose term expired the previous June 30. Appointed by President Eisenhower, Commissioner Lee's term is to June 30, 1960.

Commissioner John C. Doerfer was, on June 4, 1954, reappointed by President Eisenhower for a regular 7-year term, to June 30, 1961.

There were no major changes in staff organization during the year. The Commission operated with nearly 1,150 employees, about one-third of whom were in the field.

The Commission had an apropriation of $7,400,000 from which, by practicing economies and retrenchments, it was able to effect a saving of nearly $450,000.

The Commission pursued its efforts to streamline administrative procedure and reduce paperwork. These endeavors ranged from legislation to rulemaking, augmented by Commission action in delet-

ing certain reports, simplifying forms, and otherwise cutting administrative corners consistent with legal requirements. Expediting the hearing process continued to receive special attention and action.

Addenda

As of September 30, 1954, TV, AM, and FM broadcast authorizations (not including auxiliary and experimental) totaled 4,044. Of this number, 3,728 were on the air. A breakdown follows:

Service	Authorized	Licensed	On air
TV commercial	578	112	428
TV educational	32	0	7
AM commercial	2,737	2,602	2,616
FM commercial	573	535	559
FM educational	124	117	118
Totals	4,044	3,366	3,728

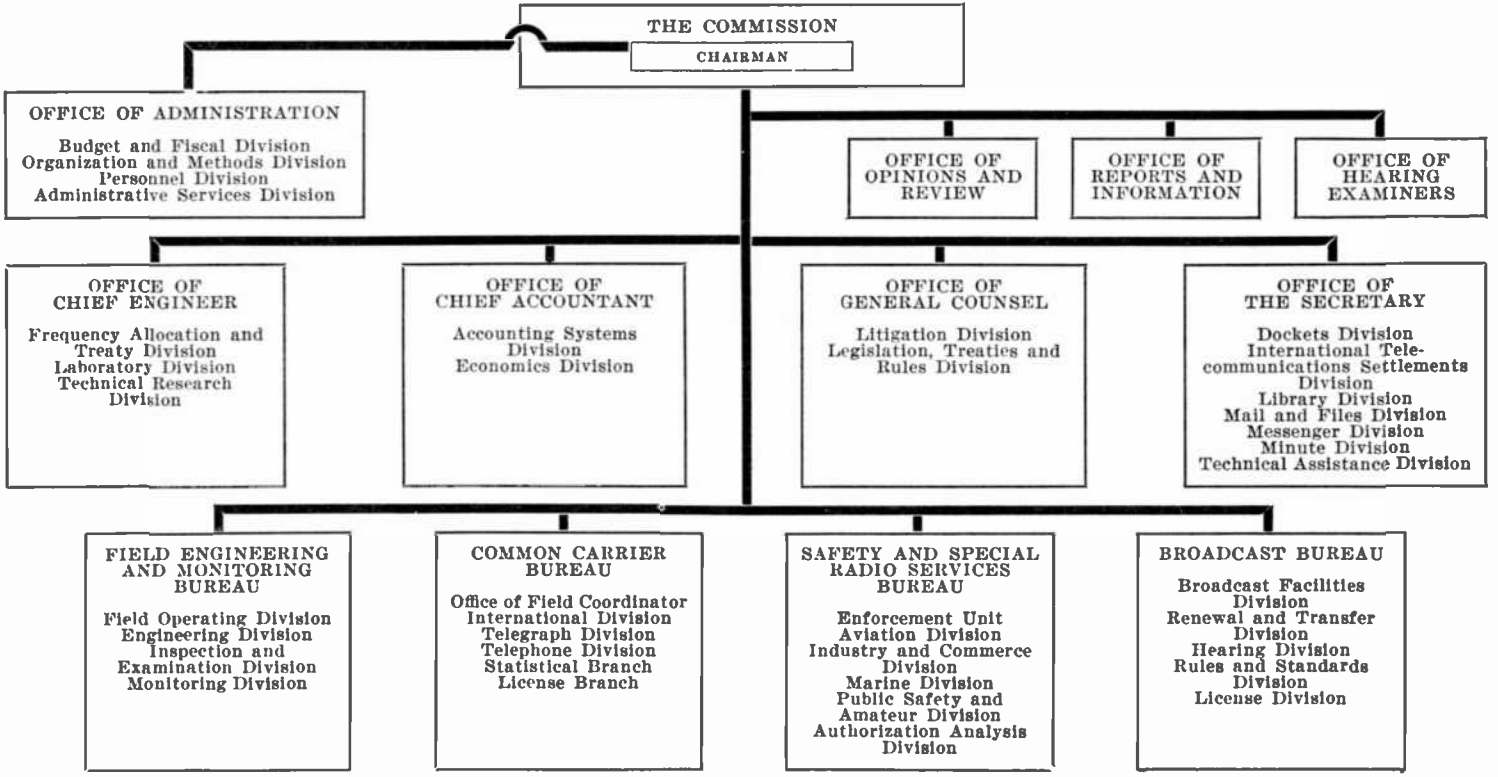
At the same time, the number of authorizations in the nonbroadcast radio services had increased to—

Marine	47,882	Amateur	123,163
Aviation	39,900	Common carrier	1,730
Industrial	22,339	Experimental	607
Public safety	16,308	Miscellaneous	1,273
Land transportation	15,241		

These 268,000 authorizations, collectively, reflect the use of about three times that number of fixed and portable and mobile transmitters.

FEDERAL COMMUNICATIONS COMMISSION

Organization Chart as of June 30, 1954



General

*"For the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all the people of the United States a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense, for the purpose of promoting safety of life and property through the use of wire and radio communication, and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communication, there is hereby created a commission to be known as the 'Federal Communications Commission' * * *"—(Sec. 1 of the Communications Act).*

20TH ANNIVERSARY

The 1954 fiscal year marked the 20th anniversary of the Federal Communications Commission.

For it was on June 19, 1934 that its creative and authorizing act—the Communications Act of 1934—was signed.

Though a previous law (the Radio Act of 1927) created and gave the predecessor Federal Radio Commission certain regulatory powers over radio, including some radio supervision that had been exercised by the Department of Commerce, it did not give the FRC jurisdiction over telegraph and telephone carriers. Certain powers with respect to such common carriers were vested in a number of different agencies, and regulation was largely ineffective.

Accordingly, in 1933 a Government interdepartmental committee recommended that radio, wire, and submarine cable communication services "should be regulated by a single body". The result was the adoption of the Communications Act of 1934, which established the Federal Communications Commission for that purpose.

That act coordinated in a single agency broadcast regulatory functions previously exercised by the Federal Radio Commission; certain supervision of telephone and telegraph operations formerly vested in the Interstate Commerce Commission; jurisdiction over Government telegraph rates which had been under the Post Office Department; and some powers of the Department of State with respect to submarine-cable landing licenses. It gave the FCC certain additional authority, including broader powers with respect to rates of interstate and international common carriers, and domestic administration of interna-

tional treaties and other agreements concerning electrical communication to which the United States is a party.

When the Commission started to function on July 11, 1934, it had 233 employees, of which number 121 were in Washington. At the the close of its first year, the FCC personnel had increased to 442. During its initial year the Commission operated on an appropriation of $1,888,176.

However, at that time the number of authorized radio stations of all kinds was only about 51,000, and the number of commercial and amateur radio operators collectively was fewer than 67,000.

Today the number of radio authorizations exceeds 1,200,000, including more than 270,000 station authorizations, which cover the use of some 700,000 fixed and mobile transmitters, and more than 960,000 different grades of licenses and permits are held by commercial and amateur radio operators.

The ensuing 20 years have seen the advent of TV and FM as regular broadcast services; entrance of TV into the UHF frequencies and the debut of visual broadcast in color; noncommercial educational FM and TV operation; extension of the usable radio spectrum and the birth of many new nonbroadcast radio services; utilization of radar and other electronic developments; expansion of common-carrier facilities and the use of domestic coaxial cable and microwave adjuncts, and an increasing number of individuals who operate radio transmitters for a livelihood or as a hobby. For radio alone there are now more than 60 categories of users who employ its convenience for a myriad of purposes.

To handle this increased business, the Commission now has about 1,150 employees, one-third of whom are engaged in field engineering work. Its fiscal 1954 appropriation was $7,400,000.

Following is a comparison of radio authorizations of the Commission's 1st year with those of its 20th year:

Class of service	Jan. 30, 1935	June 30, 1954
Marine	2,157	46,299
Aviation	678	40,154
Public safety	298	15,697
Industrial	146	21,598
Land transportation	0	13,945
Broadcast	623	5,881
Experimental	1,012	586
Common carrier	565	1,635
Amateur	45,561	123,287
Other	34	1,037
Subtotal	51,074	270,119
Operators:		
Commercial	[1] 30,000	842,088
Amateur	36,525	120,535
Subtotal	66,525	962,623
Grand total	117,599	1,232,742

[1] Estimated.

Less than 10,000 applications of all kinds were received by the Commission during its first year of operation. In 1953 the number was about 430,000, not including legal and tariff filings.

Many radio operations of two decades ago were on an experimental basis. These included "visual," "high fidelity," and "very high frequency" broadcast, also various embryo nonbroadcast services. Most of today's equipment and techniques developed from such testing, plus developments spurred by World War II requirements.

In 1934 there were two rival domestic wire telegraph companies and various international telegraph carriers operating in the United States. Collectively, they handled nearly 170 million telegraph messages in 1934, of which number about 14 million were international messages. The now single domestic telegraph carrier (Western Union) handled over 162 million landline messages in 1953, while the volume of international telegraph traffic exceeded 511 million words for that year.

Twenty years ago the United States had slightly more than 17 million telephones, over which an average of 74 million calls were made daily. This Nation now has in excess of 50 million telephones from which are made about 185 million calls a day.

The Commission's increased regulatory workload is further reflected in its field engineering activities. For example: in 1934 about 20,200 radio operator applicants were examined in the field and some 12,000 licenses were issued. Last year the field staff conducted more than 115,000 such examinations and issued 179,000 commercial operator authorizations.

Complaints of interference to radio reception in 1934 numbered less than 3,800. Due to the mounting number of radio stations, the extreme sensitiveness of TV reception, and the increased use of electronic equipment and electrical gadgets, the number of interference cases requiring field investigation last year exceeded 18,000.

There is a proportionate increase in other field work, too; such as inspecting radio stations of all types, monitoring the radio spectrum for engineering compliance, furnishing direction finding "fixes" for ships and planes in distress, and obtaining and analyzing technical data for Commission use.

The initial annual report of the Commission for 1935 observed:

"There are no fields of engineering in which new devices and inventions are being disclosed at a more rapid pace than in wire and radio communications. The arts, both in theory and practice, are extremely complex and cover a vast field. New devices and improvements, no matter in what radio or wire services developed, are as a general rule immediately reflected in potentialities for improvement and actual application in all other services."

This is as true today as it was then, but in a greatly magnified degree.

COMMISSION

The Commission is composed of seven Commissioners. Each is appointed by the President subject to Senate confirmation. The normal term of a Commissioner is 7 years. Not more than four Commissioners may be members of the same political party.

The Commissioner who serves as Chairman is normally so designated by the President. In the absence of such an appointment, the Commission is enabled to select one of its members to act in that capacity. The Communications Act designates the Chairman as the chief executive officer of the Commission, to coordinate and organize its work, and to represent the Commission in legislative and other official contacts. Under Commission authorization, the Chairman is responsible for the general administration of its internal affairs.

The Commissioners, who function as a unit, make all policy decisions. In the absence of a quorum of Commissioners, a Board of Commissioners present can function, subject to its actions being later ratified by the Commission en banc.

The Commission assigns specific tasks to committees of Commissioners or individual Commissioners. There are 2 standing committees of Commissioners—the Telegraph Committee and the Telephone Committee—each composed of 3 Commissioners. The Commission also prescribes staff functions.

During the year, these changes occurred in Commission membership:

Commissioner Rosel H. Hyde was, on April 19, 1954, designated by the Commission to act as Chairman pending Presidential action. He had served as Chairman since April 18, 1953, under a 1-year Executive appointment. (George C. McConnaughey was, on September 25, 1954, appointed by President Eisenhower to be a member and also Chairman of the Commission. He took office the following October 4. He succeeded Commissioner George E. Sterling, who resigned as of September 30, for the latter's unexpired term which extends to June 30, 1957. His appointment as Chairman is for one year.)

On October 6, 1953, Robert E. Lee succeeded Paul A. Walker, whose term expired the previous June 30. Appointed by President Eisenhower, Commissioner Lee was confirmed by the Senate on January 25, 1954. His term is to June 30, 1960.

Commissioner John C. Doerfer was, on June 4, 1954, reappointed by President Eisenhower—this time for a regular 7-year term—for which he was confirmed on June 29. Since April 15, 1953, Commissioner Doerfer had filled out the remainder of the term of Robert F. Jones, resigned, which expired June 30, 1954.

A list of Commissioners as of June 30, 1954, with their terms of office appears on the back of the title page to this report. Present and former Commissioners, also their tenure of service, are listed in the appendix.

STAFF ORGANIZATION

As a result of a reorganization initiated in 1949 and completed in 1952, the Commission staff operates on functional rather than professional lines. In other words, the staff is integrated into bureaus and offices on the basis of the Commission's operating requirements. Thus, each of the chief operating bureaus is a self-contained unit with legal, engineering, accounting, administrative, clerical, and other personnel needed to perform its particular functions.

The Commission's 4 bureaus and 8 offices and their respective major units are shown on the organization chart which constitutes a separate page of this chapter.

PERSONNEL

When the fiscal year ended, the Commission had 1,146 employees, which was 76 more than for the same time the year previous. Of this total, about one-third were engaged in field work—largely engineering. Personnel distribution was as follows:

	Washington	Field	Total
Commissioners	46	0	46
Office of Opinions and Review	21	0	21
Office of Hearing Examiners	34	0	34
Office of Reports and Information	4	0	4
Office of Administration	87	0	87
Office of Secretary	64	0	64
Office of General Counsel	16	0	16
Office of Chief Accountant	17	0	17
Office of Chief Engineer	66	21	87
Common Carrier Bureau	76	31	107
Safety and Special Radio Services Bureau	130	0	130
Broadcast Bureau	172	0	172
Field Engineering and Monitoring Bureau	59	302	361
Total	792	354	1,146

Biographies of Commission personnel added during the year, as well as a list of those employees leaving the Commission during that period, are being submitted to Congress as a mimeographed supplement to this printed report. This information is required by Section 4 (k) (3) of the Communications Act, as amended in 1952.

APPROPRIATION AND EXPENDITURES

Through stringent economy measures, the Commission was able to effect a saving of $449,020 in its operations during the fiscal year 1954. It did this on an appropriation of $7,400,000, which was $991,540 more than the year previous.

Obligations against the 1954 appropriation were as follows:

Appropriation		*Obligations*	
Regular appropriation (salaries and expenses)	$7,400,000	Personal services	$6,131,453
		Travel	71,210
		Transportation of things	22,373
		Communication services	165,706
		Rents and utilities	51,471
		Printing and reproduction	58,162
		Other contractual services	167,666
		Supplies and materials	118,186
		Equipment	151,543
		Land and structures	13,000
		Awards and indemnities	210
		Total obligtions	6,950,980
		Savings, unobligated balance	449,020
		Total	7,400,000

The source of these funds and the authority for expenditures thereunder was Public Law 176, 83d Congress.

FEES

Pursuant to provisions of the Independent Offices Appropriation Act of 1952, as augmented by a Bureau of the Budget circular of November 5, 1953, the Commission on January 27, 1954, proposed rulemaking looking toward the establishment, for the first time, of fees to cover the cost of its licensing and related activities. However, on March 3 thereafter the Senate Interstate and Foreign Commerce Committee resolved that the Commission should suspend this proceeding until July 1, 1955. In the light of this resolution and further discussions with the Bureau of the Budget, the Commission has suspended action in this proceeding.

SEEK LESS PAPER, MORE SPEED

In order to keep abreast of its growing workload, the Commission continued its efforts to reduce procedures and paperwork, both for itself and the industries which it regulates.

In some cases it has been necessary to request legislation to modify requirements of the Communications Act; in others the Commission has amended its own rules to cut nonessential administrative corners. The latter includes streamlining of forms, simplification and clarification of rules, elimination of reports no longer needed, and various steps to speed up the hearing process.

Also, the Commission has delegated authority to the heads of its operating bureaus to act for it in routine matters where policy has long been established. This has resulted in more expeditious handling of run-of-the-mill cases and gives the Commission more time to devote to substantive problems.

Specific illustrations will be found in sections of this report dealing with hearings, legislation, and the different communication services.

The purpose of these changes is to help simplify and speed the administrative process. The Commission is desirous of relieving applicants and licensees of paperwork and formalities which are not essential to the requirements of law and orderly regulation.

HEARINGS

One of the current major objectives of the Commission is to reduce the hearing procedure to bare essentials. One step has been to open hearings with a conference in which the parties can agree on fundamental facts which need not be gone into in the subsequent argument. This antedates but reflects the Government's interest in simplifying the hearing process through the President's Conference on Administrative Procedure. FCC Commissioner John C. Doerfer is a member of that conference as well as a member of its Pre-Hearing Committee.

In addition, the Commission, where possible to do so, makes findings on basic qualifications of competing applicants (legal, financial, and technical) before designating them for hearing. This has helped to eliminate testimony upon which no controversy exists.

The Commission and bar are working together to reduce the amount of oral testimony at hearings, and to make the hearing record a written one insofar as possible. Consideration is also being given to means for further reducing the number and volume of filings and counterfilings in connection with cases in hearing. As of February 17, 1954, the Commission limited the number of pleadings that may be filed in these proceedings. This was done because numerous and repetitious pleadings have delayed and complicated consideration of cases, and indications were that many such pleadings were unnecessary to their disposition. The Commission also believes that briefer "briefs" would help to expedite the hearing procedure.

These objectives, however, must be consistent with the requirements of law, and their achievement will depend largely upon the cooperation of lawyers practicing before the Commission.

Television cases accounted for most of the Commission's hearing load during fiscal 1954. Docket statistics for that period were:

Class	Pending June 30, 1953	Designated for hearing	Disposed of without hearing	Disposed of following hearing	Pending June 30, 1954
AM broadcast	140	84	77	33	114
FM broadcast	2	0	0	2	0
TV broadcast	119	255	92	93	189
Other broadcast	6	2	3	0	5
Petitions and rulemaking	16	55	40	2	29
Total broadcast	283	396	212	130	337
Safety and special	19	59	47	2	29
Common carrier	40	52	20	21	51
Joint and general	30	50	32	3	45
Total nonbroadcast	89	161	99	26	125
Grand total	372	557	311	156	462

LEGISLATION

During the fiscal year, four bills were enacted by the 83d Congress which amended the Communications Act. Three of them had been recommended to Congress by the Commission as part of its legislative program.

On March 23, 1954, Public Law 314 was approved. This law amended section 501 so as to provide that any violation of the act, except a second or subsequent violation, would be punishable as a misdemeanor rather than a felony. It was introduced as H. R. 4559 at the request of the Commission.

On March 26, 1954, Public Law 320 was approved. It amended section 309 (c) to give the Commission 30 days instead of 15 days to take action on protests filed against applications granted without hearing. It was introduced as H. R. 4558 at the Commission's request.

Public Law 321, also approved March 26, 1954, amended section 319 to enable the Commission to, in certain instances, waive the requirement that a construction permit be secured for certain types of radio stations. It was introduced as H. R. 4557 at the Commission's request.

Public Law 345, approved April 27, 1954, amended sections 2 (b), 3 (e) and (u), and 221 (b) and served to clarify the Commission's jurisdiction over certain types of communications common carriers. It was introduced as H. R. 6436 as a result of joint efforts of the Commission, the United States Independent Telephone Association, and the National Association of Railroad and Utilities Commissioners.

In addition to the three proposals enacted at the request of the Commission, the following additional proposals by the Commission to amend the Communications Act were submitted to Congress:

Extensive amendments to part II of title III, which concern radio equipment and radio operators on board ships, to reflect the requirements of the Safety of Life at Sea Convention (London, 1948), which went into effect on November 19, 1952. The convention was ratified by the Senate on April 30, 1949. These proposed amendments were

introduced as S. 2453. This bill was passed by the Senate and, at the close of the fiscal year, was pending before the House. (It was adopted August 3, 1954.)

Amendments to reflect the provisions of the agreement concluded by the United States and Canada for promoting safety on the Great Lakes by means of radio, and to repeal certain provisions of the Ship Act of 1910 which are no longer necessary as a result of this agreement. The agreement has been ratified by both countries, and comes into force on November 13, 1954. S. 3464, which incorporated both of these proposals (the repeal of the Ship Act had previously been the subject of a separate bill, S. 1947), was passed by the Senate and was pending before the House at the close of the fiscal year. (It, too, was adopted August 3, 1954.)

Amendments to sections 503 and 504 (b), to provide for monetary forfeitures in the case of violations of the Commission's rules and regulations relating to radio stations other than broadcast stations. This proposal was introduced as S. 1979 and H. R. 5673.

An amendment to section 309 (c), designed to prevent protests filed to grants of applications without hearing from being used as a delaying tactic. Specifically, this proposal would eliminate the existing requirements that a hearing be held on each application against which a protest has been filed and that the effectiveness of the grant made by the Commission be stayed until the protest has been disposed of by the Commission after hearing. It was introduced as H. R. 7795.

In addition to these Commission proposals, Congress also considered various other legislative proposals affecting the Commission. Some of the more important of these are here listed:

S. 2926, S. 3203, and H. R. 7842 concern the Commission's authority to charge fees for licenses issued or services provided. The Commission presented testimony before the Senate Committee on Interstate and Foreign Commerce in connection with S. 2926 and commented on the others.

Bills relating to the multiple ownership of radio broadcast stations were introduced in the Senate as S. 3095 and S. 3350. Testimony was presented by the Commission on S. 3095 before the Senate Committee on Interstate and Foreign Commerce.

Several bills dealing with the use of interstate communications facilities for the transmission of gambling information were considered by Congress, and the Commission presented testimony before the Senate Committee on Interstate and Foreign Commerce with respect to one of these bills (S. 3542).

S. 3546 and H. R. 9700, on which the Commission commented, concerned the Commission's authority over radio and television networks.

H. R. 6431, concerning the regulation of subscription radio and television, was also commented on by the Commission.

It also commented on H. R. 6819, to establish a Telecommunications Policy Committee.

The Senate Committee on Interstate and Foreign Commerce held lengthy hearings concerning problems involved in the use of ultra high frequencies for television broadcasting. The Commission presented extensive testimony at those hearings.

During fiscal 1954 the Commission submitted comments to Congress and the Bureau of the Budget with respect to more than 45 different legislative proposals which had been referred to the Commission for comment.

LITIGATION

Section 401 of the Communications Act confers upon the district courts of the United States jurisdiction to enforce the Communications Act and the orders of the Commission. Judicial review of Commission actions is provided for in section 402 of the act. Section 402 (a) gives jurisdiction to the courts of appeals (under Public Law 901, 81st Cong., effective January 28, 1951) over suits to enforce, enjoin, set aside, annul, or suspend any order of the Commission with the exception of orders granting or refusing applications for licenses. Section 402 (b) provides for direct appeal from such other orders of the Commission to the United States Court of Appeals for the District of Columbia Circuit. The great majority of cases involving review of Commission action is instituted in the latter court.

During the fiscal year there were 55 cases in which the Commission was a party in the Federal courts. Thirty-eight of these were instituted during that period—34 in the Court of Appeals for the District of Columbia Circuit, 1 in the Court of Appeals for the Second Circuit, and 3 in the District Courts for the Southern District of Illinois, for the Southern District of New York, and for the District of Columbia. The other 17 cases were pending at the beginning of the year.

Due to some confusion as to whether certain orders are appealable under sections 402 (a) or 402 (b) of the Communications Act, in 5 cases instituted in the Court of Appeals for the District of Columbia Circuit review of the same Commission order was sought in separate actions brought under each subsection. Since these were separate actions, they are reported separately here and in the following table.

In addition to cases in which the Commission was a party, there were 7 cases pending in the Federal courts which involved criminal violations pertaining to the Communications Act which were instituted at the request of the Commission. Of these cases, 1 resulted in conviction and sentencing of the defendant. The rest were pending at the close of the year.

The Supreme Court, in three companion actions on appeal from the United States District Court for the Southern District of New York,

sustained in part and invalidated in part the Commission's rules pertaining to the broadcast of lotteries. This was an affirmance of the district court's judgment.

In the courts of appeals, the Commission was affirmed in 3 cases, reversed in 1 case, 6 cases were dismissed on jurisdictional grounds, and 13 cases were dismissed by agreement of the parties or as being moot. In the District Court for the Southern District of New York one injunction was issued to enforce an order of the Commission. In the District Court for the Southern District of Illinois 1 case was dismissed on jurisdictional grounds. In the District Court for the District of Columbia 1 case was dismissed on jurisdictional grounds and 2 cases were dismissed by agreement of the parties or as being moot.

As of June 30, 1954, there were 24 cases pending in the courts of appeals, and 1 case in the District Court for the Southern District of New York. (After the close of the fiscal year the Court of Appeals for the District of Columbia Circuit affirmed the order of the Commission in 2 cases and reversed the order of the Commission in one matter where appeals were brought under both sections 402 (a) and 402 (b) of the Communications Act. During the same period 6 new cases were filed in that court.)

A tabulation of the status of litigation for the fiscal year follows:

	Supreme Court	Court of Appeals under sec. 402 (b)	Court of Appeals under sec. 402 (a)	District courts	Total
Total	3	28	19	5	55
Decisions affirming Commission			3		3
Decisions reversing case	[1] 3	1			4
Dismissed on jurisdictional grounds		4	2	2	8
Dismissed by agreement of parties or as being moot		6	7	2	15
Cases pending June 30, 1954		17	7	1	25

[1] Companion cases, sustained in part, reversed in part.

The following cases decided during the year were of particular interest:

In *Federal Communications Commission* v. *American Broadcasting Company, Inc.*, *Federal Communications Commission* v. *National Broadcasting Company, Inc.*, and *Federal Communications Commission* v. *Columbia Broadcasting System, Inc.* (347 U. S. 284), the Supreme Court of the United States affrmed the decision of a three-judge District Court, reported in the 1953 annual report, ruling upon the Commission's rules pertaining to the broadcast of lottery information. The rules interpret 18 U. S. Code, Section 1304, which prohibits the broadcast of lotteries. They also provide that a license will not be issued to a broadcast station which makes a practice of broadcasting lotteries. In these three companion actions brought to enjoin enforcement of the rules, the Supreme Court held that adoption of the rules was fully within the Commission's statutory authority and that there was little dispute over the element of prize or the

Commission's interpretation of the element of chance. With respect to the third element of a lottery—consideration—the Court sustained that portion of the rules finding consideration in a requirement that a thing of value be furnished or that there be possession of a sponsor's product. The Court held invalid that portion of the rules defining consideration in terms of a requirement that the audience listen to a program as a condition of winning. The Commission's rules have been amended to conform to the Court's decision and, as amended, made effective.

In *Zenith Radio Corporation* v. *Federal Communications Commission* (211 F. 2d 629), the United States Court of Appeals for the District of Columbia Circuit reversed a Commission decision denying appellant's application for a construction permit for a new television station on channel 2 in Chicago, Ill. The court held that Zenith's application entitled it to a hearing under the statute, and that this right had not been waived either by Zenith's failure to intervene as a party in rule making proceedings in which channel 4 in Chicago was deleted and the licensee on that channel, Balaban and Katz Corp., was proposed to be moved to channel 2, or by its failure to intervene in adjudicatory proceedings in which Balaban and Katz' license was renewed and transferred to Columbia Broadcasting System, Inc. Zenith was therefore entitled to a comparative hearing with other applicants or proposed licensees on channel 2.

The court also held, however, that the renewal of Balaban and Katz' license and its transfer to Columbia had become final since they were not appealed from, and that all of the rights in Balaban and Katz' former license now adhered in Columbia, whose interest could not be ignored. The court thus said, "The comparative hearing, therefore, between Zenith and Balaban and Katz must actually be a comparison between operation by Zenith and operation by the Columbia Broadcasting System". The Commission, upon the court's remand, designated Zenith and Columbia for comparative hearing for Channel 2. A request by Zenith for leave to file a petition for mandamus to require a hearing between it and Balaban and Katz was subsequently denied by the court.

In *People's Broadcasting Company* v. *United States and Federal Communications Commission* (209 F. 2d 286), the United States Court of Appeals for the District of Columbia Circuit sustained the Commission's authority to adopt by rule making a nationwide television allocation plan. It also sustained the Commission's authority under section 316 (a) of the Communications Act to modify a license without application therefor by the licensee. The Commission had deleted television channel 4 in Lancaster, Pa., and substituted channel 8, and had ordered a comparative hearing for Channel 8 between WGAL, Inc., the licensee of a station on channel 4, and appellant, an applicant for channel 8. In addition, the court upheld the Commission's determination to give WGAL, Inc., a temporary authorization at minimum power to operate on channel 8 pending the comparative hearing, as a practical solution of a problem involving the public interest in the continuity of television service. This did not impair appellant's right to a fair comparative hearing.

In *Logansport Broadcasting Corp.* v. *United States* (210 F. 2d 24), the Court of Appeals for the District of Columbia Circuit upheld the validity of the Commission's rules prescribing a nationwide system for allocating television frequencies by assigning particular channels to over 1,000 communities throughout the country. Under these rules only applications which are in conformity with the plan receive Commission consideration. The principal attack on the rules was that section 307 (b) of the Communications Act precludes the assignment of frequencies in any way but by action on applications filed with the Commission.

The court held in this respect that the act authorized the Commission to allocate channels among communities either by passing upon specific applications or by rule making proceedings, and that in this case the Commission had not abused its discretion by deciding that a more equitable distribution of facilities might be accomplished by rule making processes. The court also held that the procedures utilized by the Commission in adopting the allocation plan conformed with the requirements of the Administrative Procedure Act, and that the Commission's determination to allocate VHF television channel 10 to Terre Haute, Ind., rather than to Logansport, Ind., and Owensboro, Ky., was within the Commission's statutory authority and supported by substantial evidence in the record.

In *Columbia Broadcasting System, Inc., of California* v. *Federal Communications Commission* (211 F. 2d 644), the Court of Appeals for the District of Columbia Circuit affirmed an order of the Commission denying a request by the appellant, licensee of a standard broadcast station, to have the program test authority of another standard broadcast station revoked or modified. Only after the issuance of a construction permit and program test authority—an interim authorization preceding the grant of regular station license—to the other station, did appellant discover that the authorized operation would cause interference within its normally protected contour. Upon a prima facie showing of such interference the Commission determined to hold a hearing on the application for regular station license of the other station, but it refused, during the pendency of that hearing, to revoke or modify the program test authority under which the station was in fact operating. The court held that this decision did not constitute a modification of appellant's license in violation of Section 316 of the Communications Act, because after the grant of construction permit to the offending station the issuance of a license was governed by section 319 (c) rather than section 316. The court held that the Commission had properly exercised its discretion in refusing to halt, during the pendency of the hearing, operations already in progress pursuant to authorizations previously made in the licensing process.

In *United States* v. *National Plastikwear Fashions, Inc.*, the Commission was successful in its first attempt to obtain court enforcement of a cease and desist order issued by the Commission pursuant to the recently given authority of Section 312 of the Communications Act, as amended in 1952. The United States District Court for the Southern District of New York issued a preliminary injunction enjoining defendant, the manufacturer of plastic wearing apparel, from violating the Commission's order directing defendant to cease and desist from operating certain industrial heating equipment which was not certified or licensed in accordance with the requirements of part 18 of the Commission's rules, and which was causing harmful interference to important radio communications of the United States Army in the New York City metropolitan area. In its opinion, the court found that the Commission's cease and desist order had been duly issued, after a full administrative hearing, in accordance with section 312 of the Communications Act; that defendant had failed to exercise its statutory right of appeal to the United States Court of Appeals for the District of Columbia Circuit from the Commission's order; that defendant had continued its operations in violation of the Commission's order; and that such operations continued to cause harmful interference to important Army radio communications. (On September 27, 1954, the president of the corporation was sentenced to 30 days in jail and the corporation was fined $2,500.)

318372—54——3

APPLICATIONS AND OTHER FILINGS

Approximately 430,000 applications of all kinds were received by the Commission during the year. Of these, 8,200 dealt with broadcast, nearly 142,000 involved nonbroadcast, nearly 4,200 had to do with common carriers, and about 275,000 related to radio operators—commercial and amateur.

These figures do not include thousands of petitions and other legal filings in connection with hearing proceedings, or some 17,200 tariffs and 1,800 annual and monthly reports of common carriers and holding companies which also required Commission attention.

CORRESPONDENCE

Nearly 1,279,000 pieces of correspondence in the form of letters, telegrams, etc., were received or dispatched through the Commission's Mail and Files Division during the year. Of this number, about 875,000 were incoming and 404,000 were outgoing. These figures do not include mail handled in the field offices, or outgoing correspondence from the Washington office of the Field Engineering and Monitoring Bureau.

RELEASES AND PUBLICATIONS

Regulatory and administrative procedure required the issuance, during fiscal 1954, of mimeographed public notices and official documents (orders, decisions, opinions, etc.) which represented the use of 45,700 stencils, nearly 9,300,000 sheets of paper, and about 13,400,000 impressions.

The Commission issues no press releases as such, and maintains no mailing lists for its mimeographed or printed issue. Its printed publications are processed by the Government Printing Office and are sold by the Superintendent of Documents. These printed publications, which are not distributed by the Commission, include rules and regulations, engineering standards, annual reports, bound volumes of decisions and reports, common carrier statistics, the Communications Act of 1934 as amended, and miscellaneous publications. A complete list appears in the appendix to this report.

TECHNICAL ASSISTANCE ACTIVITY

Assistance in planning technical study programs for foreign nationals interested in telecommunication increased during fiscal 1954. Although the main activity was in arranging for such study in private industry under the Government's point 4 program, much time was also devoted to planning training programs for recipients of

grants under the United Nations, Mutual Security, and International Educational Exchange Service.

Some 18 individual programs were arranged for point 4 trainees from 7 countries. A total of 42 individuals representing 14 countries were received, 7 of which had programs arranged for them by the Commission.

Of the 4 representatives who received certificates of award during the year for completing the point 4 program, 3 were from Israel and 1 from Egypt. This brings to 17 the total number of foriegn nationals who have completed this program to date.

In the future, point 4 and Mutual Security trainees will be sponsored by the Foreign Operation Administration; while United Nations and IEES trainees will continue under Department of State sponsorship.

National Defense

" * * for the purpose of the national defense * * * "—(Section 1 of the Communications Act).*

" * * the President, if he deems it necessary in the interest of national security, or defense, may suspend or amend, for such time as he may see fit, the rules and regulations applicable to any or all stations or devices capable of emitting electromagnetic radiations * * * "—(Sec. 606 (c) of the Communications Act).*

GENERAL

The Communications Act recognizes the importance of wire and radio communication in time of national emergency. It empowers the Federal Communications Commission to regulate such non-Government operations in the interest of the national defense as well as for the promotion of safety of life and property in general.

The act also gives the President special emergency powers over electrical communication and radiation to further protect the country during war or threat of war. This is reflected in the Commission's current program to guard against the possibility of radiations being used as "beams" to guide enemy aircraft and missiles in event of attack, as well as to curb emissions of miscellaneous electrical devices interfering with regular radio communication services.

CONELRAD PROGRAM

In addition to plans for regulating wire and radio communication facilities during an emergency, the Commission must control the radiations of a great variety of electronic equipment and gadgets which have developed since World War II.

In 1951 Congress gave the President special authority to deal with electrical radiations as a defense measure. This authority was subsequently incorporated in the Communications Act. Later that same year the President authorized the Commission to enforce regulations in this connection. The text of the related amendments and Executive Order appeared in the Commission's 1952 annual report.

One of the results is the CONELRAD plan (so called because this combination of letters is coined from the words *CON*trol of *EL*ectromagnetic *RAD*iation). This plan, or system, is being applied to the various radio services.

Its first application—affecting the broadcast services—was announced by the White House in late 1952. This White House statement was printed in the 1953 annual report. The covering broadcast rules became effective May 15, 1953.

During an alert, FM and TV broadcast stations would be silenced, but designated AM stations would use 640 or 1240 kilocycles to broadcast essential news, information, and civil defense instructions. This operation would be juggled in such a way as to confuse the enemy regarding the location of the participating stations. The alert would be sounded by the Air Defense Command of the Air Force.

One nationwide test and many small area tests of the CONELRAD broadcast system were held during the year. The results indicated that it is performing as contemplated. Air Defense Command observations indicate that broadcast operations under CONELRAD are virtually of no value to a possible air enemy. Broadcasting of civil defense information to the public has been adequate in approximately 80 percent of the cities having CONELRAD stations. The CONELRAD staff and the broadcast industry are working to improve coverage in areas not now being adequately served.

On February 25, 1954, the Commission proposed to extend the CONELRAD plan to the Aviation Radio Services. It became effective June 14 of that year. In event of an alert, aeronautical radio stations would operate under instructions of the Civil Aeronautics Authority Air Route Traffic Control Centers. Only aviation radio stations required for air-traffic control and other essential purposes would remain on the air; the others would be silent.

The Commission announced on March 11, 1954, that it had approved a CONELRAD plan for the Public Safety Radio Services. In case of attack, police, fire, forestry conservation, special emergency, and State Guard radio stations would continue necessary operations under controlled conditions. They would be subject to direction of the Air Defense Control Centers of the Air Force.

A CONELRAD plan for the Amateur Radio Service was approved by the Commission on June 2, 1954. After receiving an alert from broadcast stations, all amateur stations would cease operation unless specifically authorized by the Commission to continue on the air.

Plans for the International Broadcast Service, noncommercial educational FM stations, and the Citizens Radio Service have been approved by the Commission and await concurrence by the Secretary of Defense and the Director, Office of Defense Mobilization.

Plans for Alaska, Puerto Rico, the Virgin Islands, the Hawaiian Islands, and Guam are nearing completion.

It is expected that during the next fiscal year essentially all radio stations licensed by the Commission will operate under CONELRAD

requirements. (On September 24, 1954, the Commission approved a temporary CONELRAD plan for voluntary compliance by all stations—except AM, FM, TV, amateur, and aviation—operating on frequencies up to 890 megacycles, until mandatory plans are put into effect.)

Meetings have been held with representatives of Canada and Cuba. Methods of exchanging air-defense warnings between the United States and Cuba were completed during April 1954.

At the present time the Commission has representatives at each Air Division (Defense) Headquarters and at each Air Defense Force Headquarters for implementation and liaison purposes.

The radio industry has cooperated fully with this Commission in developing and implementing CONELRAD plans.

CITIZENSHIP REQUIREMENTS

The Communications Act limits radio station licenses to citizens of the United States. This privilege is denied to aliens and foreign governments, and to their representatives; also to any corporation of which any officer or director is an alien or of which more than one-fifth of the capital stock is owned or controlled by foreign interests. The latter provision also applies to consolidations or mergers of telegraph carriers.

Under its statutory authority to prescribe the qualifications of radio operators, the Commission on June 10, 1954, proposed to make ineligible for licensing any amateur or commercial operator who is a member of the Communist Party or any organization which has been required to register as a Communist-action or Communist-front organization under the provisions of the Internal Security Act of 1950, or any organization which advocates or teaches the overthrow of the United States Government or the government of any of its political subdivisions by force and violence. The operator application forms would include questions with respect to membership in organizations and be accompanied by the fingerprints of applicants.

OTHER DEFENSE ACTIVITIES

The Commission is engaged in other defense activities which cannot be chronicled here because of the security classification given these projects by higher authority. In brief, however, they may be said to be the coordinated effort of various Federal bodies and the communication industry to cope with potential emergencies, to see that wire and radio media are harnessed to the defense program and that essential circuits are available under any eventuality, and, further, that our vital communication facilities are adequately safeguarded.

Common carrier telephone and telegraph services, for example, not only play a leading role in meeting current defense communication requirements, but they are a major consideration in planning for any possible contingency.

Practically all of the existing nonbroadcast services help in protecting life and public property on the land, on the water, and in the air; or in speeding business and other communication. Also, there are special radio services dedicated to disaster and emergency relief, civilian defense, State Guard, Civil Air Patrol, and kindred purposes. These services are described in the chapter dealing with the Safety and Special Radio Services.

Further, the Commission patrols the radio spectrum around the clock with the Government's only monitoring network covering the continental United States and its possessions. Besides keeping an engineering eye on the transmissions and equipment of existing radio stations, it is on the constant watch for illicit radio operation, interference to authorized radio services from radio and other electrical equipment, and furnishes radio bearings for lost or disabled sea and air craft.

Information about the control of noncommunication radiation devices will be found in chapters of this report dealing with Field Engineering and Monitoring and Research and Laboratory activities.

The Telecommunications Planning Committee, representative of various Government agencies concerned with the national defense, was re-established by the President on September 23, 1953. FCC Commissioner Edward M. Webster serves as its Vice Chairman.

On November 4, 1954, the President established a Cabinet Committee on Telecommunications Policy and Organization to study existing governmental policies and programs affecting all forms of electrical communication (except domestic broadcasting) in the light of present world conditions.

In fiscal 1954, the Federal Communications Commission had its own Defense Steering Committee, of which Commissioner George E. Sterling was Defense Commissioner and Commissioner Robert T. Bartley was Alternate Defense Commissioner. (Commissioner Robert E. Lee was subsequently designated Defense Commissioner.)

Common Carrier Services

*"'Common carrier' * * * means any person engaged as a common carrier for hire, in interstate or foreign communication by wire or radio * * * "—(Sec. 3 (h) of the Communications Act).*

*"All charges, practices, classifications, and regulations for and in connection with such communication service, shall be just and reasonable * * * "—(Sec. 201 (b) of the Communications Act).*

DOMESTIC TELEPHONE

General

During calendar 1953, the telephone industry maintained its accelerated construction program to supply additional services for millions of new customers. The Bell System spent an estimated $1.4 billion for additional plant facilities which brought its total plant book cost to more than $13 billion. The total Bell System construction during the past 4 years almost equaled its total gross plant book cost at the end of 1940. The independent telephone companies also made substantial plant additions to boost the telephone industry total to more than $14.5 billion by the end of 1953.

Telephone developments during fiscal 1954 included the completion of new radio relay "backbone" routes between Chicago and St. Louis; between Chicago, Milwaukee, and Minneapolis; between Louisville, Nashville, Chattanooga, Atlanta, and Jacksonville; and between Yakima and Spokane. Also completed were numerous branch radio relay systems emanating from these and other major relay routes. Construction was started on new major radio relay systems between Amarillo and Los Angeles; between Minneapolis and Fargo; between Atlanta and Dallas; and between New Orleans and Baton Rouge. Almost 5 million long-distance telephone circuit miles were being derived from microwave relay systems. New techniques were applied to expand the capacity of the Philadelphia-Chicago coaxial cable system.

These microwave and coaxial cable facilities were being used to bring live TV programs to about 300 television broadcasting stations in more than 190 cities throughout the Nation, and the first coast-to-coast public transmission of color TV occurred on January 1, 1954. (By November of 1954 the Bell System was serving 244 TV stations in 225 cities.)

By the end of calendar 1953, there were more than 50 million telephones in service throughout the Nation, over 41 million of which were operated by the Bell System and over 9 million by independent telephone companies. The Bell System added more than 1.9 million telephones during 1953. It reported 307,000 held orders for main service and 762,000 requests for regrades in existing service as of June 30, 1954. Comparable figures 12 months earlier were 605,000 and 1,300,000, respectively. By June 30, 1954, the total number of domestic telephones exceeded 51 million.

There were about 179 million (147 million in the Bell System) average daily local telephone conversations during calendar 1953 while the daily long-distance calls averaged 6.6 million. Many calls were reclassified from toll to local during the year as a result of expansion of local exchange areas. After adjusting for these reclassifications, the local and toll calls increased 2.9 and 4.9 percent, respectively, over 1952. Toll calls were only slightly above the same months of the preceding year in the first 6 months of calendar 1954. Teletypewriter exchange service (TWX) calls increased about 9.7 percent during calendar 1953 to reach a total of over 20 million.

The use of dial telephone equipment was expanded both for local and long-distance service. Eighty-one percent of all Bell telephones and 59 percent of the independent telephones are now dial operated. Bell operators were dialing 44 percent of toll calls directly to destination by the end of 1953 with 2,450 cities and towns connected to the toll dialing network, a gain of 750 during the year. The number of large traffic centers equipped for toll dialing rose to 23, and plans were to provide similar facilities at 9 additional cities during the current year. Customer toll dialing, already in operation at Englewood, N. J., was inaugurated in suburban exchanges near Detroit and Pittsburgh to permit subscribers to dial their long-distance calls directly to about 13 million subscribers located in 14 metropolitan areas throughout the Nation. Subscribers in the Detroit and Washington metropolitan areas were able to dial calls to selected nearby cities. These dialing services required new centrally located accounting machinery which automatically records each call, for subsequent billing purposes.

Bell System operating revenues reached a new high of $4,416,729,614 in 1953, an increase of about 9 percent over 1952. Consolidated net income applicable to American Telephone & Telegraph Co. capital stock amounted to $478,512,265, an increase of 17.7 percent over 1952. Earnings per share increased from $11.45 in 1952 to $11.71 in 1953, despite an increase in number of shares outstanding.

Expansion of the Bell System is illustrated by the following table:

Year	Number of telephones	Plant book cost	Revenues	Employees
1940	17,483,981	$4,701,177,364	$1,174,322,517	275,317
1945	22,445,519	5,702,056,557	1,930,889,452	387,300
1950	35,343,440	10,101,521,562	3,261,528,032	523,251
1952	39,413,889	11,971,435,727	4,039,664,218	579,500
1953	41,353,483	13,059,232,000	4,416,729,614	587,839

Services and Facilities

Construction of facilities.—The Bell System spent about $1.4 billion for expansion and improvement of existing facilities during 1953, the largest portion of which went for exchange plant additions, such as central office buildings, exchange switching equipment, exchange distribution plant, and subscriber station equipment. During the same period, the A. T. & T. Long Lines Department spent a record $133 million for new plant construction, part of which went to provide a 27-percent increase in long-distance circuits.

During fiscal 1954, the Commission granted 234 applications involving estimated expenditures of $62,985,906 for authority to construct, lease, acquire, and operate wire and cable facilities in connection with interstate and foreign telephone service. Included were 12 authorizations for acquisition or lease by telephone companies of facilities owned by other companies. The following table shows the estimated costs and amounts of wire and cable construction authorized by the Commission since 1948:

Fiscal year	Number of projects	Cost	Sheath miles of cable	Tube miles of coaxial units	Conductor miles of open wire
1948	348	$127,162,499	2,637.5	46,080	16,373
1949	313	38,638,919	1,370.5	1,323	7,278
1950	141	13,230,678	399.3		3,491
1951	218	45,795,686	957.1	2,704	5,461
1952	323	107,533,688	1,388.7	2,972	5,998
1953	358	89,228,416	1,494.0	5,678	2,006
1954	234	62,985,906	730.0	564	1,837

The Bell System also continued its vast microwave radio construction program during fiscal 1954. The Commission granted a total of 652 Bell applications for microwave construction, including 13 held over from 1953. These projects involved an estimated expenditure of $51.5 million to provide an estimated 30,492 broadband channel miles for toll telephone and video program services. By the end of fiscal 1954, the Bell System operated nearly 5 million toll telephone circuit-miles over microwave paths, which was more than double the number at the end of the previous year. The microwave systems, in conjunction with coaxial cable systems, were also being used to provide about 54,000 channel miles of TV program circuits.

Independent telephone companies also expanded the use of microwave systems during fiscal 1954. The Commission authorized 13 new projects involving estimated expenditures of $617,000 which would be used to provide about 5,000 toll telephone circuit-miles and about 62 TV program channel-miles.

The Commission revised its rules relating to the granting of authority for the supplementation of interstate communication facilities. These revisions permit carriers to secure continuing authority under which small projects may be initiated without securing prior specific authority, provided that a brief report is submitted to the Commission semiannually showing the projects undertaken.

Discontinuance, reduction or impairment of service.—During fiscal 1954, the Commission granted seven applications to discontinue, reduce, or impair telephone service. Three of these involved the substitution of one carrier for another in providing exchange service. One involved the substitution of toll-station service in lieu of exchange service, 1 involved a temporary discontinuance of toll interconnections, 1 involved closure of a coastal harbor station after the only vessel it served was decommissioned, and 1 involved the elimination of toll-station service at a community.

Speed of service.—The Bell System reported that the average time required for completing toll calls dropped from 1.8 minutes in calendar 1952 to 1.6 minutes in 1953, and that 95 percent of all toll calls went through while the calling party held the line.

Acquisitions and consolidations.—The Commission received 19 applications from domestic telephone carriers for authority under section 221 (a) of the Communications Act to acquire the property of another telephone company. After due notice of public hearing, 10 of these applications were granted, along with 1 held over from fiscal 1953. Of those pending at the close of the year, an initial decision had been issued on one, a hearing had been held on another and awaited initial decision, while hearings had been scheduled but not held on the remaining seven.

Interlocking directorates.—The Commission received 20 applications filed by individuals pursuant to section 212 of the act for authority to hold positions of officer or director of more than one domestic carrier subject to the act. All but one of these applications had been granted by the end of the fiscal year.

Reclassification of companies.—The Commission granted petitions by 3 telephone companies to be classified as "connecting carriers" under section 2(b)2 of the act which would render them subject only to sections 201 through 205, inclusive.

New techniques.—A tiny revolutionary electronic device called the transistor continued to find new and wider uses in the telephone indus-

try, particularly as a substitute for thermionic tubes. In one installation in the trial stage near Americus, Ga., transistors are being used to derive several voice paths from one pair of telephone wires to expand service to rural telephone subscribers.

Foreign attachment cases.—The Commission, on May 7, 1954, issued its final decision in the cases of *Jordaphone Corporation of America et al.* v. *American Telephone and Telegraph Co. et al.* (docket 9383) and *In the Matter of the Use of Telephone Answering Devices in Connection With Interstate and Foreign Telephone Service* (docket 9701), both of which proceedings involved the lawfulness of the foreign attachment provisions of the Bell System companies' tariffs as applied to automatic telephone answering devices in connection with interstate and foreign telephone service. The Commission found that such devices would be primarily used in connection with intrastate and local telephone service and only incidentally in interstate and foreign communication. It concluded, therefore, that the determination as to the use of such devices in any particular locality should be made by the appropriate State or local regulatory authority.

Final decision was still pending in the case of *Hush-A-Phone Corp. et al.* v. *American Telephone and Telegraph Company et al.* (docket 9189), which involved the lawfulness of the foreign attachment provisions of the defendants' tariffs insofar as they might be construed to prohibit the use of the Hush-A-Phone device.

Bell lease and maintenance of radio equipment.—The Commission started inquiry into the growing practice of Bell System companies leasing radio equipment to various licensees and performing the maintenance therefor on a monthly charge basis. Among other things, the Commission is seeking to determine whether the licensees involved have complete control over the operation of the radio equipment, whether the lease and maintenance charges of the telephone companies may be so low that their common-carrier services are subsidizing the lease-maintenance activities, whether the telephone companies may use arguments regarding the availability to prospective lessees of regular communication services to help sell the lease-maintenance service, and whether lease-maintenance activities may lead to demands that portions of the radio spectrum not now allocated to common carriers be reallocated to common carrier uses.

Domestic public land mobile radio service.—Activity in this service continues to be noteworthy for the interest shown in one-way signaling (radio paging) operations. This operation typically involves communication from a base station to pocket-type receivers carried on the subscriber's person. As of June 30, 1954, there were 34 such systems licensed, 24 others authorized, and 9 had been terminated.

Due to the lack of sufficient frequencies to accommodate all applicants for new one-way signaling systems in certain areas, it was necessary to hold comparative hearings for the Philadelphia area, the Fort Worth-Dallas area, the St. Louis area, the Los Angeles-Long Beach area, and the Seattle area. Final decisions had been issued in the St. Louis and Seattle cases, and an initial decision given in the Philadelphia case. In addition, a final decision was issued in a previously heard Los Angeles case.

The two-way land mobile radiotelephone service furnished by miscellaneous (nontelephone company) common carriers continued to expand and was being provided by 258 licensed systems, and 29 others had been authorized. In addition, there are 2 such systems in operation in Alaska, 1 in Hawaii and 1 in Puerto Rico.

The two-way land mobile radiotelephone service furnished within the United States by general communications carriers (telephone companies) was being provided on 207 systems licensed to Bell companies and 20 to non-Bell companies. Bell companies were authorized to establish 13 additional systems within the United States. The Hawaiian Telephone Co. is the only general communications common carrier providing such service (at Honolulu) outside the continental United States.

Rules governing domestic public radio services.—Only the land mobile radio operations of common carriers are currently being conducted under rules and regulations specifically applicable to a regularized service. The domestic common carrier operations of microwave radio relay systems, television STL (studio-to-transmitter link) stations, TV pickup stations, rural subscriber radio stations, short-haul toll radio stations, stations for control of remotely located transmitters, and repeater stations for automatic relay of land mobile station transmissions are all being licensed as developmental stations in the experimental radio service.

During the year, a rulemaking proceeding (docket 10821) was initiated to revise the rules and regulations governing the common carrier land mobile radio service and to establish rules and regulations for authorizing the aforementioned types of common carrier radio operations on a regular service basis. The proposed rules are designed to be of material assistance in the preparation and filing of common-carrier applications for radio authorizations and in the regulation of these services.

Rural subscriber and short-haul toll radiotelephone services.—Expansion continued in these experimental services which provide short-distance radio communication, on VHF frequencies, to points where it is impracticable to provide wire line communication. As of

June 30, 1954, telephone companies held licenses for 26 rural subscriber radio stations and construction permits for 6 others. In addition, 12 stations were licensed and 4 were authorized to miscellaneous common carriers. Fifty experimental short-haul toll radio stations were licensed to Bell companies and 5 to non-Bell companies. Four construction permits were outstanding.

Community TV antenna servicing.—The rapid increase in the number of community antenna TV systems has led to requests for common carrier microwave authorizations to relay the TV signals from the point of pickup to the cable distribution point. During the fiscal year, authorizations for such relay systems were made to the Mountain States Telephone and Telegraph Co. and to J. E. Belknap and Associates, a specialized common carrier in this field.

State radio operation.—On petition of the State of California, the Commission proposed rulemaking (docket 10777) to afford interested parties an opportunity to present views concerning contemplated amendments of parts 10 and 11 of the rules. These amendments would provide that operational fixed stations licensed to various agencies of a State could be used to provide coordinated service to other eligible agencies such as the Federal State Market News Service of California; also that any facilities so licensed could be used during off-peak periods for the general administrative communications of the State government. Common carriers commented adversely on the grounds that they have adequate facilities to meet State communications needs, and that provision of such facilities by States would result in unnecessary and uneconomical duplication of facilities.

Coastal and Alaskan services.—These services, though largely authorized on a common carrier basis, are discussed in a separate chapter on Safety and Special Radio Services because of their close relationship to radio aids for the safety of life and property.

Rates and Tariffs

Tariff schedules.—At the close of the year, 365 telephone carriers had tariffs or concurrences on file with the Commission, or 29 more than at the close of the previous year. The increase was due to new carriers in the Domestic Public Land Mobile Radio Service. The carriers filed 15,210 tariff publications, establishing new or modifying existing rates and regulations. Sixteen of these were rejected for failure to comply with notice requirements; none were suspended.

Special permissions.—Fifteen applications for special permission to make changes in tariffs on less than statutory notice, or for the waiver of some other rule requirements, were received. All were granted.

Increased message toll telephone rates.—Increased rates for interstate message toll telephone service became effective October 1, 1953, as provided for in revised tariff schedules filed with the Commission on August 28 by the Bell System telephone companies. The revised tariffs provided for increases of 5 cents in the rates for each 1-minute overtime period on station-to-station and person-to-person calls involving most distances above 24 miles; and for increases of 5 and 10 cents in the initial period (3-minute) rates for night and Sunday calls involving most distances between 41 miles and 2,300 miles. The increases in the initial-period rates for night and Sunday calls resulted in more uniformity in the percentage differentials between those rates and the initial-period day rates at the various mileages.

The new rates were estimated to produce about $65 million in additional annual telephone revenues, an increase of about 8 percent. Of this $65 million, about $30 million accrued to the Bell System companies as increased earnings, $2 million went to their independent connecting companies, with the balance representing principally Federal income tax payments.

The Commission, after due consideration and study of attendant filings, decided to take no action to prevent the new rates from becoming effective since it appeared that, under existing rates, interstate earnings of the Bell System companies were deficient and that the level of earnings which would result from the revised rates was sufficiently within the area of reasonableness as not to present any substantial question as to their lawfulness. In this connection, it appeared to the Commission that the additional revenues would bring the Bell System's return on its interstate services from less than 5 percent to within a range of 6 to 6½ percent.

Investigation of Bell System rates.—The Commission, on March 31, 1954, terminated the investigation which it instituted on January 19, 1951, of the Bell System's rates and charges for interstate and foreign communications services (docket 9889). This action followed a review of the Bell interstate and foreign operating results which indicated that further action in the proceeding was not required.

Teletypewriter exchange (TWX) service rates.—Increases and revisions in the rates for interstate TWX service became effective July 1, 1953. Contractual arrangements between the Long Lines Department of A. T. & T. and the regional telephone operating companies of the Bell System, covering compensation of the latter for their participation in furnishing interstate TWX service, were modified at the same time. There was substituted for the former commission and prorate basis of compensation a plan designed to reimburse the regional companies for their expenses incurred in connection with the

service plus a return on their investment devoted to it, in part a fixed rate of return and in part a rate of return equal to that being earned by the Bell System on all interstate services.

Bell System video program transmission rates.—In order to provide tariff rates and regulations covering the transmission of network TV color programs, the A. T. & T. successively extended its "Experimental Color Systems" tariff schedules.

Under the "experimental color" tariff, which was originally to expire on December 31, 1953, the Bell System's rates for the transmission of color broadcasts are the same as for the transmission of regular black-and-white (monochrome) broadcasts except for a higher station connection charge in the case of color. In its first letter dated December 28, 1953, requesting special permission to extend its color tariffs, A. T. & T. stated "the present rates for experimental color systems are substantially less than the full costs of furnishing interexchange and local facilities suitable for the NTSC system and that the extension of these rates is proposed without prejudice to compensatory rate schedules which will be filed shortly".

As of the close of fiscal 1954, the Bell System had not filed revised tariff schedules to cover the new color standards. However, in anticipation of such a filing, A. T. & T. submitted to the Commission a study made by the Bell System companies with respect to their current and future costs of furnishing video services. The methods used in making the study as well as the validity of the results were being reviewed and analyzed by the Commission.

Interstate telephone exchange service rates.—The Northwestern Bell Telephone Co. increased its rates, effective November 1, 1953, for interstate telephone exchange service furnished in 13 exchanges on the borders of Iowa, which exchange service is subject to the Commission's jurisdiction since it is not subject to regulation by any State or local authority. Upon consideration of data relating to the Iowa operations, the Commission decided to take no action to prevent the rates becoming effective as filed. The increase of about $900,000 in annual revenues will bring exchange rates in these border communities into line with rates for exchanges serving interior localities in Iowa.

Telephone rates between United States and Alaska.—Charges for most telephone calls between the United States and Alaska were to be increased 75 cents for the 3-minute initial period and 25 cents for each minute of overtime, effective July 1, 1954. The increased revenues, estimated to amount to about $200,000 annually, will all accrue to the Alaska Communications System, administered by the Chief Signal Officer of the Army, which operates the communication links between the United States and Alaska.

318372—54——4

Telephone excise taxes reduced.—Federal excise taxes, which had been 25 percent on long distance calls of 25 cents or more and on leased wire services, and 15 percent on long-distance calls of less than 25 cents and on local service, were all reduced by congressional action to 10 percent, effective April 1, 1954.

Other Regulatory Matters

Depreciation.—The work of developing information in connection with the Commission's continuing program of fixing depreciation rates for telephone companies was carried out during the year with respect to several Bell companies. On the basis of such information and through joint reviews of relevant facts with State commissions and the companies concerned, depreciation rates were prescribed for the first time for Wisconsin Telephone Co., Bell Telephone Co. of Nevada, and for each operating area served by The Pacific Telephone and Telegraph Co. (5 operating areas in 4 States). The new rates resulted in annual depreciation charges aggregating $60,925,000 and represented a reduction of $2,196,000 annually, or 3.5 percent.

In addition, the Commission modified most of the depreciation rates previously prescribed for the following Bell companies: Illinois Bell, Bell of Pennsylvania, and New England Telephone & Telegraph. The new rates in the case of the first 2 mentioned companies produced annual charges aggregating $49,482,000 and represented a total reduction of $797,000 annually, or 1.6 percent, whereas in the case of the New England company, the resulting depreciation charges of $24,028,000 annually represented an increase of 0.5 percent.

In prescribing depreciation rates for the Pacific and Nevada companies, the Commission considered the views expressed by certain State commissions that prescription should be postponed pending further study to determine whether the straight-line, total-life method used by the FCC for computing depreciation should be abandoned in favor of the remaining-life method. The Commission concluded that no sufficient showing had been made for a change in method and, accordingly, made its prescription on the total-life basis without prejudice to further review of depreciation methods.

By the end of the fiscal year, the program of prescribing depreciation rates for telephone companies had been carried out with respect to all 23 Bell companies, including the Long Lines Department of A. T. & T. In the case of 12 of these companies, the depreciation rates were revised at least once during the past 4 years in order to reflect changes arising from developments in the art and other factors. While the established rates reflect both upward and downward adjustments in depreciation charges, their overall net effect to date represents a reduction aggregating approximately $29,000,000 annually, or more than 6 percent.

In spite of the downward adjustments in depreciation rates, depreciation expense charges of telephone companies continued to rise due to a substantial increase in plant facilities. For the calendar year 1953 these charges in the case of the 23 Bell companies amounted to almost $441,000,000, an increase of $31,986,000, or 7.8 percent over the previous year. The increase in depreciable plant facilities, however (expressed in terms of the recorded book cost), amounted to 9.1 percent during the same period.

Separation procedures.—The procedures used by Bell companies to separate and apportion their investment and expenses between intrastate and interstate services were the subject of further studies by the Commission in cooperation with State regulatory authorities, through the National Association of Railroad and Utilities Commissioners (NARUC). Since the major portion of telephone plant is used in common to render intrastate and interstate services, a uniform and equitable method of separation, acceptable to both State and Federal jurisdictions, is essential to the determination of reasonable rates for services subject to each of the several jurisdictions.

The current studies, which were pending at the close of the fiscal year, were undertaken as a means of mitigating the regulatory problems which are presented by the fact that intrastate long-distance rates are generally higher than interstate long-distance rates for equivalent distances of service. It has been contended by various regulatory authorities that the disparity between intrastate and interstate rates results, at least in part, from inequities in the methods of allocation and that larger amounts of investment and expenses of the Bell System should be apportioned to interstate operations.

Interstate telephone service within large metropolitan areas.—One new interstate exchange embracing a large metropolitan area was established during the year at Louisville, Ky. Other interstate exchanges in this category are Cincinnati, Ohio; Kansas City, Mo.; Providence, R. I., and Washington, D. C. Some of them present problems of regulatory jurisdiction not yet fully resolved.

Bell System Federal income taxes.—The Internal Revenue Code of 1954 will present new income-tax allocation as well as other problems. One may result from the inclusion of Western Electric Co., Inc., the manufacturing and supply unit of the Bell System, in the latter's consolidated income-tax returns. Western has not been included in the Bell consolidated returns filed each year since 1950. There is doubt that it could have been included in these returns without the Bell companies sacrificing their favorable tax status of "regulated public utility" as defined in the Excess Profits Tax Act of 1950.

If Western is included in the Bell consolidated returns on a basis of eliminating from consolidated taxable income Western's profits on

intercompany transactions, such inclusion will result in deferrals of the impact of income taxes which in turn will lead to substantial reductions in the revenue requirements of the telephone companies. A representative of A. T. & T. has argued against the elimination of these intercompany profits in consolidated returns on the grounds that such elimination "is both exceedingly costly and impracticable and merely shifts the tax effect from one period to another".

Western Electric earnings and prices.—The Commission, in cooperation with the NARUC, continued its review of the prices, earnings, and costs of Western Electric Co., Inc. Data developed by these reviews are reported quarterly and annually to the various telephone regulatory commissions in order to assist them in their consideration of Western's prices to its affiliated telephone operating companies in the Bell System insofar as such prices affect the revenue requirements of the companies.

Pensions and relief.—The pension plans of the Bell companies were unchanged during fiscal 1954. For the calendar year 1953, pension and other benefit costs (including Federal taxes for social security benefits) for the Bell System, including manufacturing and research activities, amounted to approximately $272 million. This is an increase of about $27 million over 1952. The combined pension trust funds of these companies totaled approximately $1,762 million as of December 31, 1953. At that time 32,728 retired employees were receiving service pensions and approximately 21,000 active employees were eligible to retire at their own request.

During fiscal 1954, a review was started of the revised actuarial data underlying certain of the basic actuarial factors used in developing the Bell System pension accrual rates.

Uniform system of accounts.—The system of accounts was amended to permit all pension costs, including provisions for pensions based on service prior to the period for which accruals are made, to be charged to operating expense when certain conditions are met.

In response to inquiries from certain companies, a number of informal interpretations of the system of accounts were made, including such subjects as capitalization of standby mobile telephone units and the allocation of the pay of employees performing multiple duties.

Accounting research.—Research was continued on accounting regulations of other regulatory agencies and accounting principles enunciated by professional accounting organizations for the purpose of determining their applicability to the communications industry. Studies were also continued with respect to the "all-inclusive" income statement, certain aspects of depreciation accounting, accounting for tax savings resulting from filing consolidated tax returns, and accounting for acquisitions of private communication systems from pub-

lic utilities not engaged in furnishing communication services to the public.

Plant accounting practices.—During fiscal 1954, followup examinations were made of the plant accounting practices of certain Bell companies. These examinations revealed a decided improvement, particularly with respect to the classification of plant as between plant in service and plant under construction. The companies are making further improvements in these accounting procedures.

Restatement of plant accounts on basis of original cost.—The accounting for a number of current acquisitions of plant, including mergers of small companies, was handled during the year in accordance with the Commission's accounting regulations. In some instances this involved the disposition of amounts in excess of original cost. Final accounting for certain acquisitions of plant from nontelephone companies is being held in suspense pending determination as to whether original cost accounting shall be applied to such transactions. These transactions include acquisitions of private radiotelephone communications systems which the former owners continue to operate as the licensees under lease arrangements at specified monthly charges and the telephone companies maintain the facilities.

Continuing property records.—Further studies and reviews were made of the continuing property records of several Bell companies during fiscal 1954.

As indicated in the 1953 report, one of the principal features of a continuing property-records plan is the provision for determining the cost of plant to be retired from the accounts. The Bell System had proposed a revised method for the development of average retirement unit costs which would give recognition to the trends in the level of costs and to the age distribution of plant retirements in addition to those factors now recognized under the present method. Further study of the proposed Bell method was made during fiscal 1954 by the Commission in conjunction with A. T. & T. and the NARUC Committee on Accounts and Statistics. The Bell companies have been authorized to adopt the revised method pending the possible development of an economically feasible "cost-by-years" method. It is anticipated that the revised method will be placed into effect by these companies during fiscal 1955. This should result in more accurate accounting for plant retirements.

NARUC committees on depreciation and accounts and statistics.—The Commission cooperated with these committees in a number of projects of mutual interest to State and Federal regulatory commissions. Commission representatives participated in further consideration of proposed revisions in the systems of accounts for electric, water and gas utilities, with respect to general accounting principles involved

which are also applicable to communication utilities. In addition to the revision of the method of developing retirement unit costs discussed under the continuing property records section of this chapter, considerable time and effort were devoted to a study, in cooperation with the Bell System, of possible methods of simplifying the present practices of accounting for telephones installed and removed. This study was still in progress at the end of the year.

Annual and other reports.—The Commission's rules relating to reports from communication common carriers were completely revised, giving considerable relief to all carriers as to data required to be reported and relieving the smaller carriers from filing any annual reports.

DOMESTIC TELEGRAPH

General

Almost all of the domestic message telegraph service in the United States is provided by The Western Union Telegraph Company. Private line and other special telegraph services also are furnished by Western Union, but the great bulk of these, including teletypewriter exchange service, is furnished by the telephone companies.

Western Union's land-line operating results in fiscal 1954 were somewhat lower than in fiscal 1953. Although gross operating revenues continued at high levels, the volume of message telegraph traffic decreased in the fall of 1953. Operating expenses were affected by wage increases which became effective in June 1954.

For the calendar year 1953, Western Union reported gross land-line revenues of $208,578,000 and 162,188,00 messages handled, as compared to 1952 revenues of $184,336,000 and 159,735,000 messages. Results of the company's systemwide operations, including the ocean-cable system, provided $14,469,000 net income after Federal income taxes of $9,417,000 for 1953, as compared to 1952 reported earnings of $1,661,000 with $200,000 for Federal taxes. The 1953 earnings were augmented to the extent of $6,364,000, after providing $2,217,000 for Federal taxes, by a net gain on the sale of the company's investment in its subsidiaries, American District Telegraph Co., and the Teleregister Corp. Earnings in 1952 were depressed as a result of the nationwide strike in April and May of that year.

Western Union used the revenue from the sale of its investments in subsidiary companies to complete the retirement of a $12 million bank loan, negotiated in 1950, and to provide additional capital to be used for financing expansion of its growing private wire and facsimile services.

For the last half of fiscal 1954, Western Union reported land-line gross operating revenues of $100,162,000 as compared with $103,-274,000 for the first half of fiscal 1954. Message volume for the last

half of fiscal 1954 is estimated at about 4 percent below the level of the message volume for the previous 6 months. Systemwide earnings for the last half of fiscal 1954 amounted to $3,300,000 after providing $3,564,000 for Federal income taxes.

At the close of fiscal 1954 the telegraph company increased rates for the purpose of offsetting the cost of increased wages, expected to increase operating expenses by about $7 million a year over the next 2 years and restore earnings to about 5 percent, the level that prevailed during the last half of fiscal 1953.

Services and Facilities

Speed of service.—Western Union is required to conduct daily studies of speed of service at its 25 largest message centers and to report monthly summaries to the Commission. These reports show the average origin to destination speed (interval between the time a message is filed by sender and the time it is delivered to addressee, or first attempt) and the average office relay drag (time required for a message to pass through a large message center). Fifteen of the message centers are operated by reperforator-switching equipment while the remaining 10 are manually operated. The following table compares the speed of service in minutes reported by Western Union for the past 2 fiscal years:

	Average speed in minutes	
	Fiscal 1953	Fiscal 1954
Origin to destination: Delivered by:		
Telephone	43.0	43.7
Messenger	46.2	47.2
Private tieline	37.8	37.9
Office relay drag	8.4	8.4

The above summary shows that origin to destination service for fiscal 1954 was somewhat slower than in the previous year and office relay drag remained the same. However, as a result of Western Union's recent efforts to improve speed of service in its 15 reperforator centers, where large volumes of messages are relayed, the company attained the fastest monthly average speed of service at such centers during May and June 1954 (5.8 minutes) yet reported. If this continues, the overall origin to destination speed of service should improve also.

Due to limited personnel and funds, Commission studies of service conditions are necessarily restricted to the most pressing situations. However, during the year the Field Engineering and Monitoring Bureau personnel in 17 district offices assisted the Common Carrier Bureau by making routine speed-of-service inspections of 81 Western Union offices and agencies, and the Common Carrier Bureau field

offices made 478 inspections of Western Union offices located in or adjacent to those cities. In addition, the bureau headquarters staff made on-the-spot inspections of telegraph service conditions at certain of the larger offices.

Western Union modernization program.—Western Union's modernization program was instituted in 1946. Its principal component was completed in 1950 and consisted of the construction of 15 strategically located reperforator-switching centers for the automatic and semiautomatic relay of telegrams between cities. Each reperforator office serves from 1 to 6 States and each is provided with direct channels to other centers.

To extend the service benefits of the high-speed transmission facilities provided through these reperforator message centers, Western Union, as of June 30, 1954, had provided 245 large branch offices, all except 2 of which are located in nonreperforator cities, with direct-circuit connections to distant reperforator centers. Of this number, 206 are equipped for sending originating messages into the reperforator system and the remainder are equipped for both sending and receiving messages. These direct-circuit connections provide faster and more efficient service by eliminating the manual relay of messages.

The principal development affecting the modernization program during fiscal 1954 was the installation at Richmond, Va., of additional switching equipment of the latest type. As a result, the larger tributary offices in Virginia and North Carolina are interconnected directly with automatic switching equipment in the Richmond traffic center and messages from these offices can be handled more rapidly than before.

Total channel-miles in telegraph service, including carrier, physical, and other facilities, approximated 3,372,000 miles as of June 30, 1954, an increase of 182,000 miles during the fiscal year. Total carrier channel miles on leased facilities and Western Union-owned circuits increased from 2,148,122 miles to 2,351,708 miles. Total telegraph channel-miles in service on June 30, 1954, were more than double the 1946 capacity. The increased channel mileage was derived largely from the application of carrier equipment to voice frequency channels.

Western Union continued to provide increasing numbers of telegraph users with deskfax tielines and other direct wire connections with telegraph central offices. The deskfax, a compact facsimile telegraph machine installed on the desk of the business user, speeds the delivery and pickup of telegrams. During fiscal 1954, deskfax installations were completed to 4,860 additional customers' offices, bringing to 13,534 the total number in use. Company plans call for approximately 20,000 deskfax installations by the end of calendar 1954. In fiscal 1954, teleprinter-operated direct-wire connections to customers were increased from 21,388 to 22,586.

The large and continuing increase in direct customer connections lessens the need for messenger and telegraph office handling, and correspondingly reduces public service requirements at certain telegraph offices. There has been a substantial trend away from messenger pickup and delivery of telegrams. The increasing number of deskfax tielines and greater use of the telephone to accept and deliver telegrams is accelerating this trend. The following table shows the percentage of messages delivered and picked up by messenger, by tieline, by telephone and over the counter for 1934, 1944 and 1954:

	Percent of total messages					
	Delivered			Picked up		
	1934	1944	1954	1934	1944	1954
Terminal handling method:						
Messenger	74	51	45	50	25	18
Tieline	14	24	35	14	25	40
Telephone	9	22	18	19	24	32
Counter	3	3	2	17	26	10

Western Union undertook a program of connecting its large volume tieline customers directly to the company's public message reperforator switching system. Such arrangements eliminate the usual interception and manual relay of tieline messages at the originating telegraph message center, thereby effecting substantial economies and speeding up service.

At the close of fiscal 1953, Western Union announced plans for further expansion in the facsimile and private wire service field. A number of custom-built private wire systems were installed and major additions were made to certain existing systems in fiscal 1954. Some of these systems employ equipment and methods similar to those used in the telegraph company's own mechanized switching centers. A new and extensive private wire system was being completed for the General Services Administration. This system will link governmental centers throughout the Nation in a 15,000-mile network employing the latest telegraph techniques.

Gross expenditures on the modernization program through calendar year 1953 amounted to some $56 million, with an estimated $26 million to be spent in future years. Estimated savings in operating expenses resulting from this program currently aggregate about $31 million a year.

Construction of wire facilities.—The Commission granted five requests of Western Union for authority to construct or operate new or extended wire telegraph lines. The applications covered the leasing of 102,031 telegraph channel miles at an annual rental of $208,338, and the construction of 69,369 telegraph channel miles of line and associated equipment at a cost of $1,571,720.

Facilities leased to subscribers for private-line telegraph service supplied by Western Union rose from 1,248,000 miles to 1,493,572 miles during the fiscal year, an increase of almost 20 percent.

Discontinuance, reduction, or impairment of service.—A total of 1,202 applications for reduction in hours of service or closure of public telegraph offices were filed by Western Union as compared to 1,953 such applications during the previous fiscal year. In addition, 224 applications were pending at the beginning of the year. Of the total, 1,259 applications were granted, 30 were withdrawn, and 137 were pending at the close of fiscal 1954. Generally, where hours were reduced or offices closed, substitute service was made available.

On December 21, 1953, the Commission proposed rulemaking (docket 10816) *In the Matter of the Amendment of Part 63 of the Commission's Rules and Regulations Governing Extension of Lines and Discontinuance of Service by Carriers*, to enable interested parties to present their views regarding a petition filed by American Communications Association requesting certain changes in the requirements for posting and publishing of notice of applications by carriers for authority to discontinue, reduce or impair telegraph service, and to require that hearings be held on all formal applications where objections are filed. (On October 25, 1954 the Commission amended its rules to require carriers to post adequate public notices in affected offices, but denied the ACA petition in other respects.)

Messenger delivery limits.—Western Union filed tariff amendments to clarify its practices relating to limits within which messages are delivered by messenger without additional charge. The changed regulations provide that delivery of messages will be made without additional charges to any address within the established city or community limits of any point listed in the company's tariff. The tariffs had previously fixed such delivery limits at specified distances from open telegraph offices.

Rates and Tariffs

Tariff schedules.—At the end of the fiscal year, 32 domestic telegraph carriers had tariffs and concurrences on file with the Commission. During the year, they filed 924 tariff publications establishing or changing rates, regulations, practices, and classifications of service.

Domestic telegraph rates.—As reported in the 1953 annual report, Western Union filed new and revised rates and regulations for interstate leased facilities (private-line telegraph services). After due examination, they were permitted to become effective July 1, 1953, resulting in both increases and decreases, the overall effect of which amounted to an estimated reduction of $357,000 annually in the company's revenues.

On June 15, 1954, Western Union filed new and increased rates, effective July 15 and August 1, 1954, for interstate message telegraph and money-order services, foreign money-order service, and certain other interstate services. The company estimated that the revised rates, if made effective systemwide (interstate and intrastate), will produce about $10 million additional revenue a year. Western Union stated that the increased rates were necessary to offset the cost of wage increases and restore the company's earnings position to the approximate level which obtained during the first half of 1953. The overall average effect is an increase in the cost of these telegraph services to the public approximating 12 percent. The schedules also provide for a flat discount or reduction of 20 cents a message in the charges for all sent paid messages in excess of 100 messages in a month filed by tieline to points in the United States or Alaska. Western Union initiated this volume discount rate in recognition of lower terminal costs experienced from traffic handled over tielines.

Ticker rental charges.—As a result of hearings held in early 1953 regarding the lawfulness of Western Union's revised tariff schedules establishing new and increased charges and new regulations applicable to "tickers" used in leased facilities service, effective August 1, 1952 (docket 10274), the Commission, by decision released April 22, 1954, held that the increased rates had not been shown to be unreasonable or otherwise unlawful. On June 19, 1954, the Chicago Board of Trade, one of the intervenors, appealed to the Court of Appeals for the District of Columbia Circuit, where the matter was pending at the end of the fiscal year.

Other Regulatory Matters

Original cost of plant and continuing property records.—Field verification and analysis has been completed with respect to the methods and procedures applied and the accounting performed in connection with Western Union's reclassification of its plant and equipment on the basis of original cost, and with regard to the establishment and maintenance by Western Union of a continuing property record system.

Depreciation.—No changes in Western Union's depreciation rates were made during the fiscal year. The carrier is concluding studies of the factors underlying the development of depreciation rates, looking toward a comprehensive revision of the rates by the end of 1954 that will reflect, more accurately, obsolescence and retirement of a substantial amount of its older equipment and installation of newer types of equipment having different service-life and salvage characteristics.

Miscellaneous accounting matters. The Commission devotes continuing attention to the telegraph carrier's accounting methods and

procedures for the purpose of assuring proper treatment in and reporting of accounts as an aid to effective rate regulation. In this connection, attention was directed during the fiscal year to such matters as (*a*) local office bookkeeping and flow of accounting and other data to headquarters offices; (*b*) changes in subaccounts and temporary or experimental accounts, and other internal controls; (*c*) accounting for temporary investments in Federal securities; (*d*) accounting for sales of investments in subsidiary companies; and (*e*) accounting for plant under construction.

Uniform system of accounts.—The system of accounts was amended to prescribe total-life depreciation except in instances where the Commission authorizes the use of the remaining-life method which was formerly prescribed. Provisions relating to accounting for cost of pensions were also amended to permit charging such costs to operating expense when certain conditions are met, which is consistent with a similar amendment applicable to telephone carriers. Work was also continued on preparation of a combined system of accounts for domestic and international telegraph carriers.

INTERNATIONAL TELEGRAPH AND TELEPHONE

General

Fixed point-to-point telegraph message service between the continental United States and the rest of the world was provided by 4 cable and 6 radiotelegraph carriers. Four of these carriers also provided direct customer-to-customer international telegraph service, primarily to European countries. In addition, 9 carriers rendered marine radiotelegraph service between ships and shore. Of these, 4 were international point-to-point carriers, whereas the other 5 provided only communication between land stations and ships at sea. Radiotelephone service was furnished between the continental United States and over 100 foreign points by the American Telephone & Telegraph Co. International telegraph and telephone service was also provided to and from the United States possessions and Territories on a basis generally comparable to service to and from the continental United States.

The downward trend in the total volume of international telegraph traffic reported by the 10 cable and radiotelegraph carriers for the calendar year 1952 leveled off during the first half of 1953, and was actually reversed during the last half of that year. However, the increase in message traffic volume which obtained during the second half of 1953 was not sufficient to offset the decrease for the preceding half year. Thus, the word volume of United States international telegraph traffic handled by the carriers during calendar 1953 totaled 511,256,493 paid words, which was about 1 percent or 5,005,080 paid words under the 1952 level.

Industrywide message revenues, on the other hand, increased slightly to $46,094,179, as compared to $44,916,384 for 1952, mainly because of the benefits accruing to the carriers from increased collection rates on traffic inbound from the United Kingdom later in calendar 1952 and certain Latin American countries in calendar 1953. At the same time, revenues from nonmessage services also increased $943,449, to a total of $13,632,442, reflecting the continued growth of such customer-to-customer services as leased channel and international teleprinted exchange services.

As a result, total gross operating revenues for 1953 amounted to $59,726,621, an increase of about 3.7 percent or $2,121,244 over the previous year. Net operating revenues of the industry before provision for Federal income taxes amounted to $6,509,448 in 1953. This was $461,509 or 7.6 percent more than the previous year, and the highest for any year since the end of World War II.

The growth in international radiotelephone service continued, and the number of calls handled during calendar 1953 passed the million mark for the first time in the history of this service. The chargeable calls in 1953 totaled 1,052,812, representing an increase of about 7.1 percent over a year ago. The revenues (including associated land-line charges) amounted to $10,918,450, or about 5.5 percent above those in 1952.

International Services

Telegraph facilities.—In general, international telegraph service by cables is provided to Europe and to many countries in the West Indies, Central and South America. In addition, cable carriers provide service to most other points through connection with foreign facilities.

At the close of fiscal 1954, the radiotelegraph companies were serving 87 foreign countries and overseas points either by direct circuits or via relay stations at Tangier, North Africa. Some points in northern Europe, the Near East, and Asia were served primarily via Tangier in order to provide more reliable service. Relaying technique is used at other points not only to overcome propagation difficulties but also to provide service to additional countries by connections with foreign carriers.

In addition to public message traffic, certain telegraph carriers provide radiotelephone transmission and reception service for broadcast programs. Program service includes such material as on the spot foreign news commentaries which are broadcast on "news roundups" in this country. Transmission of sponsored sporting events, such as boxing matches and baseball games, to Latin American broadcast stations increased during the year. Similarly, the Department of State and the United Nations utilize this service to send information

to be retransmitted locally from foreign points. Radiophoto transmission and reception service provided by some carriers is used primarily by news agencies.

Requirements of the United States and foreign governments, commercial enterprises, and airlines which operate internationally, for leased channel teleprinter service, provided by both the cable and radiotelegraph carriers, have continued to increase. Customer-to-customer international teleprinter exchange service—similar to domestic TWX (teletypewriter exchange service)—is an arrangement whereby the cable or radio carrier provides circuit facilities and equipment to the customer for personal communication with his associates overseas. This service is used principally by financial and other commercial interests on a time and metered basis. These facilities are used by subscribers in the United States, particularly in the vicinity of New York City and Washington, for communication with several European countries, the Belgian Congo, and Venezuela. Service of this type is also available between San Francisco and Hawaii.

Radiotelegraph service is likewise available between the United States and ships at sea. Under international agreement, each country is required to provide for the settlement of accounts for vessels under its registry of tolls for radiotelegraph traffic exchanged with coastal stations of other administrations. This function is carried out by the International Telecommunications Settlements Division in the Commission. In fiscal 1954 this division accounted for the following messages and made the following disbursements:

Messages on hand beginning of period	41,055
Messages received during period	131,556
	172,611
Messages processed during period	147,133
Messages on hand June 30, 1954	25,478
Cash on hand at beginning of period	$67,919.33
Cash received from United States companies	208,618.02
	276,537.35
Cash disbursed to foreign governments	209,948.52
Cash on hand for disbursement June 30, 1954	66,588.83

Telephone circuits.—A new radiotelephone circuit was established to Singapore so that message toll service is now in effect with 111 foreign countries and overseas points. There is direct communication on 63 of these circuits. Of these, 59 are served by radiotelephone from either New York, San Francisco, or Miami. Canada and Mexico are served by interconnecting wire lines at their respective borders. Cuba is served by submarine cables and Alaska is served via the

facilities of the Alaska Communications System. Program and private line service is available between the continental United States and many foreign countries and overseas points.

Plans are underway to install two coaxial cables with submerged repeaters between Nova Scotia and Scotland, to be owned one-half by American Telephone & Telegraph Co. and one-half by United Kingdom and Canadian communications interests. These cables will be connected to land-line and microwave radio relay systems to provide control terminals at New York, Montreal, and London. They will be capable of handling 36 two-way telephone conversations simultaneously. What effect this development will have on easing the transatlantic radiofrequency shortage is not known at this time since it is quite possible that the spectrum space thus saved may be absorbed by normal increase in requirements for communication channels.

Radiotelephone service is also being made available to the passengers of an increasing number of oceangoing vessels. In the past year this service was established with three additional transoceanic vessels.

Applications.—Licensees in the International Fixed Public Services filed 405 applications for additional frequencies, points of communication, and transmitters as well as for short-term authorizations for program and other special services. The Commission acted on 432 such applications during the same period. The number handled was approximately 27 percent less than during the preceding year. This is brought about principally by a reduction in the number of applications filed for additional frequencies in implementing the Atlantic City allocation table. The number of "out-of-band" frequency assignments in these services has been reduced from 35 to 15. Progress has been aided materially by the rearrangement of operating patterns and the development of multichannel transmission techniques which result in more efficient use of the frequency spectrum.

Radiotelephone and radiotelegraph service has been instituted on an experimental basis in the very high frequency range between stations in Puerto Rico and the Virgin Islands. Heretofore such service had been on high frequencies. It is expected that the change will improve service and help to conserve the relatively scarce high frequencies.

Merger.—Studies are continuing under the auspicies of the Senate Committee on Interstate and Foreign Commerce regarding the feasibility and desirability of a merger of the major companies providing international telegraph service. Although it appears that some progress has been made in this matter, no definite results had been reached at the end of the fiscal year.

Licensing of submarine cables.—On May 10, 1954, the President issued Executive Order 10530 which, in section 5, designates the Com-

mission to receive, grant, or revoke licenses to land or operate submarine cables in the United States without the approval, ratification, or other action of the President, provided the approval of the Secretary of State is obtained and such advice from any executive department of the Government the Commission may deem necessary. Formerly, under Executive Order 6779 of June 30, 1934, the Commission was directed to receive such applications and, after obtaining the approval of the Secretary of State, to advise the President with respect to their grant, denial, or revocation.

(The first license issued under this authority was on October 20, 1954, to the American Telephone and Telegraph Co., for twin submarine telephone cables between Port Angeles, Wash., and Ketchikan, Alaska.)

Docket Cases

Western Union-Globe and Tropical contracts.—The 1953 annual report referred to the final decision issued May 18, 1953, in this matter (docket 9292), in which the Commission concluded that certain contracts entered into by Western Union with Globe Wireless, Ltd., and Tropical Radio Telegraph Co., respectively, for the exchange of specified international telegraph traffic, were violative of section 222 of the Communications Act and the formula prescribed thereto. On February 24, 1954, the Commission denied the petitions of these companies for a rehearing, and again ordered them to cease and desist from transferring traffic pursuant to such contracts and to enter negotiations for an agreement on damages due the complainants (Commercial Pacific Cable Co.; Mackay Radio and Telegraph Co., Inc.; The Commercial Cable Co., All American Cables and Radio, Inc.; and RCA Communications, Inc.), as well as a plan of reparations.

On March 4, 1954, the Commission set April 1, 1954, as the date by which the cease-and-desist orders in this proceeding were to be complied with. Western Union, Globe, and Tropical on March 29 sought review of the Commission action in the Federal courts and also requested that the Commission's order be stayed pending the appeal. The request for a stay was denied, but the appeal is still pending before the Court. After notice that no agreement on damages had been reached by May 24, 1954, the Commission, on June 30, 1954, granted an extension to September 30, 1954 of the time within which to come to such agreement.

Western Union divestment.—Investigation and hearing was instituted by the Commission on March 5, 1952, into the matter of the divestment of Western Union's international telegraph operations in accordance with section 222 of the Communications Act. This section, which authorized the merger or consolidation of domestic telegraph carriers, required that any merger plan should provide for

the divestment of the international telegraph operations theretofore carried on by any party to the proposed merger within a reasonable time, and after the Commission found the compensation for the property to be divested commensurate with its value. In approving the merger of Western Union and Postal Telegraph, Inc., in 1943, the Commission required the former to exercise due diligence in effecting divestment of its cables (docket 6517). Since Western Union had not effected divestment, the instant proceeding (docket 10151) was instituted. Hearings in the matter were concluded on March 25, 1954, and the matter is now awaiting an initial decision.

Buccaneer application.—This proceeding involved an application filed on June 9, 1952, by Buccaneer Line, Inc., for a new fixed public radiotelephone station at Jacksonville, Fla., to furnish radiotelephone service between Jacksonville and certain points in the Yucatan peninsula in Mexico (docket 10376). Hearings in the matter, scheduled for April 14, 1953, were postponed pending negotiations between the American Telephone & Telegraph Co. and Mexican communications companies for the establishment of communication between the points desired through interconnection with their existing facilities. The carriers were able to establish satisfactory service and the Commission on April 29, 1954, granted a motion by Buccaneer to dismiss its application without prejudice.

Mackay circuits to Netherlands and Portugal.—In a previous annual report it was noted that RCA Communications, Inc., had appealed to the United States Court of Appeals for the District of Columbia Circuit from the Commission decision of February 21, 1951, granting Mackay Radio & Telegraph Co., Inc., authority to establish radiotelegraph circuits to the Netherlands and Portugal which would compete with existing RCAC circuits (docket 8777).

After a reversal of the Commission decision by the Court of Appeals, both the Commission and Mackay were granted certiorari by the Supreme Court of the United States for review. On June 8, 1953, the Supreme Court reversed the lower court and ordered the case remanded to the Commission for such action as may be open under the court's opinion. The Supreme Court, although agreeing that the grant of the Mackay applications would not result in a violation of section 314 of the Communications Act, stated that the Commission could not base such a grant on a finding that there exists a national policy favoring competition in this field, but rather must find ground for "reasonable expectation that competition may have some beneficial effect", although specific findings of immediate tangible benefit are not required.

Following oral argument on February 8, 1954, the Commission held further hearings to bring the record up to date. Meanwhile,

318372—54——5

pending a new Commission decision, Mackay is being permitted to operate the circuits. This case is particularly significant in that it presents a basic policy problem as to the extent to which the Commission may find additional competitive circuits in the public interest on the basis of the benefits expected to be derived by the public as a result of competition.

RCAC complaint on Canadian traffic.—Section 222 of the act, which authorized the merger of Western Union and Postal, provided that the merged company shall divide among the international telegraph carriers such traffic as is destined to points outside the continental United States and also to distribute telegraph traffic destined to Canada among that country's carriers in accordance with formulas established pursuant to that section. On March 24, 1954, RCA Communications, Inc., filed a petition alleging that Western Union was in violation in that it was failing to turn over to RCAC certain traffic destined for trans-Pacific points which Western Union had received from the Canadian National Telegraph in Canada. The petition requested a ruling by the Commission. The matter is under consideration.

Rates and Tariffs

Rate levels.—During calendar 1953 the level of rates for telegraph traffic outbound from the continental United States remained unchanged, while for telegraph traffic inbound some changes in rates were reported. Although these revisions were in the nature of surcharges added to the normal rates by certain Latin American countries to increase the revenues of their telegraph operating administrations, they were of financial benefit to those United States carriers which carry on international telegraph operations in those countries. United States carriers which provide service to Latin American countries by communicating with foreign correspondents did not share in the increases in inbound rates.

Tariff schedules.—During fiscal 1954, communications carriers furnishing international and marine telegraph service filed 1,123 tariff schedules affecting charges and regulations applicable to such services.

Contracts and divisions of tolls.—International and marine telegraph carriers filed 254 contracts, 815 amendments to existing contracts, 108 reports of negotiations with foreign correspondents, and 511 statements showing revisions in the division of tolls arrangements for telegraph messages between the United States and foreign countries.

Other Regulatory Matters

Depreciation.—Substantial progress was made in implementing the continuing program of prescribing depreciation rates for international

telegraph carriers. On the basis of cooperative studies with the carriers, the Commission, for the first time, prescribed annual depreciation rates, effective January 1, 1954, for All America Cables and Radio, Inc., and The Commercial Cable Co. The annual net effect of these new rates, based on the gross book cost of depreciable plant on December 31, 1953, represents reductions in annual depreciation charges of approximately $77,000 (or 15 percent) for All America, and $60,000 (or 21 percent) for Commercial Cable. Depreciation rates are expected to be prescribed for some of the other carriers during fiscal 1955.

Studies were also continued to determine the reasonableness and propriety of the annual depreciation rates and charges, book depreciation reserves, and the depreciation accounting practices of these carriers. In order to effect more flexibility in the Commission's rules, the systems of accounts for the international telegraph carriers were amended to make the application of the remaining-life method of depreciation accounting permissive rather than mandatory.

Continuing property records.—Two of the three international telegraph carriers fulfilled the requirements to install and maintain satisfactory property records during the year. The third carrier made substantial progress and, with the advice and assistance of the Commission, is expected to restate its records in a satisfactory manner during fiscal 1955. Studies were continued to verify and to evaluate the regulatory effectiveness of the forms, records, and procedures employed by these carriers in installing and maintaining their property records.

Relief and pensions.—The Commission pursued its general studies of the international telegraph carriers' pension arrangements, particularly with the view of determining the effect of pension costs upon operating expenses. Six of the carriers introduced changes in their pension plans, primarily to expand coverage and to increase employees' benefits. The Commission revised its systems of accounts for international telegraph carriers to provide that when certain provisions in the accounts are met, the entire cost of pensions, whether relating to past or to current service of employees, may be charged to operating expenses.

Reclassification of plant.—Although the reclassification of plant of the international telegraph carriers has been substantially completed, additional adjustments may be required with regard to three carriers. In order to be assured of the propriety and reasonableness of the final results, comprehensive studies were in progress at the end of fiscal 1954 to analyze the methods and procedures applied, and to verify the entries recorded and the accounting performed to restate the plant of these carriers on the basis of original cost.

Miscellaneous accounting matters.—With the view of further implementing effective rate regulation, studies were conducted to determine the reasonableness and propriety of the international telegraph carriers' accounting and reporting procedures. These studies, among other things, related to (*a*) expunging from the carriers' rate bases all plant not used and useful in the public interest, (*b*) plant retirements and installations, (*c*) segregation of operating revenues, (*d*) traffic-damage claims, and (*e*) ocean-cable maintenance.

STATISTICS

General

Reports were filed on an annual basis by 323 common carriers and 19 controlling companies for the calendar year 1953. Considerable financial and operating data taken principally from these reports are published annually in a volume entitled "Statistics of the Communications Industry in the United States" (see appendix list of Commission publications sold by the Superintendent of Documents). The larger telephone and telegraph carriers also file monthly reports of revenues and expenses, and summaries of these data are published monthly by the Commission.

Telephone Carriers

The annual reports received from common carriers include those from 64 telephone carriers and 249 carriers engaged in rendering mobile radiotelephone service. Selected financial and operating data concerning large telephone carriers for the year 1953 as compared to 1952 are shown in the following table:

Telephone carriers [1]

Item	1952	1953	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$12,608,517,366	$13,749,883,288	9.05
Depreciation and amortization reserves	$3,411,440,935	$3,618,085,781	6.06
Net investment in plant and equipment	$9,197,076,431	$10,131,797,507	10.16
Local service revenues	$2,516,731,327	$2,777,053,634	10.34
Toll service revenues	$1,534,854,055	$1,641,990,139	6.98
Total operating revenues	$4,228,750,352	$4,628,117,965	9.44
Operating expenses	$2,986,565,273	$3,222,873,105	7.91
Taxes	$737,732,268	$838,052,515	13.60
Net operating income after all taxes	$504,452,211	$567,191,745	12.44
Net income	$420,733,463	$496,507,445	18.01
Dividends declared	$346,388,050	$398,972,071	15.18
Company telephones:			
Business	12,899,770	13,394,632	3.84
Residence	28,987,800	30,448,066	5.04
Number of calls originating during the year:			
Local [2]	68,369,589,937	69,978,334,496	[3]
Toll [2]	2,194,086,251	2,268,968,227	[3]
Number of employees at end of October	615,141	625,832	1.74
Male	207,350	215,080	3.73
Female	407,791	410,752	0.73
Total compensation for the year	$2,200,657,106	$2,378,679,557	3.09

[1] Intercompany duplications, except in minor instances, have been eliminated.
[2] Partly estimated by reporting carriers.
[3] The number of calls shown are not comparable, as many calls were reclassified from "Toll" to "Local" during 1953, due to enlargement of numerous local calling areas.

Business and Residence Telephones by States

There were 50,373,000 telephones in the continental United States, of which 35,342,300 were located in residences and 15,030,700 in business establishments, as of January 1, 1954. The number of telephones, arranged by States, is shown in the following table. The figures were compiled by the American Telephone & Telegraph Co.

State	Business	Residence	Total
Alabama	145,600	376,300	521,900
Arizona	78,500	137,900	216,400
Arkansas	90,900	195,600	286,500
California	1,553,000	3,100,000	4,653,000
Colorado	161,300	354,700	516,000
Connecticut	255,400	662,700	918,100
Delaware	44,800	99,200	144,000
District of Columbia	250,800	283,100	533,900
Florida	361,600	548,300	909,900
Georgia	222,100	495,300	717,400
Idaho	45,500	113,200	158,700
Illinois	1,074,700	2,302,600	3,377,300
Indiana	329,100	968,400	1,297,500
Iowa	184,100	705,500	889,600
Kansas	161,500	512,300	673,800
Kentucky	147,800	403,600	551,400
Louisiana	185,100	450,900	636,000
Maine	63,300	182,200	245,500
Maryland	230,800	588,700	819,500
Massachusetts	512,300	1,249,700	1,762,000
Michigan	624,400	1,751,600	2,376,000
Minnesota	250,400	759,000	1,009,400
Mississippi	79,100	189,400	268,500
Missouri	369,300	919,400	1,288,700
Montana	50,600	121,700	172,300
Nebraska	107,800	334,600	442,400
Nevada	28,200	38,000	66,200
New Hampshire	41,400	120,100	161,500
New Jersey	565,000	1,424,000	1,989,000
New Mexico	65,900	93,000	158,900
New York	2,223,800	4,275,300	6,499,100
North Carolina	210,800	502,800	713,600
North Dakota	35,600	104,400	140,000
Ohio	772,300	2,245,700	3,018,000
Oklahoma	191,100	453,700	644,800
Oregon	150,000	360,400	510,400
Pennsylvania	972,600	2,675,000	3,647,600
Rhode Island	77,800	190,800	268,600
South Carolina	101,800	224,300	236,100
South Dakota	40,000	126,000	166,000
Tennessee	206,900	542,100	749,000
Texas	733,800	1,565,600	2,299,400
Utah	67,100	173,000	240,100
Vermont	26,200	74,300	100,500
Virginia	259,200	585,500	844,700
Washington	249,500	606,600	856,100
West Virginia	105,700	294,500	400,200
Wisconsin	296,600	798,800	1,095,400
Wyoming	29,600	62,500	92,100
United States	15,030,700	35,342,300	50,373,000

Land Line Telegraph

Annual reports containing financial and statistical data for the calendar year 1953 were received from 10 domestic and international telegraph carriers. The accompanying table sets forth financial and operating data relating to the domestic land-line operations of the Western Union Telegraph Co. for the calendar year 1953 as compared to 1952. The data pertaining to its cable operations are included in a later table relating to ocean-cable carriers.

The Western Union Telegraph Co. [1]

Item	1952	1953	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$286,371,865	$289,448,249	1.07
Depreciation and amortization reserves	$126,579,820	$128,776,085	1.74
Net investment in plant and equipment	$159,792,045	$160,672,164	0.55
Message revenues	$153,086,977	$174,649,515	14.09
Total operating revenues	$184,336,414	$208,578,008	13.15
Operating expenses, depreciation and other operating revenue deductions	$183,394,757	$193,863,321	5.71
Net operating revenues	$941,657	$14,714,687	[2]
Provision for Federal income taxes	[3] $200,000	[3] [4] $9,417,000	[2]
Net income (or deficit)	($724,009)	$11,785,117	[2]
Dividends declared	$3,688,959	$3,690,143	0.03
Number of revenue messages handled [5]	159,735,155	162,187,632	1.54
Number of employees at end of October	39,853	38,957	(2.25)
Total compensation for the year	$126,974,301	$139,488,909	9.86

[1] Represents data for land-lines operations. Figures covering cable operations are included in the table below relating to ocean-cable carriers.
[2] Not comparable.
[3] Represents the provision for Federal income taxes on the net income of the company as a whole. Although applicable to both wire-telegraph and ocean-cable systems, this amount has not been allocated to such systems by the carrier in its records.
[4] Includes $2,217,000 allocated as Federal income tax on net capital gains from sale of investments in subsidiary companies.
[5] Includes domestic transmission of transoceanic and marine messages (about 8,620,000 in 1952 and about 8,438,000 in 1953).

Radiotelegraph and Ocean-Cable Carriers

There are shown in the accompanying tables the principal financial and operating statistics selected from the annual reports filed by the United States radiotelegraph and cable carriers furnishing international communications services. These tables compare the figures for the calender year 1953 to those for the previous year.

Radiotelegraph carriers

Item	1952	1953	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$37,930,604	$39,129,876	3.16
Depreciation and amortization reserves	$16,966,280	$17,705,958	4.36
Net investment in plant and equipment	$20,964,324	$21,423,918	2.19
Message revenues:			
Domestic [1]	$1,830,865	$1,857,041	1.43
Transoceanic	$21,599,495	$21,235,725	(1.68)
Marine	$1,529,491	$1,528,362	(0.07)
Total operating revenues	$30,582,922	$30,237,680	(1.13)
Operating expenses, depreciation and other operating revenue deductions	$26,563,787	$27,309,420	2.81
Net operating revenues	$4,019,135	$2,928,260	(27.14)
Provision for Federal income taxes	$2,434,413	$2,780,734	14.23
Net income	$2,314,586	$2,477,000	7.02
Dividends declared	$503,000	$400,000	(20.48)
Number of revenue messages handled:			
Domestic [2]	57,706	49,421	(14.36)
Transoceanic	10,956,947	10,712,257	(2.23)
Marine	1,039,681	964,824	(7.20)
Number of employees at end of October	5,949	6,008	.99
Total compensation for the year	$22,295,352	$23,468,678	5.26

[1] Includes revenues from the domestic transmission of transoceanic and marine messages, and revenues from domestic classification messages (primarily Canadian and Mexican).
[2] Represents domestic classification messages (primarily Canadian and Mexican).

Ocean-cable carriers (including cable operations of the Western Union Telegraph Co.)

	1952	1953	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$89,170,714	$92,038,045	3.22
Depreciation and amortization reserves	$55,957,080	$57,641,617	3.01
Net investment in plant and equipment	$33,213,634	$34,396,428	3.56
Message revenues:			
Domestic [1]	$182,616	$160,853	(11.92)
Transoceanic	$19,773,917	$21,312,199	7.78
Total operating revenues	$27,022,455	$29,488,941	9.13
Operating expenses, depreciation and other operating revenue deductions	$24,993,651	$25,907,756	3.66
Net operating revenues	$2,028,804	$3,581,185	76.52
Provision for Federal income taxes		$70,000	
Net income	$2,078,484	$2,369,930	14.02
Dividends declared			
Number of revenue messages handled:			
Domestic [2]	81,897	90,145	10.07
Transoceanic	9,599,431	9,926,457	3.41
Number of employees at end of October	5,591	5,678	1.56
Total compensation for the year	$13,759,322	$14,038,363	2.03

[1] Includes revenues from the domestic transmission of transoceanic messages, and revenues from domestic classification messages (primarily Canadian).
[2] Represents domestic classification messages (primarily Canadian).

International Telegraph Traffic

According to the carriers' reports with respect to international telegraph message volume, a total of 511,256,493 paid words were transmitted out of or received in the United States during the calendar year 1953 by the international cable and radiotelegraph carriers. Of this total, 257,724,393 paid words were handled in the outbound direction, and 253,532,100 paid words were handled in the inbound direction. The cable carriers accounted for 243,749,717 paid words, or 47.7 percent of the total volume, while the radiotelegraph carriers handled 267,506,776 paid words, or 52.3 percent of the total volume. The number of telegraph words exchanged between the United States and each of the principal countries of the world during calendar 1953 is shown in the following tabulation:

United States—international telegraph (radio and cable) traffic in words, 1953 (includes traffic transiting the United States)

Country	Number of words		Country	Number of words	
	Outbound from the United States	Inbound to the United States		Outbound from the United States	Inbound to the United States
EUROPE, AFRICA, AND THE NEAR EAST			EUROPE, AFRICA AND THE NEAR EAST—con.		
Algeria	151,697	110,335	France	14,828,636	12,996,882
Arabia	866,912	944,549	French West Africa	139,676	90,175
Austria	1,352,215	1,444,137	Germany	12,569,908	13,113,873
Belgian Congo	307,138	278,365	Greece	1,759,095	1,189,818
Belgium	4,649,214	3,992,316	Hungary	237,812	236,965
British East Africa	278,879	257,923	Iceland	289,390	296,127
British West Africa	228,984	206,619	Iran	628,457	1,186,833
Czechoslovakia	371,670	456,502	Iraq	281,527	207,105
Denmark	1,690,596	1,097,597	Ireland	779,550	908,094
Egypt	1,262,465	1,360,179	Israel	2,663,295	2,512,650
Ethiopia	193,218	143,312	Italy	9,554,576	7,464,462
Finland	501,741	484,680	Lebanon	840,666	939,039

United States—international telegraph (radio and cable) traffic in words, 1953 (includes trawc transiting the United States)—Continued

Country	Number of words	
	Outbound from the United States	Inbound to the United States
EUROPE, AFRICA, AND THE NEAR EAST—con.		
Liberia	479,144	589,853
Libya	111,451	83,770
Luxembourg	122,818	91,344
Morocco—French	627,490	575,488
Morocco—Tangier	467,624	400,425
Netherlands	6,786,656	5,805,482
Norway	2,699,135	1,857,830
Persian Gulf	388,942	460,996
Poland	923,521	531,412
Portugal	1,420,836	826,863
Rhodesia	110,977	126,833
Rumania	145,544	108,277
Spain	3,375,638	1,869,576
Sweden	3,234,846	2,663,355
Switzerland	6,695,325	4,585,840
Syria	220,556	174,514
Transjordania	325,207	238,973
Trieste, Free Territory of	181,166	153,814
Turkey	1,156,068	995,423
Union of South Africa	2,256,801	2,359,618
U. S. S. R.	4,887,619	1,894,215
United Kingdom	47,694,606	46,927,189
Yugoslavia	1,099,338	1,132,270
All other places	1,034,628	1,849,705
Total	142,873,251	128,222,102
WEST INDIES; CENTRAL, NORTH, AND SOUTH AMERICA		
Argentina	5,178,414	6,313,341
Bahamas	770,067	912,450
Barbados	234,238	164,862
Bermuda	1,005,462	1,302,540
Bolivia	623,306	738,669
Brazil	9,658,228	10,446,054
British Guiana	188,011	247,657
British Honduras	114,109	110,657
Canada	8,447,705	10,797,326
Canal Zone	749,913	660,502
Chile	2,303,124	2,508,942
Colombia	5,377,909	5,088,895
Costa Rica	844,382	765,371
Cuba	5,767,601	8,380,534
Dominican Republic	1,198,265	1,128,447
Ecuador	1,340,734	865,934
Guatemala	1,228,903	1,286,892
Haiti	801,050	760,831
Honduras Republic	783,227	741,474
WEST INDIES; CENTRAL, NORTH, AND SOUTH AMERICA—con.		
Jamaica	971,276	747,539
Mexico	1,943,844	1,503,533
Netherlands West Indies	892,446	1,083,718
Nicaragua	812,470	667,768
Other British West Indies [1]	165,676	111,029
Panama	1,185,649	1,247,191
Paraguay	263,847	326,874
Peru	2,275,586	1,964,603
Puerto Rico	3,944,234	3,605,488
Salvador	895,673	741,836
Surinam	137,919	137,068
Trinidad	757,176	510,420
Uruguay	1,880,407	1,846,414
Venezuela	6,719,497	7,973,861
Virgin Islands	297,577	288,953
All other places	185,358	99,054
Total	69,943,283	76,076,727
ASIA AND OCEANIA		
Afghanistan	169,403	76,841
Australia	3,364,942	2,804,090
Burma	716,292	186,768
Ceylon	383,647	302,124
Formosa	990,412	1,044,693
Guam	437,036	595,057
Hawaii	4,812,860	4,525,777
Hongkong	1,702,504	1,660,334
India	4,110,882	3,774,344
Indochina	306,780	371,990
Indonesia	2,130,842	2,128,251
Japan	15,481,901	19,010,679
Korea	412,884	687,733
Malaya, Federation of	1,296,567	1,225,474
New Zealand	985,200	773,242
Okinawa	402,862	634,421
Pakistan	1,020,880	1,025,704
Philippines	4,722,888	5,849,241
Thailand (Siam)	1,016,553	1,092,907
All other places	330,104	320,431
Total	44,795,439	48,090,101
Unknown destination or origin	112,420	1,143,170
Grand total	257,724,393	253,532,100

[1] Points not listed separately.

Common Carrier Radio Facilities

At the close of the fiscal year there were 1,635 authorizations in the common carrier radio services; namely, 610 domestic public land mobile, 39 fixed public telegraph, 24 fixed public telephone, and 962 experimental.

Common Carrier Applications

During the year, common carriers filed 4,168 applications (exclusive of Alaskan and marine mobile). They were in the following categories:

	Pending June 30, 1953	Received	Disposed of	Pending June 30, 1954
PUBLIC RADIO COMMUNICATION				
Domestic public land mobile	75	694	695	74
Fixed public telephone (domestic)	0	2	2	0
Fixed public telephone (international)	10	127	127	10
Fixed public telegraph (domestic)	0	2	2	0
Fixed public telegraph (international)	54	269	297	26
Canadian registration	0	41	41	0
Subtotal	139	1,135	1,164	110
WIRE COMMUNICATION				
Telephone extensions	3	209	212	0
Telegraph extensions	2	43	45	0
Telephone reductions	1	6	5	2
Telegraph reductions	225	1,211	1,327	109
Subtotal	231	1,469	1,589	111
Interlocking directorates	0	20	19	1
Jurisdictional determination	0	3	3	0
Submarine cable landing licenses	0	0	0	0
Petitions or motions (nondocket)	3	2	4	1
Experimental common carrier	46	1,539	1,521	64
Subtotal	49	1,564	1,547	66
Total	419	4,168	4,300	287

Safety and Special Radio Services

" * * for the purpose of promoting safety of life and property through the use of wire and radio communication * * *"—(Sec. 1 of the Communications Act).*

" * * and generally encourage the larger and more effective use of radio in the public interest * * *"—(Sec. 303 (g) of the Communications Act).*

GENERAL

The Safety and Special Radio Services embrace radio activities necessary for the performance of the Commission's responsibility with respect to the licensing of stations for purposes other than broadcast or common carrier. These nonbroadcast services are almost as varied as they are numerous. They are highly important because their prime responsibility is to safeguard life and property. They are the largest and most active of all radio communication facilities in use today.

These services are of the following general classes:

1. *Safety services.*—Marine, Aviation, Police, Fire, Forestry-Conservation, Highway Maintenance, Special Emergency, and State Guard.
2. *Industrial services.*—Power, Petroleum, Forest Products, Special Industrial, Low-Power Industrial, Relay Press, Motion Picture, Agriculture, and Radiolocation-Land.
3. *Land transportation services.*—Railroad, Motor Carrier (formerly Urban Transit and Intercity Bus), Taxicab, Automobile Emergency, and Highway Truck.
4. *Amateur, disaster communications, and citizens services.*

This group represents the use of radio by ships afloat and by planes in the air; by police and fire departments; by electric and gas companies; by highway and forestry agencies; by railroad and streetcar systems; by ambulances, taxicabs, trucks, and buses; and by a host of other interests, including geologists, newspaper reporters, fishermen, lumber jacks, motion-picture directors, manufacturers, distributors, and individuals. In brief, the Safety and Special Radio Services embrace practically every radio usage which is neither broadcasting nor, for the most part, open for hire to the general public.

The number of authorizations in these services now exceeds 262,000, representing the use of nearly 653,000 fixed and mobile transmitters.

Since common use must be made of the relatively few available frequencies in the Safety and Special Radio Services, licensing and regulatory problems become more complex as additional transmitters are permitted to operate. This requires a high level of compliance with regulations governing operation of these stations which, in turn, places increased importance on the functions of enforcement nationally.

MARINE RADIO SERVICES

There are now more than 46,000 authorizations in the Marine Radio Services, representing eight classes of stations using radio for water navigational and other communication purposes.

Safety at Sea

Basic radio laws governing marine safety are contained in (1) the International Convention for the Safety of Life at Sea, (2) Title III, Part II of the Communications Act, and (3) the Ship Act of 1910, as amended. These laws require the installation of radio equipment, and provide for qualified radio operators and other safety features. They apply, respectively, to (1) certain classes of ships engaged on international voyages and registered in countries signatory to the Safety Convention, (2) certain classes of United States vessels when navigated on the high seas (approximately 1,600 ships), and (3) a few vessels on the Great Lakes. In addition, vessels of countries not parties to the convention are subject to the Communications Act when leaving United States ports.

The International Convention for the Safety of Life at Sea, negotiated in London in 1948, became effective November 19, 1952. Several rule changes were made during the past year to implement its requirements. On June 2, 1954, the Commission adopted a rule which will permit existing cargo ships to carry a spare antenna in lieu of an emergency antenna. On September 23, 1953, the Commission clarified the circumstances under which shipboard interior communication systems provide contact between navigation personnel and the radio room. In cooperation with shipping interests, an acceptable procedure for the annual checking of calibration of direction finders by shipboard personnel was developed.

Under the Safety Convention and Coast Guard regulations, most passenger ships are required to carry both portable and nonportable lifeboat radio equipment, and cargo ships must carry portable lifeboat radio equipment meeting Commission specifications. Most

United States seagoing vessels have portable lifeboat radio equipment of types approved by the Commission.

On June 23, 1954, the Commission modified its rules to permit continued use of existing installations of nonportable lifeboat radio equipment on passenger ships carrying less than 14 lifeboats until June 1, 1955. However, two new types of lifeboat nonportable radio equipment developed by the electronics industry in accordance with the Commission's rules have been type approved by the Commission. Powered entirely from storage batteries, these transmitters can be used by persons unfamiliar with radio communication. A built-in keyer provides for automatic transmission of the international distress and auto-alarm signals on 500 kilocycles and the international distress signal and a long dash for direction-finding purposes on 8364 kilocycles. In addition, the new transmitters give added distance range on both frequencies.

Title III, Part II, of the Communications Act.—On June 15, 1954, the Senate passed a bill (S. 2453) to implement the radio provisions of the Safety Convention. Consisting primarily of amendments to Title III, Part II, it was based on recommendations of the Commission designed to eliminate inconsistencies between the act and the convention and to facilitate administration of both laws. (It was adopted August 3, 1954.)

Great Lakes Agreement and Ship Act of 1910.—On May 17, 1954, a bill (S. 3464) to amend the Communications Act to make certain provisions for carrying out the Agreement for the Promotion of Safety on the Great Lakes by Means of Radio was introduced. The Great Lakes Agreement will come into force on November 13, 1954. Under its terms, a radiotelephone safety system is provided for several hundred vessels navigating the Great Lakes. The bill embodies recommendations of the Commission to repeal the Ship Act of 1910, which provides a radiotelegraph safety system now applying to only a few Great Lakes ships, as well as certain provisions to facilitate administration of the Great Lakes Agreement. (It, too, was adopted August 3, 1954.)

The Commission on June 10, 1954, proposed rules to implement the Great Lakes Agreement and, at the year end, was preparing for the inspections and certifications of ships' radio installations required by this treaty with Canada.

Exemptions from compulsory safety requirements.—The Commission is authorized by the Safety Convention and the Communications Act to, within prescribed limits, grant exemptions from ship radio installation requirements to certain vessels or classes of vessels. Under this authority it renewed blanket exemptions for 1 year to all passenger vessels of 15 gross tons and under when navigated

not more than 20 nautical miles from the nearest land; to all passenger vessels of less than 100 gross tons when navigated within certain areas along the coast; and to a number of individual vessels, most of which were to cover a single voyage.

Individual applications for exemption received during the year numbered 37, of which 23 were granted, the rest being included in existing blanket exemptions. Additionally, 6 passenger-ferry vessels were exempted from the radio requirements of the Safety Convention while engaged on short voyages on inland waters of the west coast between the United States and Canada.

Distress studies.—Studies of distress communication are used to strengthen the Commission's rules to promote use of marine radio for safety of life and property. Among other matters, these studies showed that the international radiotelegraph distress signal (S O S) was used throughout the world 150 times during the year. This was by or on behalf of 93 foreign ships, 25 United States ships, 24 foreign aircraft, and 8 United States aircraft. An outstanding instance was when this signal brought about speedy rescue of many persons on the British troopship *Empire Windrush* which caught fire and sank in the Mediterranean.

A telegraph alarm signal, transmitted before or in connection with a radiotelegraph distress signal, actuates auto alarms on vessels not maintaining continuous listening watch (generally cargo ships carrying only one operator), thus alerting the operator to receive the distress message. The effectiveness of this device was demonstrated in numerous cases during the year. One such alarm signal flashed by a coast station at Bermuda alerted 60 ships and resulted in rescue of the majority of the crew members of a United States Army B–29 aircraft which had been forced down in the open sea.

Detailed study was made of nine major ship collisions occurring in the Delaware River area during the years 1951 through 1953, which cost 27 lives and property loss of approximately 18 million dollars. The study indicated a need for ship-to-ship voice communication for navigational purposes in inland waters to guard against such circumstances.

Radiotelephone calling and distress frequency.—As concluding steps in establishing 2182 kilocycles as a universal radiotelephone calling and distress frequency, ship stations using the medium frequency radiotelephone band 1600 to 3500 kilocycles were required as of January 1, 1954, to maintain a listening watch during their hours of service on the frequency 2182 kilocycles. Coast stations were similarly required to keep such listening watch commencing July 1, 1954. Ships equipped with radiotelegraph and required to maintain a radiotelegraph listening watch on 500 kilocycles were excepted from this requirement.

At its seventh plenary assembly meeting in London, 1953, the International Radio Consultative Committee (CCIR) recommended an alarm signal for international use on the maritime radiotelephony distress frequently 2182 kilocycles and also set forth the conditions which automatic devices intended for reception of the alarm signal should fulfill. This concludes the CCIR study program involving practical tests by interested nations to determine a suitable worldwide radiotelephone alarm signal.

Radio Aids to Navigation

Shore-based radar stations are being developed to assist the piloting of ships entering, leaving, or mooring within harbors. Since the Coast Guard has the responsibility of providing and supervising public aids to marine navigation, the establishment of these private aids is effected only with its concurrence. Very high frequency maritime radiotelephone systems are being used developmentally by such radar stations.

Authorizations were renewed for operation on a developmental basis of shore-based radar stations in the harbors of Long Beach, Los Angeles, and San Francisco, Calif. Two developmental shore radar stations were also authorized for use in the Gulf of Mexico for the navigation of vessels in connection with offshore oil-well-drilling operations.

As of June 30, 1954, more than 2,400 United States ships were authorized to use radar.

General Marine Radio Communication Systems

Two-way radiotelegraph or radiotelephone communication between coast stations and ship stations and between ship stations accounts for the great bulk of frequency utilization in the maritime mobile service. This communication may be for public, business, or ship operational purposes. Frequencies involved range widely throughout the radio spectrum covering service over distances of a few miles up to several thousands of miles. Thus, these stations may be in overlapping categories. However, the following figures (as of June 30, 1954) reflect the more important categories:

Utilizing frequencies in the 2–3 megacycle band for telephony:	
Public coast	45
Limited coast	3
Ship	41,020
Utilizing very high frequencies for telephony:	
Public coast	26
Limited coast	98
Public ship	1,333
Limited ship	925

Utilizing high frequencies for long distance telephony:

Public coast 5

Utilizing various frequencies for telegraphy:

Public coast 28

One of the most significant factors affecting maritime stations has been the implementation of the Atlantic City table of frequency allocations below 27 megacycles. The substantial progress made in this matter during the fiscal year 1953 was continued during fiscal 1954. Thus, during 1954, the use of the high frequency ship telegraph calling bands was inaugurated. Regulatory steps were completed for inaugurating, beginning July 1, 1954, the implementation of the new cargo-ship high frequency telegraph working bands and discontinuance of the old Cairo working frequencies by January 1, 1955. Plans were completed for bringing into force during the early part of calendar year 1955 the new passenger-ship high frequency radiotelegraph working bands. Also, during fiscal 1954, the plan heretofore adopted for assignment of high frequencies to coast telegraph stations was almost completely effectuated. Additionally, plans for assignment of high frequency radiotelephone frequencies to coast and ship stations in the Great Lakes and Mississippi River areas were put into effect. Assignment of high frequency radiotelephone frequencies in the ocean areas continued to be made as new frequencies became available.

Rulemaking was finalized for revision of 2-megacycle radiotelephone frequencies proposed during the year. Since finalization, some of these frequencies have been cleared and made available and considerable relief to marine congestion in this band is anticipated.

In addition to frequency assignment changes, various steps were taken by the Commission looking toward improvement of maritime mobile radio equipment so as to promote more efficient usage of frequencies. Some primary examples of these efforts are:

1. Proposed application of type acceptance procedures so that standards of performance for marine radio equipment will be uniformly and effectively applied.

2. Proposed establishment of definite standards for attenuation of harmonic emission and application of a certification requirement before a ship station is permitted to operate on the frequency 2738 kilocycles.

3. Proposed establishment of minimum transmitter power inputs for radiotelephone equipment below 25 megacycles and requirement of effective grounding systems for such installations.

4. Application as of January 1, 1955, of new and closer frequency tolerances to all ship stations operating on frequencies below 25 megacycles.

Maritime Fixed Services

Stations in the maritime fixed service are classed as marine fixed, marine control, marine repeater, marine relay, and receiver test stations.

Approximately 60 marine fixed stations communicate on ship radiotelephone frequencies, being normally located in coastal waters, and are authorized to communicate with public coast stations primarily for safety purposes. This class of station is intended to meet the communication needs of the petroleum industry in offshore oil-well-drilling operations.

One marine control and one marine repeater stations are authorized. Operation of these stations is in the 72–76-megacycle band and they function in connection with the operation of coast stations.

Seven marine receiver test stations are licensed. They operate on certain ship frequencies to test remote receivers associated with public coast stations.

Alaska Fixed Public and Maritime Mobile Services

Alaskan communities depend largely on radiotelephone and radiotelegraph communication for safety and business purposes because of the scarcity of wire line facilities. Special frequencies are allocated for communication between communities in Alaska, between communities and the Alaska Communication System (ACS), and between coast and ship stations. The main intra-Alaska communication trunklines are operated by ACS under the Department of National Defense. The ACS routes message traffic to all parts of the world. The Commission maintains liaison with it in coordinating communications facilities in Alaska to serve the public interest.

Plans were completed during the latter part of fiscal 1954 for an on-the-spot survey of Alaskan stations and informal conferences with Alaskan licensees. It is hoped that the facts so gathered will furnish the groundwork for improving Alaskan radio communication and aiding regulation by the Commission.

At the close of the fiscal year there were, exclusive of Government stations, 495 point-to-point telephone stations, and 67 point-to-point telegraph stations operating in Alaska. In addition, 10 public coast stations employing telegraphy and 391 public coast stations employing telephony are authorized.

Radio Technical Commission for Marine Services

The Commission continued its participation in the activities of the Radio Technical Commission for Marine Services (RTCM). It is through its special committees that this Government-industry organization comes to grips with the current problems of marine telecom-

318372—54——6

munications. Following is a brief report of its committee activities:

Special Committee 16, studying the marine identification problem, has not concluded its work. This problem has been raised to the international level and will be studied by the International Radio Consultative Committee (CCIR). The RTCM will probably be the medium selected to carry out the CCIR study in this country.

Special Committee 17, established at the request of the Commission, prepared technical specifications covering new lifeboat radio equipment required by the Safety Convention. Its final project was the drafting of technical specifications for compulsory 2-megacycle radiotelephone equipment for installation where required by that convention.

Special Committee 18 was established at the request of the Commission to study and make recommendations with respect to a standardized method of identifying marine radiotelephone channels for geographic areas. Although the work of the committee has been concluded, no recommendations will be made by the RTCM until the findings have been coordinated with Canada.

Special Committee 19 is continuing its study of a reliable short-range radiotelephone system for communication from ship to ship and ship to shore.

Special Committee 21 concluded its study of the marine radio beacon direction-finding system and its recommendations were transmitted to various Government departments as well as to industry.

Special Committee 22 was established at the request of the Commission to study the problem of whether provision should be made to set up worldwide common working frequencies in the 2-megacycle band preparatory to the United States ruling on this question at the next Administrative Radio Conference.

Special Committee 23 was established because certain Government agencies, particularly the Coast Guard and the Navy, have anticipated a need for coast station transmission on 8364 kilocycles in particular emergency situations and the RTCM was asked for its recommendations on this subject.

Special Committee 25 was created to study shipboard radiotelephone equipment and, in cooperation with Radio-Electronics-Television Manufacturers Association (RETMA), to draw up suitable standards.

The RTCM collaborated with the RTCA (its sister organization for aeronautics) in a study of the operational objectives for long-distance navigation aids by supplying the marine requirements for inclusion in the report, which was utilized as a recommended position for the United States delegation to an ICAO meeting in Montreal.

AVIATION SERVICES

The Aviation Services provide the radio communication which is vital in connection with the operation of aircraft, both from the standpoint of safety of life and property as well as for efficient, expeditious, and economical operation. The more than 40,000 authorizations in these services cover navigational aids, traffic control operations, approach and instrument landing systems, special devices such as radio altimeters, all involving the use of radio.

Aviation Organizations and Conferences

During fiscal 1954 the Commission met with various coordinating and policy groups, both on a domestic and international scale, to solve the many new problems which are occurring as a result of telecommunications developments. The most important of these groups are the Air Coordinating Committee (ACC), the Radio Technical Commission for Aeronautics (RTCA), and the International Civil Aviation Organization (ICAO).

A major and continuing function of the Commission is participation in the work of the Air Coordinating Committee. The ACC recommends proposed United States policy on aviation to the President, and acts as a vehicle for coordinating aviation matters between Government and industry. The Commission is active in the ACC through its membership on the Technical Division and the following subcommittees of that division: Aeronautical Communications and Electronic Aids; Air Space—Rules of the Air and Air Traffic Control; Search and Rescue; Airmen Qualifications; and Aerodrome, Air Route, and Ground Aids.

In addition, the Commission is represented on the Air Traffic Control and Navigational Panel. This panel was established on the recommendation of the Congressional Aviation Policy Board and the President's Air Policy Commission for the purpose of guiding the program relating to all-weather air navigation and traffic control facilities as well as the national air-defense system.

The Radio Technical Commission for Aeronautics is a cooperative association of Government-industry aeronautical telecommunication agencies. It conducts studies for the purpose of providing guidance to, and coordinating the efforts of, the organizations concerned. The Commission is represented on the executive committee and special technical committees.

During the past year the RTCA studied and made recommendations on such problems as (1) implementation of the VHF utilization plan and review of transition period communication requirements; (2) high altitude grid plan for VOR/DME frequency pairing; (3) minimum performance standards for airborne electronic equipment

for the transition period common system; (4) VOR and localizer test equipment adjustment standards; (5) amended program for implementation of the common system of air navigation traffic control; (6) evaluation of the necessity for VOR test signals; (7) reevaluation of VOR airways lateral separation procedures; (8) helicopter air-navigation communication and traffic control; (9) radar safety beacons; (10) possible interference to aeronautical radio facilities from TV operation in the UHF band; (11) remoting of long-range radar displays; and (12) control of airport lighting by aircraft radio.

The Extraordinary Administrative Radio Conference (EARC) of the International Telecommunication Union (ITU) Geneva, 1951, concluded an agreement which allocated exclusive frequencies for the Aeronautical Mobile Route (R) service. Since then the Commission has cooperated, domestically and internationally, in aeronautical frequency planning to implement the provisions of the agreement. This work included participation in ICAO meetings and, in addition, the Commission assisted in the preparation for and participated in the United States-Mexican discussion regarding frequency assignment problems which was held in Mexico City. and participated in the Ottawa meeting of the United States-Canadian officials concerning implementation of the agreement.

The International Civil Aviation Organization (ICAO) was established to develop standards and recommend practices for international civil aviation through the process of regional and divisional agreements among the nations of the world. During the year the Commission assisted in the preparation of the United States position and participated in the fifth session of the Communication Division of the ICAO held in Montreal, and in the Special Middle East Communication Meeting of the ICAO, held on the Island of Rhodes, and helped prepare for the Second African-Indian Ocean Regional Air Navigation meeting at Santa Cruz.

Aircraft Radio Stations

As of June 30, 1954, there were nearly 2,300 authorized aircarrier aircraft, and nearly 26,000 private aircraft radio stations.

Aeronautical En Route and Aeronautical Fixed Radio Stations

These stations, of which nearly 1,400 are authorized, furnish a non-Government radio communication service necessary for the safe, expeditious, and economical operation of aircraft. Aeronautical land stations are used to communicate with aircraft, whereas aeronautical fixed stations are employed for point-to-point communications.

The Civil Air Regulations require domestic air carriers to maintain radiotelephone facilities at terminals and at such other points

as may be deemed necessary by the Government to insure a satisfactory two-way ground-air communication service over the entire aircraft route.

Aeronautical fixed stations are used primarily in international operations and in Alaska, and provide the primary point-to-point communication service.

Civil Air Patrol Radio Stations

These stations are used in connection with Civil Air Patrol activities and emergencies pertaining to the protection of life and property. Air shows, missing-aircraft search missions, training missions, and communication systems at encampments; bases and meetings are examples of their services. There are approximately 9,400 authorized fixed and mobile CAP radio stations.

Airdrome Control Stations

These stations are used for transmitting necessary control instructions to aircraft arriving at and departing from airports. Such control is necessary so as to maintain safe separation of aircraft to prevent collision and to govern the flow of air traffic into and out of airports. They may also communicate with aeronautical mobile utility stations installed aboard vehicles essential to the operation of an airport. Though, for the most part, operated by the Federal Government, nearly 50 such stations are licensed by the Commission.

Aeronautical Mobile Utility Stations

This type of facility is installed aboard ground vehicles used in the operation of an airport, and provides communication between such vehicles and the airdrome control tower and aircraft on the ground. One hundred and twenty-five stations of this type are licensed by the Commission.

Aeronautical Navigational Aid Radio Stations

These stations are used to transmit special radio signals to assist an aircraft in determining its position with reference to the navigational facility involved. Included are radio beacons, radio direction finders, radio ranges, localizers, glide paths, marker beacons, and ground-control-approach stations. This service, for the most part, is operated by the Federal Government; however, over 250 such stations hold Commission licenses.

Flying School Radio Stations

Aircraft and ground flying school radio stations are used to transmit instructions to students or pilots while operating aircraft in flight. There are now 11 ground stations of this type.

Flight Test Radio Stations

Aircraft and ground flight test radio stations transmit communications essential to the testing of aircraft or major components of aircraft. More than 130 stations are used for this purpose.

Aeronautical Advisory Radio Stations

These stations are authorized for landing areas not served by an airdrome control station. They are used to provide an advisory communication service limited to the necessities of safe and expeditious operation of aircraft pertaining to the condition of runways, types of fuel available, wind conditions, available weather information, or other information necessary for aircraft operations.

Such stations may also communicate with private aircraft engaged in organized civil-defense activities in event of enemy attack and be used on a secondary basis to provide communication with private aircraft engaged in organized civil-defense activities. There are over 400 licensed stations of this type.

Aeronautical Public Service Radio Stations

Nearly 300 aircraft public service radio stations handle public correspondence between private individuals aboard aircraft in flight and persons on the ground. The aeronautical public service station connects with the nationwide land-line telephone system through the facilities of public coast stations.

PUBLIC SAFETY RADIO SERVICES

The Public Safety Radio Services comprise the Police, Fire, Forestry-Conservation, Highway Maintenance, Special Emergency, and State Guard Radio Services. Collectively, authorizations in these services are approaching 16,000, representing the use of nearly 165,000 transmitters.

In discharging its responsibilities to these vital services for public protection, the Commission has been assisted immeasurably by the cooperation of various committees such as the Associated Police Communication Officers, Inc.; the International Municipal Signal Association; and dozens of frequency advisory committees which serve their respective areas and services. The members of these committees give unsparingly of their time and their specialized knowledge with no compensation except the satisfaction which accrues from the resulting mutual benefits.

In keeping with past practice, the Commission has assigned representatives and speakers to the national meetings of these groups to

discuss ways and means to increase the utility of radio in connection with their particular services.

Rules Governing the Public Safety Radio Services (part 10) were reprinted this year to incorporate all the amendments adopted since the original printing in 1949. Copies can be purchased from the Superintendent of Documents, Government Printing Office.

Police Radio Service

Licenses in the Police Radio Service are issued only to law enforcement agencies of States, Territories, possessions, and towns, cities, counties, and other governmental agencies. Private or company police departments are not eligible to hold licenses in this service.

Police radio authorizations total nearly 8,800 covering an estimated 108,000 transmitters. Under the Commission's simplified license procedure, one license usually covers the base station and associated mobile and packsets.

Police stations use radiotelephone for base station to mobile station communication. Zone and interzone radiotelegraph networks effect regional and nationwide communication coverage.

Radio keeps police units in almost instantaneous contact and speeds dispatching of assistance. There have been occasions when radio patrol cars were within less than a block of the scene of the crimes and were able to quickly apprehend the criminals.

A relatively new use of radio by police departments affects the motoring public. More and more signs along the highways warn that the speed of automobiles is being checked by radar. This can be done so quickly and without the knowledge of the motorist that the speeder is no longer alerted by his rearview mirror showing a police car pacing him. The speed of traffic invariably slows down after a radar traffic control is set up. Police departments are also experimenting with closed-circuit television pickup in several areas in connection with suspect "lineups" and other operations.

Fire Radio Service

Eligibility requirements for the Fire Radio Service are the same as for the Police Radio Service except that persons and organizations such as volunteer fire departments may obtain a license upon a showing that they are responsible to local governments for maintaining a firefighting facility. While many fire departments, especially those in the smaller communities, still receive service from police radio, the trend is for separate fire radio facilities. The larger communities have separated their police and fire radio systems for quicker and more efficient operation.

The usual fire radio system consists of a combination of base, mobile, and pack or "handie-talkie" radio sets. Lightweight portable sets are carried by firemen into the burning building so that communication can be maintained with the mobile station nearby. Where seconds count and danger is great, the ability to integrate the different elements of a firefighter group by radio is of immeasurable assistance.

The number of fire radio stations increased to more than 1,600, with over 22,200 transmitters.

Forestry-Conservation Radio Service

The Forestry-Conservation Radio Service is used in forest areas to facilitate the work of detection and suppression of forest fires. The fire towers scattered throughout the forests are equipped with radio to enable forest rangers to communicate with headquarters. Many States use radio-equipped aircraft to carry men and material to the scene of a fire. The men and equipment, including a lightweight radio set, are dropped in the vicinity where it is a simple matter to maintain communication between the groups engaged in fighting the blaze.

In lieu of a forest ranger on duty in the fire tower, developmental use of closed-circuit television is being studied. When perfected, it appears probable that 1 man may perform the detection duties now performed by 10 men.

Operation of forestry-conservation stations is almost exclusively in the hands of State government departments, except for a few private organizations with large timber holdings and in New England where many cities use such stations to integrate their fire departments with the State forestry firefighting department under a mutual-aid plan.

The number of these stations increased to nearly 2,700, with nearly 19,000 transmitters.

Highway Maintenance Radio Service

Authorizations for stations in the Highway Maintenance Radio Service are issued only to States, Territories, possessions and other governmental subdivisions including counties, cities, towns, and similar entities.

The use of radio to coordinate the many phases of highway maintenance work not only greatly enhances the safety of the motoring public but also, through more efficient use of men and heavy, expensive roadbuilding equipment, reduces costs considerably.

This service has nearly 1,100 authorizations with 10,000 transmitters.

Special Emergency Radio Service

This particular service provides communication facilities for the safety of life and property for diverse groups of persons such as physicians and veterinarians normally practicing in rural areas, ambulance operators and rescue organizations, beach patrols providing a lifesaving service, school-bus operators, persons in isolated areas where public communication facilities are not available, communication common carriers desiring to provide standby facilities or make emergency repair, and disaster relief organizations.

Heretofore, the various chapters of the American Red Cross were the only disaster relief organizations seeking special emergency radio station licenses. Now there is a tremendous growth in the use of these stations by governmental subdivisions to provide civil-defense communication facilities.

In the past 2 years the Special Emergency Radio Service has grown from 670 to nearly 1,500 stations with about 5,400 transmitters.

State Guard Radio Service

This service was established to meet the radio communication requirements of State seminilitary organizations established to assume the duties normally performed by the National Guard during such times as the latter may be on active duty. There are about 140 stations with over 300 transmitters.

DISASTER COMMUNICATIONS SERVICE

The Disaster Communications Service is designed to provide essential communication in connection with disasters or other incidents which involve disruption of regular communication facilities or which require temporary supplemental communication facilities. The frequency band 1750 to 1800 kilocycles is allocated to this service.

Any person eligible to hold a radio station license is eligible for a license in the Disaster Communications Service, provided it is shown that the station will constitute an element of a bona fide communications network organized, or to be organized, and operated in accordance with a locally or regionally coordinated disaster communications plan. Stations of the United States Government may also operate in this service if authorized to do so by their controlling agencies.

When there is no impending or actual disaster, stations in this service may communicate only with respect to drills and practice sessions and conduct necessary equipment tests. When there is an emergency or disaster, they may be used to carry communications necessary or essential to relief work, including those concerning personal matters in the case of individuals directly affected.

A majority of the applications submitted, and disaster communications plans filed, has been for use of the stations for civil-defense purposes. Nearly 300 disaster communications stations are licensed under 25 approved disaster communication plans. They employ nearly 1,500 transmitters.

INDUSTRIAL AND LAND TRANSPORTATION RADIO SERVICES

The Industrial and Land Transportation Radio Services encompass a wide range of "private" radio users, such as power utility, petroleum, taxicab, railroad, manufacturing, agricultural, forestry, mining, trucking, urban transit, and intercity bus. The rules governing specific services in this group are designed, and are periodically revised, to meet the unfolding needs of users in relation to the public interest.

The large volume of applications filed in these services requires that frequencies be allocated and that eligibility standards be set on an industrywide basis. Though interference between licensees sharing the same frequency is somewhat alleviated by coordinating individual frequency assignments with licensee-advisory committees, the Commission finds that the overloading of available channels in some areas is resulting in an increasing number of interference complaints. In adjusting such complaints, the Commission first endeavors to enlist the cooperation of the licensees involved in order to help achieve the maximum equitable utilization of available frequencies.

Long-range programs having as their object the improvement of frequency utilization by such means as geographic assignment, reduction of channel spacing (split-channel assignments), and allocation of additional spectrum space to these services, are being considered. These studies will not, however, afford any immediate relief from the problem of VHF band congestion in the mobile service because of the long-term implementation required to carry any particular program into effect.

In the private fixed-service field, the Commission, assisted by representatives of both manufacturers and users of equipment, is engaged in a continuing study of private microwave systems with a view to establishing a permanent license policy. This study, participated in by the Radio-Electronics-Television Manufacturers Association (RETMA), deals with the capabilities and technical characteristics of microwave systems employing frequencies above 890 megacycles. Beyond the technical phases of this study are considerations of public policy stemming from the question of whether or not communications common carriers could render equivalent service. Requests for microwave facilities will, therefore, continue to be handled on a developmental basis pending completion of this study.

In the 72–76-megacycle fixed band, the Commission has adopted a new policy governing assignment of frequencies which, it is expected, will permit the continued use of this band for nonbroadcast repeater-control links without causing harmful interference to reception on adjacent television channels 4 and 5. In carrying forward the general concept that all operations in the 72–76-megacycle band shall remain subject to the condition that no harmful interference will be caused to TV reception, the new criteria establish interference contours along which the probable effect on TV signals at any location can be estimated.

Rulemaking proceedings, concluded this year, effected a suballocation of 450–460-megacycle band frequencies to the various industrial and land transportation radio services. This action provides more efficient frequency utilization by permitting the regular assignment of paired frequencies in this band for two-frequency duplex system operation, at the same time continuing to provide for fixed control circuits under certain conditions. It is expected that many industrial users in the overcrowded VHF portion of the spectrum will reestablish their facilities in the higher band, thereby reducing interference.

The Commission has undertaken a complete revision of the rules governing the Special Industrial Radio Service and, effective October 15, 1954, consolidated the Intercity Bus and Urban Transit Radio Services into a new "Motor Carrier Radio Service" designed exclusively for motor carriers engaged in the transportation of passengers as a regular business.

With respect to the Special Industrial Radio Service, the Commission feels that the public interest is better served by determining eligibility on the basis of the activity performed rather than on the basis of who performs it. It is therefore proposed to open that service to certain classes of persons engaged in specialized services for those who could themselves qualify for radio. Illustrative of this group are crop dusters and oilfield service organizations. These proposals also recognize other types of service and delivery functions which, it is believed, are entitled to private radio by reason of geographic isolation or because they involve inherently dangerous or split second timing operations. Heavy machinery maintenance and the delivery and pouring of transit mixed concrete and hot asphalt are examples.

CITIZENS RADIO SERVICE

Frequencies allocated to the Citizens Radio Service are used to carry communications for which no specific provision is made elsewhere in the Commission's rules.

Originally, this service was of interest primarily to individuals desiring short-distance, two-way radio communication for personal convenience or miscellaneous business purposes. During the past year, however, its use by large business organizations increased sharply. This growth is attributable in part to the added number of equipments on the market under the Commission's type-approval program. Corporate licensees use citizens radio systems chiefly in connection with miscellaneous urban dispatch operations that are beyond the scope of the rules governing other safety and special radio services. The 460–470-megacycle band is specially well suited for use in large cities where the reflection of signals from building surfaces and other structures tends to overcome the shadow effect experienced at lower frequencies. Owing to the fact that some type-approved citizens radio equipment is now being mass produced, the per-unit price is almost competitive with conventional VHF equipment.

The Citizens Radio Service has more than 7,000 authorization covering nearly 16,000 transmitters.

The range of citizens radio stations is limited essentially to line of sight. This very limitation, however, increases the number of systems that can be accommodated. For this and other reasons, the Commission has no present plan to channelize this band, feeling that interference problems can be best solved at the local level by cooperative effort among licensees. The frequency 27.255 megacycles in this service remains available for the control of objects and devices by radio.

In order to encourage the development and manufacture of low-cost equipment of the "walkie-talkie" type, the Commission relaxed the technical requirements applicable to transmitters employing 3 watts or less input power.

No major substantive changes in the rules governing citizens radio are contemplated at this time. However, the administration of this service during the past year has exposed deficiencies in the rules with respect to operation from remote control points, automatic relaying by self-actuating means, antenna painting and marking requirements, and civil-defense participation. The Commission intends to institute rulemaking proceedings looking toward clarifying these matters.

AMATEUR RADIO SERVICE

The Amateur Radio Service affords opportunity for interested persons to engage in radio communication and experimentation as a hobby. Amateurs have pioneered in many phases of radio. Many early broadcast stations grew out of amateur experimentation with

radiotelephony. Amateurs were the first to discover and utilize the "shortwaves" (below 200 meters) for international communication. Many other "firsts" can be attributed to the radio amateur.

For many years amateurs have transmitted personal messages for the general public and, where international regulations permit, are currently handling many messages between members of the Armed Forces and their families at home. This, of course, is done without charge. Amateur activity includes long-distance (DX) competition, emergency and disaster service, participation in civil-defense programs, and the development and testing of numerous new experimental and operational techniques.

A person desiring to operate an amateur radio station must demonstrate knowledge of radio theory, laws, treaties, and regulations, and ability to send and receive the International Morse Code in order to successfully pass the examination for one of the five classes of amateur operator license. The Novice Class license is available, upon successful completion of the examination, to the beginner. It permits limited operation for a 1-year period to provide operating and technical experience in preparation for higher class license examinations. Since their inception in 1951, the Commission has issued 34,257 Novice Class and 10,520 Technician Class authorizations. The Technician Class license is for amateurs interested in experimental operation above 220 megacycles and, since the requirements differ only in code speed from the General and Conditional Class, it is often used as a stepping-stone to the attainment of these classes of license.

During the period 1947–51, the growth in the number of licensed amateurs had averaged approximately 5,000 a year, and since the advent of the Novice and Technician classes, the average growth has been approximately 10,000 per year. At the close of the fiscal year, more than 120,000 amateur operator licenses of different classes and over 123,000 amateur station licenses were on the Commission's books. However, these figures include about 3,000 authorizations which have expired but are renewable because they are within the 1-year "grace" period.

While the record of adherence to the rules by such a large group has been very commendable, a moderate number of citations for technical and operational infractions were issued. The Commission also ordered the suspension of the licenses of 10 amateurs involved in more serious violations of rules.

A most important part of amateur activity is their service to the public in providing much needed communication during an emergency. Their value in this field has been officially recognized by the creation,

in 1952, of the Radio Amateur Civil Emergency Service (RACES). This service makes use of the amateurs, their equipment, and portions of their normal frequency bands in time of war or other national emergency.

While amateur communication assistance during floods, fires, tornadoes, and other natural disasters has been an amateur tradition for many years, the organization of RACES communication networks furnishes an even greater reserve of volunteer communication facilities available for such emergencies. When normal amateur activity is shut down during a time of enemy attack or other national emergency, the amateurs may continue to serve the public through their participation in the RACES. Since wire and other radio facilities can be expected to be severely burdened during an enemy attack, amateur communication will fill a vital and most important civil-defense need.

During the past year, 98 RACES communication plans were approved, making a total of 123 plans approved and 754 RACES stations licensed since the establishment of this service.

Reports of amateurs furnishing communication during more than 35 separate natural disasters came to the Commission's attention during fiscal 1954. Over 100 amateurs in the Flint, Mich., area provided vital communication service to that tornado-ravaged city over a period of 6 days. Amateurs handled over 900 emergency messages after a tornado struck Worcester, Mass.

During the year, the amateur rules were revised to incorporate amendments adopted prior to November 20, 1953, including necessary changes and additions to bring the appendix up to date. Subsequent to their revision, the operator examination procedures were changed to provide for Novice and Technician Class examinations to be given by mail only, and to reduce the distance from examination points beyond which a resident is eligible for the Conditional Class examination from 125 miles to 75 miles. After oral argument, the rule permitting amateur portable and mobile operation outside the continental United States was amended to include such use of the 21-megacycle amateur frequency band. The rule limiting use of the 3.5-megacycle amateur frequency band to amateur stations in those Pacific Territories and possessions east of 170 degree West Longitude was amended to extend such operation to all possessions in the Pacific area that are under the Commission's jurisdiction.

In rulemaking status at the end of the fiscal year were two proposals affecting amateurs. One is to expand telephony subbands in the 14- and 28-megacycle amateur bands and the use of type AØ emission in

the 50-megacycle amateur band. Comment concerning the general principle of further subdivision of the amateur bands for special groups was solicited. The second matter proposes amending the amateur eligibility requirements to exclude members of the Communist Party or allied organizations and, further, would provide that only persons of good moral character could hold an amateur radio operator's license (see "National Defense" chapter). Factors including past membership in subversive organizations and whether a person has been convicted of a felony would be considered in determining the character qualifications of amateur applicants.

ENFORCEMENT UNIT

The Enforcement Unit of the Safety and Special Radio Services Bureau acts as legal adviser to the chief of that bureau. In addition, it has the responsibility of enforcing compliance with the Communications Act and the Commission's rules by licensees in the various radio services administered by the bureau. The time of the Enforcement Unit is divided about equally between these two primary functions.

A major problem in this enforcement work has been how to most effectively eliminate harmful interference to the aviation services caused by second harmonic radiations emitted by marine radio stations. The need of a solution is urgent because of the impact on frequency shifts to implement the Atlantic City agreements. In a considerable number of cases, individual license modification proceedings have been initiated to delete use of frequencies when repeated warnings have failed to produce compliance.

In the field of legislation during the year was enactment of a measure eliminating the requirement of construction permits for amateur mobile radio stations and the granting of authority to the Commission to waive construction permits for certain other classes of amateur stations. Appropriate rule changes to reflect these changes are in progress.

STATISTICS

Stations in Safety and Special Radio Services

Stations in the Safety and Special Radio Services (exclusive of experimental, which are treated in a separate chapter) exceeded 262,000 at the close of the fiscal year. This represents a net increase of about 31,000 during the year. The numbers of authorized stations in the various services are shown in the following table.

Each separate license, construction permit, or combination construction permit and license is counted as one station. For example, a station might include a base transmitter and many mobile units.

Class of station	June 30, 1953	June 30, 1954	Increase or (decrease)
Aviation Services:			
Carrier aircraft	2,190	2,289	99
Private aircraft	27,945	25,819	(2,126)
Public service aircraft	380	284	(96)
Aeronautical and fixed	1,343	1,391	48
Civil air patrol	6,620	9,396	2,776
Airdrome control	47	46	(1)
Aeronautical navigational	226	255	29
Flight test	101	133	32
Flying school	12	11	(1)
Aeronautical utility mobile	124	125	1
Aeronautical advisory	327	405	78
Total	39,315	40,154	839
Marine Services:			
Ship	36,889	42,618	5,729
Ship radar	2,282	2,420	138
Coast	196	210	14
Marine utility	10	12	2
Alaskan coastal	368	401	33
Alaskan fixed public	516	562	46
Maritime radiolocation service	20	17	(3)
Maritime fixed service	76	59	(17)
Total	40,357	46,299	5,942
Public Safety Services:			
Police	8,005	8,728	723
Fire	1,134	1,627	493
Forestry-conservation	2,425	2,686	261
Highway maintenance	877	1,088	211
Special emergency	1,072	1,429	357
State Guard	118	139	21
Total	13,631	15,697	2,066
Land Transportation Services:			
Railroad	928	1,219	291
Urban transit	101	98	(3)
Intercity bus	68	76	8
Taxicab	4,018	4,361	343
Automobile emergency	227	305	78
Highway truck	580	832	252
Citizens	3,829	[1] 7,054	3,225
Total	9,751	13,945	4,194
Industrial Services:			
Power	6,089	7,562	753
Petroleum	4,540	5,505	965
Forest products	877	1,034	157
Special industrial	4,563	6,587	2,024
Low power industrial	419	673	254
Relay press	54	68	14
Motion picture	23	32	9
Agriculture	9	9	0
Radiolocation—land	84	128	44
Total	17,378	21,598	4,220
Amateur and Disaster Services:			
Amateur	111,289	[2] 123,287	[2] 11,998
Disaster	191	283	92
RACES	99	754	655
Total	111,579	124,324	12,745
Grand total	232,011	262,017	30,006

[1] Includes 5,088 authorizations issued by field offices through March 31, 1954.
[2] The number of amateur authorizations shown includes certain (3,000 estimated) authorizations which have expired but are renewable because they are within the 1-year "grace" period.

Applications in Safety and Special Radio Services

Almost 141,000 applications for stations in the Safety and Special Radio Services were received during 1954. This represents a decrease of 3,310 applications compared to the previous year. The number of applications received in each service is shown below:

Class of Station	Received 1953	Received 1954	Increase or (decrease)
Aviation Services:			
Aircraft	16,527	19,998	3,471
Ground	2,808	3,461	653
Civil air patrol	7,548	3,161	[1] (4,387)
Total	26,883	26,620	(263)
Marine Services:			
Ship	16,819	19,161	2,342
Ship radar	1,136	745	(391)
Coast	454	344	(110)
Marine utility	0	0	0
Alaskan coastal	680	229	(451)
Alaskan fixed public	829	300	(529)
Maritime radio location service	25	17	(8)
Maritime fixed service	57	85	28
Other marine services	42	[2] 0	[2] (42)
Total	20,042	20,881	839
Public Safety Services:			
Police	5,650	5,454	(196)
Fire	1,193	1,152	(41)
Forestry-conservation	1,223	1,362	139
Highway maintenance	780	734	(46)
Special emergency	1,256	927	(329)
State Guard	136	42	(94)
Total	10,238	9,671	(567)
Land Transportation Services:			
Railroad	856	790	(66)
Urban transit	78	60	(18)
Intercity bus	86	50	(36)
Taxicab	3,871	2,576	(1,295)
Automobile emergency	229	260	31
Highway truck	673	669	(4)
Citizens	696	928	232
Total	6,489	5,333	(1,156)
Industrial Services:			
Power	4,167	4,126	(41)
Petroleum	3,659	3,232	(427)
Forest products	700	633	(67)
Special industrial	4,768	4,579	(189)
Low power industrial	452	445	(7)
Relay press	22	43	21
Motion picture	24	12	(12)
Agriculture	39	17	(22)
Radiolocation—land	148	158	10
Total	13,979	13,245	(734)
Amateur and Disaster Services:			
Amateur	66,018	64,051	(1,967)
Disaster	159	173	(14)
RACES	141	769	628
Total	66,318	64,993	[1,325]
Grand total	143,949	140,743	[3] [3,206]

[1] Civil Air Patrol applications in 1953 were abnormally high because new simplified application forms were filled out by nearly all previously authorized Civil Air Patrol units. The 1954 reduction reflects the accomplishment of this relicensing.

[2] "Other marine services" are now included in other marine classifications.

[3] The overall decrease in applications is primarily the result of using FCC Application Form 400 in the Public Safety, Industrial, and Land Transportation Services. This form permits issuance of combined construction permits and licenses in most cases, thereby eliminating the filing of a separate license as formerly.

318372—54——7

Transmitters in Safety and Special Radio Services

Approximately 653,000 transmitters were authorized to operate in the Safety and Special Radio Services as of January 1, 1954. Of these, 153,000 land and fixed stations represent an increase of 1,500, and 499,000 mobile units represent an increase of about 66,500, or a total increase of 68,000 transmitters during a 10-month period.

Class of station	Land or fixed station transmitters	Mobile station transmitters	Total transmitters
Aviation Services:			
Aircraft	0	32,118	32,118
Ground	2,133	597	2,730
Civil air patrol	2,434	4,752	7,186
Total	4,567	37,467	42,034
Marine Services:			
Ship	0	40,105	40,105
Ship radar	0	2,384	2,384
Coast	202	7	209
Marine utility	0	77	77
Alaskan coastal	385	0	385
Alaskan fixed public	555	0	555
Maritime radiolocation	22	0	22
Maritime fixed	86	0	86
Total	1,250	42,573	43,823
Public Safety Services:			
Police	6,318	101,594	107,912
Fire	1,106	21,170	22,276
Forestry-conservation	2,397	16,428	18,825
Highway maintenance	727	9,122	9,849
Special emergency	1,079	4,308	5,387
State Guard	115	189	304
Total	11,742	152,811	164,553
Land Transportation Services:			
Railroad	942	12,597	13,539
Urban transit	80	2,256	2,336
Intercity bus	61	768	829
Taxicab	4,156	90,397	94,553
Automobile emergency	253	2,782	3,035
Highway truck	549	8,293	8,842
Citizens		15,851	15,851
Total	6,041	132,944	138,985
Industrial Services:			
Power	5,356	59,941	65,297
Petroleum	4,110	19,898	24,008
Forest products	634	7,260	7,894
Special industrial	3,309	37,296	40,605
Low power industrial	0	6,911	6,911
Relay press	28	691	719
Motion picture	13	334	347
Agriculture	9	0	9
Radiolocation	56	94	150
Total	13,515	132,425	145,940
Amateur and Disaster Services:			
Amateur	115,518	0	115,518
Disaster communications	502	641	1,143
RACES	266	532	798
Total	116,286	1,173	117,459
Grand total	153,401	499,393	652,794

Broadcast Services

"'Broadcasting' means the dissemination of radio communications intended to be received by the public, directly or by the intermediary of relay stations."—(Sec. 3 (o) of the Communications Act).

" * * a person engaged in radiobroadcasting shall not * * * be deemed a common carrier."—(Sec. 3 (h) of the Communications Act).*

*"Nothing in this Act shall be understood or construed to give the Commission the power of censorship over * * * radio communications * * * "—(Sec. 326 of the Communications Act).*

TELEVISION (TV) BROADCAST SERVICE

Authorizations

There was a net increase of slightly more than 100 television broadcast station authorizations during the year as compared to the banner number of nearly 400 in fiscal 1953, which was the first year following the lifting of the temporary freeze.

The result was that, as of June 30, 1954, the Commission had granted construction permits to 603 TV broadcast stations.

Commercial

Of this number, 573 were for commercial operation and 402 such stations were on the air or authorized to go on the air. The total grants represented 340 VHF (very high frequency) and 233 UHF (ultra high frequency) stations, of which 265 VHF and 137 UHF stations had operating authorizations. They were bringing TV service to a vast audience over most of the United States and in Alaska, Hawaii, and Puerto Rico.

Common carrier TV relay facilities are treated in the "Domestic Telephone" section of the chapter on "Common Carrier Services".

By the end of the fiscal year, all noncompetitive applications which were in a position to be granted had been so acted upon by the Commission. Consequently, of the 200 still-pending commercial applications, 186 were in hearing status. Only four competing applications, all in one city, remained to be set for hearing, pending determination on petitions for rulemaking relating to the channel requested by the applicants involved.

Action on TV applications was, in large measure, speeded by continued study and adjustment of the Commission's temporary process-

ing procedure. As adopted in April of 1952, it set up a priority system based upon the availability of TV service. After many grants had been made, the Commission felt that emphasis should be placed on local outlets rather than upon availability of outside service. Accordingly, on July 14, 1953, it gave primary consideration to cities which had no local TV stations. The Commission subsequently disposed of its TV application backlog and consequently abandoned this temporary processing procedure.

Noncommercial Educational

At the close of the fiscal year the number of construction permits granted for noncommercial educational TV operation had increased to 30, of which number 14 were VHF and 16 UHF.

Six educational TV stations were operating—3 in VHF and 3 in UHF.

Sixteen applications for such stations were pending, two of which were competitive.

Though a number of educational TV applications had been withdrawn since the service was first established, KTHE, Los Angeles, was the first grantee to cease operation (in September 1954).

Six educational TV channels were added during the year. This brought to 251 the number of channels reserved for that purpose, or 9 more than the original figure (242) in 1952. (Still another was added in September 1954.)

While several shifts of educational reservations were made upon petition, and after rulemaking, the Commission continued to frown upon any effort to transfer educational channels to commercial use.

Color TV

The green light for compatible color TV was given by the Commission on December 17, 1953, when it adopted new color transmission standards that were developed and advocated by the industry through the National Television System Committee (NTSC). The new color standards, which are based on the "simultaneous" system, replace the noncompatible "field sequential" system approved in 1950 as the best of three systems then proposed, but which was not subsequently exploited by the industry.

At that time the Commission stated that if a satisfactory compatible system had been available it would have been adopted. By "compatible" it is meant that transmission in color can, in addition to being received on color sets, be viewed in black and white on ordinary monochrome receivers. The NTSC, comprising technicians representative of many segments of the broadcasting industry, evolved and tested the compatible standards which the Commission adopted after rulemaking proceedings initiated on August 7, 1953.

The new rules for color do not specify a minimum number of hours during which TV stations must transmit color programs. However, the number of colorcasts has been increasing as more stations install color equipment and the telephone company extends its color relay facilities to additional cities and stations.

Most of the color receivers produced initially had the equivalent of a 15-inch picture tube. But larger tubes are in production, and indications are that as more color sets become available there will be a resultant reduction in cost to the public.

UHF Problems

Of 87 commercial TV grants canceled since the lifting of the freeze, 81 deletions occurred during fiscal 1954. Of these, 12 were VHF and 69 were UHF. Seven cancellations involved authorizations to operate, 6 being UHF.

Some of the conditions adversely affecting UHF were the slow rate of converting existing sets to ultra high reception, small sales of UHF receivers, the lack of high-power UHF transmitting equipment, inability of many UHF stations to obtain popular network programs, their difficulties in obtaining coverage equivalent to VHF stations, advertising support and various other reasons.

This became a matter of concern to the Commission which instituted study of UHF problems and their possible solutions. The Senate Interstate and Foreign Commerce Committee, through its Subcommittee on Communications, conducted hearings on the UHF situation, in which the Commission and the broadcast industry participated. At the close of the fiscal year, the subcommittee and the Commission were analyzing the various recommendations made at the hearing, and the Commission was preparing data and recommendations for the subcommittee.

Meanwhile, the Commission revised its multiple ownership rules so as to permit any one interest to operate 7 TV stations, provided that at least 2 are UHF. This is intended to encourage interests with program know-how and resources, but not previously eligible for additional TV grants, to enter the UHF field. The Commission will also consider applications for UHF stations to broadcast the programs of and extend the coverage of parent stations.

Several Commission rulemaking proceedings are underway looking to further alleviating some of the difficulties confronting the development of UHF operation. One proposal is to revise the chain broadcasting rules in the matter of territorial exclusivity to prevent a station from contracting with a network to keep a station in a neighboring community from obtaining that network's programs. Another involves proposals that TV stations be permitted to operate their

own intercity relay systems despite the availability of common carrier relay facilities.

"Satellite" and "Booster" TV Stations

The Commission also has under consideration, as a particular aid to UHF, the authorization of "booster" or "satellite" TV stations. Such low-power, low-antenna-height supplemental stations could be used to extend coverage or to fill in coverage in "shadow" (poorly served) areas. Operation would be on the same channel as that of the main station or on a different channel.

The fiscal year saw an intensified interest in such possible service, and a number of experimental operations was authorized to obtain technical information. Research was continued in using cross-polarization to control the size of the interference zone which surrounds a "booster" station. "Satellite" experimentation was largely devoted to the improvement and development of transmitting equipment and to field-intensity measurements of these transmitters.

The Commission continued to deny requests for experimental authority to operate TV boosters and satellites intended to sound out public reaction. This was because the technical aspects of that type of operation have not been fully determined and there could be no assurance that such a service, once started, would continue. By providing a temporary improvement to TV reception in certain areas, such stations might encourage substantial investments in TV receivers which would become useless when the experimental operations were terminated.

(On August 5, 1954, the Commission announced that it would consider applications for UHF stations which would not originate local programs but would duplicate the programs of another TV station controlled by the same party in a nearby community and thereby extend the service of the parent station. Such a station, while acting as a satellite, would be considered as a separate TV station and would use the channel assigned to the particular community in which it operated. The Commission will also consider such program duplication by stations under common control.)

Community Antenna TV Systems

At the present time, Commission authorization is not required for the installation and operation of a community antenna TV system or for any other closed-circuit TV system which is operated solely over wires. However, there is a question whether such systems, if they involve interstate communication, are common carriers subject to Commission jurisdiction. The Commission is continuing its study of various problems relating to these services.

The Commission now requires that all wired TV systems be operated so as to not cause harmful interference to regular radio services. Moreover, the Commission has proposed rules which would place a limit on the amount of radiation from such systems.

The number of community antenna TV systems in operation by the end of fiscal 1954 increased to about 300, with more than 150,000 subscribers being served.

Subscription TV

The Commission continued to authorize technical experimentation with subscription TV methods and apparatus while pursuing its study of problems involved by proposals for regular "pay-as-you-see" TV service. Such contemplated service differs in the way "scrambled" pictures are sent to decoding receivers in the homes of subscribers and the method of collecting the fees for programs.

It raises questions of public interest, and whether it is "broadcasting" within the meaning of the term as defined in the Communications Act or is a common carrier or a special operation, and where frequencies can be found for such a service.

"Party in Interest" Protests

The year confronted the Commission with a growing problem arising from protests filed under section 309 (c) of the Communications Act, as amended in 1952, which provides that a party in interest, upon making the specified showing, is entitled to a hearing on an application that has been granted by the Commission and that, pending outcome of that hearing, the protested grant is stayed. AM and FM stations, and even nonbroadcast interests, have seized this new provision of the law to protest and thus hold up TV grants after they have been made. This not only frustrates the processes of the Commission by delaying, impeding, and complicating its normal considerations, but also denies the public expected and long-awaited service.

In consequence, the Commission has requested remedial legislation of Congress which would retain the intended advantages of the protest procedure but would reduce the unanticipated ease with which the 309 (c) amendment is being used to delay the introduction of a new service to a community.

3-Year TV License

As part of its overall expediting program, the Commission on November 5, 1953, after a rulemaking proceeding, established a 3-year license period for TV broadcast stations in lieu of the previous 1-year period. The Commission determined, in essence, that sufficient experience had been gained in television operations to warrant TV the same license duration as for other broadcast services. This exten-

sion of the TV license period is expected to reduce substantially the workload for licensees and the Commission. In particular, it will ease the burden on TV licensees who also have AM and FM stations, since the licenses of all broadcast stations in the same geographical area will expire on the same date.

TV Assignment Table

Unlike AM broadcasting, the TV rules provide that applications for new stations may be filed only for channels which are listed in the table of assignments. These rules provide, further, that changes in this table may be made only by rulemaking proceedings. The Sixth Report and Order which promulgated the new TV rules made provision, with certain exceptions, for 1-year waiting period in order to expedite processing of the then backlog of TV applications and to give the Commission experience in implementing the new rules. This 1-year waiting period expired on June 2, 1953.

During the past year, 82 changes were made in the assignment table through rulemaking. These changes included 56 additional channel assignments. At the year end, 19 petitions for rulemaking to further amend the table were pending.

STANDARD (AM) BROADCAST SERVICE

Authorizations

The past year saw unabated increase in the use of the standard broadcast band. Most of the new AM assignments were to the smaller communities previously without local stations. The majority of these new stations operate daytime only.

The reasons for this trend toward daytime stations would appear to be twofold: (1) With the present comparatively crowded condition of the AM band, the addition of daytime rather than unlimited time stations is more feasible from an engineering and economic viewpoint, and (2) the continued growth of TV has resulted in a substantial loss in listeners to AM programs at night, but subtracted comparatively little from the daytime AM audience. Consequently, stations operating only during the most profitable daytime hours are considered more favorably by prospective licensees than was formerly the case.

During the year the Commission granted 142 additional AM authorizations, making a total of 2,697 such authorizations at its close.

North American Regional Broadcasting Agreement (NARBA)

This treaty, intended to regulate the assignment of AM broadcasting stations in the North American region, was signed by all countries in that region, except Mexico and Haiti, on November 14, 1950. To become effective it requires ratification by three of its major signa-

tories; namely, the United States, Canada, and Cuba. The latter country did so in December 1951. In this country the document was submitted to the Senate in February 1951, where it was referred to the Committee on Foreign Relations. A subcommittee held hearings in July 1953, but no further action has been taken.

Since the expiration in 1949 of the Interim Agreement which, with some modification, extended the provisions of the first NARBA (1937), the Commission has pursued a policy, formalized in 1951, of refraining from making new assignments or modifying existing assignments which might endanger the new agreement. The other signatory governments have, in general, followed a similar procedure.

Recently, however, there have been indications that certain of these governments may be departing from this procedure in the face of the long delay in the effectuation of the agreement. If this trend continues, there is the prospect that present undesirable foreign interference to United States stations, which would have been substantially reduced with the implementation of the new treaty, will increase still further.

Various exchanges of views have taken place between the United States and Mexico since the signing of the NARBA looking toward a settlement between the two countries on broadcast matters. This activity culminated in a series of meetings, held in Washington, March 29–April 2, 1954, for the purpose of negotiating an interim agreement between the two countries. While this end was not achieved at that time, a further conference was scheduled for October 28, 1954, at Mexico City.

Clear Channels

In 1953 the Commission initiated steps looking toward a final decision in the pending rulemaking proceeding relating to "daytime skywave" transmissions of AM broadcast stations (docket 8333). It had instituted this proceeding in 1947 to determine whether rules governing the allocation of AM stations should be modified to give more consideration to the ionospheric effect during daytime hours. The Commission later that year consolidated this proceeding with the clear-channel proceeding (docket 6741).

Meanwhile, it was found necessary to defer action on applications for new and increased daytime and limited-time facilities on those clear channels on which the United States has priority for dominant class I stations. Upon further review of this problem, the Commission severed the daytime skywave proceeding from the clear-channel proceeding and on March 11, 1954, adopted a proposed report and order, and proposed further rulemaking in the daytime skywave proceeding.

In that document the Commission proposed certain changes in its rules which would provide somewhat increased protection to class I stations against interference caused by the daytime skywave type of transmission. (On July 15, 1954, thereafter, oral argument was heard on the question whether these proposed rules should be adopted for the consideration of future applications for AM construction permits.) A period was also provided for interested parties to comment on the question whether existing stations should be required to comply with the proposed operating restrictions.

Several other rulemaking matters affecting clear channels were instituted during the year.

The Commission adopted rules which permit unlimited-time stations in United States territories to operate on frequencies upon which Mexico has priority of class I–A station use, provided that such stations protect the Mexican border. The frequencies involved are set forth in the "Gentlemen's Agreement" with Mexico (1941—Executive Agreement Series 227) in which the United States agreed to limit its class II stations to daytime operations of 1-kilowatt power or less. Similarly, the Commission has proposed that the United States clear channels be made available to unlimited-time station operations in the territories, with similar requirements to protect Mexico.

In another rulemaking proceeding, the Commission altered its rules by reclassifying the frequency 1540 kilocycles, thereby permitting a class I–B station to operate thereon at Waterloo, Iowa. This action was taken to safeguard the United States interests under the provisions of NARBA.

Revision of "10% Rule"

On August 4, 1954, the Commission revised one of its standard broadcast allocation rules, commonly called the 10% rule, which has been in effect since the inception of the AM Standards of Good Engineering Practice. The rule is designed to preclude inefficient utilization of frequencies by limiting the degree of interference which a proposed assignment would receive from existing stations to 10 percent of its normal service area.

In administering this rule, the Commission has consistently taken into consideration the need for additional service in particular areas as a factor which might warrant departure from the strict requirements of the rule.

Revision in this rule takes the need for additional service into specific account and thus brings it into line with the Commission's administrative precedents.

540 Kilocycles

On December 17, 1953, the Commission made its first AM grant to operate on 540 kilocycles (at Clarksville, Tenn.). This frequency was added to the standard broadcast band by international agreement. Rule changes were necessary to open it for domestic use. NARBA gives Canada priority for clear-channel operation on this frequency. However, United States stations can use it provided protection is afforded the Canadian priority.

FREQUENCY MODULATION (FM) BROADCAST SERVICE

Commercial

The year closed with 569 commercial FM authorizations outstanding. Authorizations were issued for 22 new stations while 54 authorizations were deleted, leaving a net loss for the year of 32 stations.

Thirteen of the new stations were granted to licensees of AM stations, 7 of which operate their AM facilities daytime only. The remainder of the new FM stations have no connections with AM stations and are independently operated.

Four of the 22 new stations went to applicants who previously held FM authorizations but had requested their deletion for one reason or another. FM still provides a nighttime outlet for AM licensees who find it impossible to obtain nighttime facilities in the AM broadcast band.

Five States now have no FM broadcast stations—Montana, Nebraska, North Dakota, Vermont, and Wyoming. No FM applications have ever been received from Montana, while the other four mentioned States once had FM stations. One commercial FM broadcast station is operating in Hawaii. This is the only FM station in any of the Territories or island possessions of the United States.

The hi-fidelity capabilities of FM are obtaining increasing recognition. A number of FM stations specialize in programing good music to devoted listening audiences. One new FM grantee proposed 100 percent good-music programing, and another one promised over 98 percent good music. Some manufacturers have developed lines of high-fidelity equipment for the "hi-fi" enthusiasts. "Hi-fi" fairs have been held in a number of cities and their attendance shows considerable interest in this field.

"Functional Music," "Storecasting," and "Transit Radio"

In order to help FM stations economically and to make a more efficient utilization of FM frequencies, the Commission is engaged in a rulemaking proceeding which would permit supplemental services to be rendered by commercial FM broadcasters. It would make pos-

sible such additional services as "functional music," which has many variations including, for example, restaurant, factory, and other background music; also "storecasting," background music in stores, and "transit radio" on passenger-carrying vehicles.

The proposed rule would relax the present minimum of 42 hours of operation a week to 36 hours for regular FM broadcast stations, besides authorizing secondary, or subsidiary, licenses for FM stations to engage in these auxiliary services.

The special programing would be authorized on a simplex basis during nonbroadcast hours using a supersonic ("beep") signal to activate special receivers owned or rented by commercial and industrial establishments for this purpose. The proposal would also permit additional program transmissions on a multiplex basis during regular broadcast hours to individuals and organizations having the necessary multiplexing receiving equipment. "Binaural" broadcasting, a type of broadcasting which undoubtedly would be welcomed by the hi-fidelity fans, would be possible on a single FM channel under the proposed rules. The rules would impose such technical standards as would insure the technical quality of the regular broadcast service.

Noncommercial Educational FM

Though comparatively small, noncommercial educational FM broadcast is the one FM service which has shown a steady increase in both authorizations and licenses over the past 6 years.

During the past year 9 new stations were authorized in this service. Five of them were for operation with 10-watt transmitters, while the others proposed to use higher powered equipment. There are presently 123 stations authorized in this service, 117 of which have qualified for regular licenses.

The noncommercial educational FM broadcast service offers a contrast to the commercial FM broadcast service insofar as deletions of stations are concerned. During this past year only 1 noncommercial educational FM broadcast station requested cancellation of its authorization.

One of the new stations authorized was the second station for the same educational licensee in the same city.

The Commission's proposal to amend the rules to permit multiplexing by FM broadcast stations would enable stations in this service to transmit a number of programs simultaneously. This would make possible the broadcast of several educational programs at the same time.

During the year the period of noncommercial educational FM licenses was extended to three years, the same as for commercial FM stations.

Facsimile Broadcast Service

Facsimile broadcasting means the transmission of still pictures, graphs, and printed or written matter to the general public. Commission rules permit FM broadcast stations to transmit "fax" on a simplex or multiplex basis. However, there appears to be no current interest in this service; no stations are now engaged in such operation.

EXPERIMENTAL BROADCAST SERVICES

The experimental broadcast services are for the purpose of conducting research and development in the technical phases of broadcasting in order to improve equipment or techniques and to obtain engineering data that will prove useful to the broadcasting industry as well as to the Commission.

Commission rules provide for three classes of experimental broadcast stations; i. e., Experimental Television Stations, Experimental Facsimile Stations, and Developmental Broadcast Stations. Experimental stations are classified on the basis of their operation in the field of video, "fax" [facsimile], or aural broadcasting.

Experimental TV Stations

Besides looking into techniques of "booster" and "satellite" and "subscription" TV operation as previously noted, experimental TV stations continued to be used by manufacturers of TV equipment for testing and developing new and improved equipment, and prospective TV applicants were given experimental authority to test new antenna sites for their proposed stations.

Developmental Broadcast Stations

The Developmental Broadcast Service is the aural counterpart of the Experimental Television Broadcast Service. Activity in this field has for the most part been limited to the development and testing of aural broadcast transmitting equipment by manufacturers. The recent surge of interest in high-fidelity sound systems may lead to some experimental broadcast operation in the field of binaural or stereophonic systems which are intended to give a three-dimensional quality to sound.

Experimental Facsimile Broadcast Stations

There was no activity in this field during the fiscal year.

AUXILIARY BROADCAST SERVICES

Auxiliary broadcast services cover the use of portable or mobile radio-transmitting apparatus to pick up programs or other events which occur outside a regular studio, and of permanently installed

transmitters to provide program circuits between the studio and transmitter of AM, FM, or TV broadcast stations and, in the case of FM and TV stations, to provide intercity relay circuits for network operation in lieu of coaxial cable facilities. During the fiscal year, rules were adopted to provide for the licensing of FM intercity relay stations.

There are now six categories of auxiliary broadcast stations, as follows:

Remote Pickup Broadcast Stations

Remote pickup broadcast stations are operated by broadcast stations for on-the-spot coverage of outside events. They are used primarily for pickup of AM and FM programs but are becoming popular with TV broadcasters, not only for relaying the aural portion of TV program pickups but also for providing communication between the field crews in setting up TV pickup equipment and for cueing and dispatching the pickup crews to the scenes of newsworthy events.

Portable or mobile equipment generally employed for this purpose ranges in power from a fraction of a watt to a few hundred watts. Most of this apparatus is self-powered and provides a reservoir of emergency communication equipment which could be used in the event of disruption of normal circuits resulting from floods, storms, or other disasters.

Aural Broadcast STL Stations

Aural broadcast STL (studio-transmitter link) stations provide a radio circuit for the transmission of programs from the studio to the transmitter of an aural broadcast station. With such service available, AM and FM stations may locate their transmitting facilities in isolated areas in order to take advantage of the most favorable site without regard to the availability or suitability of wire line transmission. The growth of this service tends to keep pace with the growth of aural broadcasting.

FM Broadcast Intercity Relay Stations

This service is intended to meet the problems of FM broadcast networks in situations where the special high-quality circuits are not available from communication common carriers. Since this class of broadcast auxiliary service is comparatively new, no stations have yet been licensed.

TV Pickup Stations

Television pickup stations are the visual counterpart of remote pickup stations and are used by TV licensees for on-the-spot broadcasts. They are a particularly useful adjunct to telecasting since costly and expensive special cables are required to handle the fre-

quency bandwidths required for the transmission of moving visual images and, without these mobile transmitters, TV programs would be restricted in most cases to those produced in the studios.

The comprehensive coverage of sporting events by TV stations is almost entirely due to the availability of this pickup service. They are also widely used in other instances where timeliness makes the use of motion-picture photography undesirable.

Television STL Stations

Television STL (studio-transmitter link) stations are used in the same manner as aural broadcast STL stations. As in the case of pickup stations, the need is greater for TV since the cost of a physical link between the studio and transmitter would prohibit the use of mountaintop transmitter sites or other locations favorable for wide-area TV coverage.

TV Intercity Relay Stations

Although Commission policy in general requires intercity relaying of TV network programs to be handled exclusively by communications common carriers, its rules permit the operation of private intercity relay systems by TV stations on an interim basis where it is shown that adequate common carrier facilities are not available. With the rapid expansion of television during the fiscal year, a number of these private systems have come into being.

(On September 16, 1954, the Commission invited comments and proposals to a petition that it authorize TV stations to operate their own intercity relay facilities in preference to using more costly common carrier facilities, especially to stimulate the development of live network service in less densely populated areas.)

HEARINGS

In conformity with its efforts to simplify and expedite the general broadcast hearing procedure, the Commission on July 15, 1954, announced substantial revisions of its covering rules. These modifications were adopted in the light of clarifying experience with expediting procedures previously adopted, and again after full consultation with representatives of the outside bar.

In brief, the Commission further changed its cutoff rules to require all competing applications for the same broadcast facility to be on file at least 60 days (in lieu of the previous 30) prior to the scheduled hearing, and that in broadcast cases the Commission will endeavor to give applicants 60 days advance notice of a hearing.

Each applicant now provides all parties to the hearing with a full set of exhibits to be offered as part of its direct case. Unless otherwise directed by the examiner, this exchange of exhibits takes place

at least 20 days in advance of the hearing date. These exhibits contain all data which the applicants desire to submit concerning their qualifications and proposals. Oral testimony by an applicant or his witnesses, with respect to his direct case, is limited to appropriate qualifications and explanation of his exhibits, if necessary, and to such testimony in connection with the applicant's direct case in substitution of exhibits or portions thereof which may have been rejected by the examiner on grounds solely of competency or form.

In all hearings involving applications for authority to construct new broadcast stations, except for good cause found in advance by the presiding officer, prehearing conferences are held both prior to and after the exchange of exhibits, with a view to eliminating, by agreement, the necessity of proving some facts, the possibility of agreement disposing of evidentiary issues raised by the exhibits exchanged, the limitation on cumulative evidence, and numerous other matters which may effectively shorten the hearing. The second prehearing conference, in most instances, is held at least 10 days prior to the date for commencing the hearing.

There is also a provision which enables any party to obtain, upon written request, from any other party to the proceeding, such detailed information relevant to its proposals as may reasonably and timely be requested, including any material falling within eight specified categories; e. g., background and experience, integration of ownership and management, and other matters bearing upon the criteria previously employed by the Commission in selecting between competing applicants for the same facilities.

Under these modifications, broadcast hearings no longer commence, as was previously the case, with hearing conferences, but instead with the actual preesntation of proof. It is no longer required that the applicants make a preliminary submission of detailed information supplemental to their applications in six different categories specified in an attachment to the Commission's letter sent to applicants prior to the designation of their applications for hearing. Also eliminated is the previous requirement that the parties state the matters upon which they propose to rely in conferences at which time the hearings were deemed to have started, but prior to the actual presentation of proof.

Findings are still made upon the basic qualifications of the applicants (legal, financial, technical, etc.) before designating their applications for hearing on a comparative basis. Thus, lengthy testimony on which no actual controversy exists continues to be eliminated.

Related expediting actions taken during the year included a February 10, 1954, rule amendment which limits the number of pleadings

which may be filed in a proceeding. This was done because numerous and repetitious pleadings tended to delay and complicate Commission consideration of the cases involved, and indications were that many of these pleadings were unnecessary to disposition of the cases involved.

On Augut 20, 1953, the procedural rules were amended to provide that when any party fails to file exceptions within the specified time to an initial decision which proposes to deny its application, such party shall be deemed to have no interest in further prosecuting its application and the latter may be dismissed for failure to prosecute.

MULTIPLE OWNERSHIP RULES

The Commission's rules concerning multiple ownership of broadcast stations were, on November 25, 1953, amended to preclude any party, or any of its stockholders, officers, or directors, having an interest in more than 7 commercial AM, 7 commercial FM, or 5 commercial TV stations.

This was the first time that these rules were applied to indirect interest and the first time that a maximum had been placed on total AM stations. The limitation on FM holdings was raised from its previous ceiling of 6. The 5 figure for TV was retained. There was no change in the existing rule which prohibits the same interest or group from operating more than one network, or more than one AM, FM, or TV station in the same area.

Subsequently, on December 23, 1953, the Commission proposed and, on September 17, 1954, amended its multiple-ownership rules to increase the maximum permissible ownership of TV broadcast stations by the same interest from 5 to 7, not more than 5 of which may be in the VHF band, effective October 22 thereafter.

POLITICAL BROADCASTS

On September 2, 1954, the Commission's rules were amended to reflect and interpret a 1952 amendment to the act which stipulates that charges for broadcasts by legally qualified candidates for public office shall not exceed the charges made by the station for other comparable purposes. Later that month the Commission issued a reference compilation and guide on "Use of Broadcast Facilities by Candidates for Public Office".

In substance, the Communications Act provides that if any station permits its facilities to be used by a legally qualified candidate for public office, it must afford equal opportunities to all other such candidates for that office, without censorship or extra charge.

318372—54——8

OTHER BROADCAST RULE CHANGES

In addition to the more important rule changes reported elsewhere in this chapter, there were other revisions affecting the broadcast field.

For one thing, the Commission banned the filing of applications in conflict with its rules, even when accompanied by petitions for rulemaking. This action is intended to promote more orderly procedure and, in particular, to eliminate the pendency of applications which cannot be acted upon because of their relation to complex, unresolved and protracted rulemaking proceedings.

Rules were finalized to required all applicants for new AM broadcast stations to specify definite transmitter sites. This step is expected to reduce the Commission's workload and to remove a number of uncertainties with respect to coverage and interference to other services that prevailed when no specific site was proposed.

One of the most controversial rules in AM allocations known as the "blanketing rule" was modified in order to ease the requirements for the selection of transmitter sites. While the rule has been liberalized in certain respects, the Commission has increased the responsibility of AM licensees in satisfying complaints of listeners of blanketing interference from excessive field intensities emitted by their stations.

The Commission has deleted provisions requiring the making of AM skywave field intensity recordings for the reason that the duration of recordings which can practically be prescribed produces unreliable results. It believes that use of its skywave curves, which were founded upon and verified by relatively large numbers of skywave recordings, provides a more satisfactory tool in allocations. The Commission stated this view as early as 1940 and has consistently reiterated it. The codification of this principle in the AM allocation rules will tend to prevent applicants from spending time and effort in expensive but unfruitful skywave recording programs to support requests for new or different broadcast facilities.

The auxiliary broadcast service rules were revised to accommodate the needs of TV broadcast stations, especially UHF stations, for pickup, studio-transmitter links, and intercity relay stations.

In another proceeding involving TV engineering standards, the delineation of zone 1 was changed to include the entire State of West Virginia.

A further proceeding having an impact on TV was one which amended the rules for the operation of fixed stations in the band 72–76 megacycles in order to give protection to TV stations operating on adjacent channels 4 and 5.

Financial reporting requirements of broadcast networks and licensees were further materially reduced by discontinuance of the preliminary report form (FCC Form 324A) and elimination of several schedules in the "Annual Report of Networks and Licensees of Broadcast Stations" (FCC Form 324).

Also during the year, the Aural Facilities and Television Facilities Divisions of the Broadcast Bureau were merged into a Broadcast Facilities Division.

STATISTICS

Broadcast Authorizations

Broadcast authorizations totaled 5,838 at the end of fiscal 1954, which was a net gain of 408 for that year. Television authorizations increased from 500 to 603, including 30 for noncommercial educational operation. Commercial FM authorizations continued to drop, numbering 569 at the close of the year as compared to 601 the year previous. However, noncommercial educational FM stations continued to gain, adding 7 during the year to set a new mark of 123. AM authorizations continued to mount, adding 113 for the year to reach a new high of 2,697.

Year-end totals for authorizations in the different classes of broadcast services were:

Class	June 30, 1953	June 30, 1954	Increase or (decrease)
Commercial AM	2,584	2,697	113
Commercial TV	483	573	90
Educational TV	17	30	13
Auxiliary TV	259	397	138
Experimental TV	17	18	1
Commercial FM	601	569	(32)
Educational FM	116	123	7
Remote pickup	1,305	1,384	79
Studio-transmitter link	47	45	(2)
Developmental	1	2	1
Totals	5,430	5,838	408

These figures do not include international broadcast stations, which are in a state of flux.

Broadcasting Since 1949

The number of authorized, licensed, and operating broadcast stations, also pending applications, at the close of each fiscal year for the past 6 years is shown in the following tables, together with totals for the number of deletions during those years:

Year	Grants	Deletions	Pending applications	Licensed	CP's on air	Total on air	CP's not on air	Total authorized
COMMERCIAL AM								
1949	200	55	382	1,963	43	2,006	173	2,179
1950	194	70	277	2,118	26	2,144	159	2,303
1951	116	35	270	2,248	33	2,281	104	2,385
1952	60	25	323	2,333	22	2,355	65	2,420
1953	187	23	250	2,439	19	2,458	126	2,584
1954	148	29	226	2,565	18	2,583	114	2,697
COMMERCIAL FM								
1949	57	212	65	377	360	737	128	865
1950	35	169	17	493	198	691	41	732
1951	15	91	10	534	115	649	10	659
1952	24	36	9	582	47	629	19	648
1953	29	79	8	551	29	580	21	601
1954	27	54	5	529	24	553	16	569
EDUCATIONAL FM								
1949	18	7	9	31	3	34	24	58
1950	25	4	3	61	1	62	20	82
1951	19	6	2	82	1	83	12	95
1952	12	2	2	91	1	92	12	104
1953	13	1	3	106	0	106	10	116
1954	9	2	1	117	0	117	6	123
COMMERCIAL TV								
1949	15	7	338	13	56	69	48	117
1950	0	8	351	47	57	104	5	109
1951	0	0	415	81	26	107	2	109
1952	0	1	716	96	12	108	0	108
1953	381	6	572	101	97	198	285	483
1954	174	81	200	104	298	402	171	573
EDUCATIONAL TV								
1952	0	0	1	0	0	0	0	0
1953	17	0	29	0	1	1	16	17
1954	13	0	17	0	6	6	24	30

Authorizations cover all stations built, building, or for which construction permits were granted. Licenses are issued only when stations meet the engineering specifications in their construction permits. Many stations go on the air with temporary facilities prior to qualifying for licenses. Noncommercial educational TV operation was first authorized in 1952.

Any seeming slight discrepancies in the relation of grants and deletions during the year to total authorizations at the end of the year are due to reinstatement of some deleted authorizations and other considerations impossible to detail in this general table.

Broadcast Applications

Broadcast applications received during the year totaled 8,200, which was 1,220 more than the previous year. Applications for new TV sta-

tions decreased from 655 in 1953 to 106 in 1954. However, in the last fiscal year 248 applications for new TV stations had to be designated for hearing as compared to 53 for AM and none for FM.

Nonhearing broadcast application statistics for the year follow:

	Received	Granted	Dismissed, denied, or returned	Designated for hearing	On hand
AM					
New stations	227	140	76	53	156
Major changes	161	116	32	27	132
Transfers	521	473	55	2	42
Renewals	1,509	1,535	60	1	246
Licenses	326	300	18	0	76
Other	990	913	80	1	70
AM total	3,734	3,477	321	84	722
FM					
New stations	33	36	1	0	6
Major changes	118	136	0	0	15
Transfers	88	89	0	0	10
Renewals	305	283	0	0	75
Licenses	95	92	0	0	14
Other	147	142	0	0	8
FM total	786	778	1	0	128
TV					
New stations	106	121	210	248	31
Major changes	201	187	11	0	24
Transfers	124	111	4	0	17
Renewals	77	80	10	2	23
Licenses	83	15	8	0	77
Other	960	886	44	5	80
TV total	1,551	1,400	287	255	252
Miscellaneous					
New stations	438	376	25	0	73
Major changes	119	108	3	1	15
Transfers	242	224	3	0	32
Renewals	867	904	4	5	146
Licenses	411	213	17	0	264
Other	52	51	3	0	3
Miscellaneous total	2,129	1,876	55	6	533
Grand total	8,200	7,531	664	345	1,635

FM and TV figures include noncommercial educational applications.

Pending Broadcast Applications

Of the 1,635 broadcast applications pending at the close of the fiscal year, over half (915) were more than 3 months old, 438 had been pending for from 3 months to a year, 158 from 1 to 2 years, and 124 for more than 2 years.

Broadcast applications are, in general, processed in the order in which received. However, some involve considerations which require more time to resolve.

Many applications indicate objectionable interference, not only to other stations in this country but to those in neighboring countries. Some applications are not properly or completely filled out, which can invite considerable correspondence. Some applications are fre-

quently amended, and this necessitates a restudy in each instance. Some applicants ask for facilities that require special case study and interpretation of the rules. Some applications are contigent upon the grant of other applications, thereby involving dual considerations. Other applications are being held up at the request of the applicant. Engineering, financial, or legal questions often arise in considering applications for renewal of license on the basis of operation during the license period. This can also result in protracted correspondence.

In every case where an application cannot be granted, the Commission has, since 1952, been required by law to formally advise the applicant of that fact and to await word from the applicant as to whether he wants to go to a hearing before the case can be designated for hearing.

The reasons for seeming delay in passing upon some broadcast applications are many, but they may be grouped in the following major categories:

Awaiting hearing because of competition with other applications. The law obliges the Commission to make a selection through the hearing process, which must follow a prescribed Federal procedure.

Awaiting final decision in hearings in which the hearing record and the subsequent filings and counterfilings can be voluminous and require extensive reading and analyzing.

Awaiting decisions in specific rulemaking on general proceedings, the outcome of which will determine whether a particular application can be granted.

Awaiting the ratification of an international broadcasting treaty or agreement.

Awaiting the outcome of legislation, litigation, bankruptcy proceedings and other legal actions.

Awaiting receipt of additional information that has been requested from the applicant.

Awaiting the applicant's compliance with financial, legal and engineering requirements, including approval of antenna site and clearance of antenna height for air navigation safety.

Awaiting negotiations between parties seeking to iron out mutual difficulties.

Awaiting the outcome of general studies or particular inquiries.

The age of pending broadcast applications as of June 30, 1954, is shown in the following table:

Service	Total	Under 3 months	3 to 12 months	12 to 24 months	Over 24 months
AM					
New stations	156	50	50	16	40
Major changes	132	46	31	16	39
Renewals	246	186	45	7	8
Other	188	132	32	13	11
AM total	722	414	158	52	98
FM					
New stations	6	5	0	0	1
Major changes	15	4	1	7	3
Renewals	75	66	8	0	1
Other	32	22	5	3	2
FM total	128	97	14	10	7
TV					
New stations	31	6	8	16	1
Major changes	24	16	7	1	0
Renewals	23	20	3	0	0
Other	174	98	55	18	3
TV total	252	140	73	35	4
Miscellaneous					
New stations	73	66	7	0	0
Major changes	15	11	3	0	1
Renewals	146	108	30	3	5
Other	299	79	153	58	9
Miscellaneous total	533	264	193	61	15
Grand total	1,635	915	438	158	124

Receiving Sets

Broadcast receiving sets are not licensed or otherwise regulated by the Commission, although it does endeavor to curb interference to or from these receivers. Industry estimates that more than 117 million radio sets are in use, including 9 million equipped to receive FM. About 47 million homes, or 98 percent of the total, have one or more AM sets, and over 25 million automobiles have radio receivers. In addition, there are more than 30 million TV sets in about 29 million homes, and of these sets less than 4 million can get the UHF band. The number of color TV receivers is estimated to be between 6,000 and 7,000, and production is increasing.

Networks

Broadcast networks as such are not licensed or otherwise regulated by the Commission. However, individual stations are subject to the chain broadcasting regulations adopted by the Commission in 1941 to promote competition in broadcasting. There are five national networks—American Broadcasting Co.; Columbia Broadcasting System, Inc.; Mutual Broadcasting System, Inc.; National Broadcasting Co.; and Du Mont Television Network—and many regional and State networks. (On August 4, 1954 the Senate Interstate and Foreign Commerce Committee announced that it would conduct an investigation of radio and television networks.)

Broadcast Industry Financial Data

In the calendar year 1953, the grand total revenues of the broadcasting industry (radio and television) passed $900 million, the highest on record. Total revenues, which comprise revenues derived from the sale of time, talent, and program materials to advertisers, were reported at $908 million. Radio revenues increased from $469.7 million in 1952 to $475.3 million in 1953, while aggregate TV revenues of $432.7 million in 1953 were 33.5 percent greater than the $324.2 million for 1952.

Broadcasting profits of $123 million in 1953 were 6.4 percent greater than those of 1952. The industry reported a profit from television broadcast operations of $68 million, 22.5 percent higher than in 1952. Earnings from radio AM and FM broadcast operations decreased by 8.4 percent from $60.1 million in 1952 to $55 million in 1953. All profit figures are before payment of Federal income tax.

The following tables show the comparative calendar year 1952–53 radio and television financial data for the radio and television broadcast industries:

All networks and stations, 1952–53

Item	1952	1953	Percent increase or (decrease) in 1953
	Millions	*Millions*	
Total broadcast revenues	$793.9	$908.0	14.3
Radio [1]	469.7	475.3	1.1
Television	324.2	432.7	33.5
Total broadcast expenses	678.3	785.0	15.7
Radio	409.6	420.3	2.6
Television	268.7	364.7	35.7
Broadcast income (before Federal income tax)	115.6	123.0	6.4
Radio	60.1	55.0	(8.4)
Television	55.5	68.0	22.5

[1] Radio includes AM and FM broadcasting.

NOTE.—1953 radio data cover the operations of 4 nationwide networks and 3 regional networks, 2,434 AM and AM-FM and 45 independent FM stations. 1952 data are for the same networks and 2,324 AM and AM-FM and 56 independent FM stations. 1953 TV data cover the operations of 4 networks and 334 stations; 1952 data are for the same networks and 122 stations.

Nationwide networks only, 1952–53 (including owned and operated stations)

Item	1952	1953	Percent increase or (decrease) in 1953
Broadcast revenues	*Millions*	*Millions*	
Radio	$95.8	$92.6	(3.3)
Television	180.2	231.7	28.6
Total	276.0	324.3	17.5
Broadcast expenses			
Radio	85.6	83.2	(2.8)
Television	170.3	213.7	25.5
Total	255.9	296.9	16.0
Broadcast income (before Federal income tax)			
Radio	10.2	9.4	(7.8)
Television	9.9	18.0	81.8
Total	20.1	27.4	36.3

NOTE.—Radio data include the operations of 16 network-owned stations in 1953 and 18 such stations in 1952. TV data include the operations of 15 network-owned stations in 1952 and 16 such stations in 1953.

FM broadcast revenues, expenses and income, 1952–53

Item	1952		1953	
	Number of stations	Amount	Number of stations	Amount
FM broadcast revenues				
FM stations operated by:		*Millions*		*Millions*
AM licensees:				
Reporting no FM revenues	406		412	
Reporting FM revenues	149	$1.5	137	$1.3
Non-AM licensees	56	1.1	45	0.8
Total FM Stations	611	2.6	594	2.1
FM broadcast expenses				
FM stations operated by non-AM licensees	56	2.1	45	1.6
Industry total		(1)		(1)
Total FM broadcast income (before Federal income tax)				
FM stations operated by non-AM licensees	56	(1.0)	45	(0.8)
Industry total		(1)		(1)

( ) Denotes loss.

[1] In view of the difficulty in a joint AM-FM operation in allocating FM operation expense separately from AM station operation expense, licensees of such stations were not required to report FM station expense separately. As a result, FM industry totals for expense and income are not available. AM-FM licensees, however, were requested to report separately the revenues, if any, attributable to FM station operation if such data were readily ava lable. In only a few instanc:s did AM-FM licensees state they were unable to segregate the FM revenues.

TV broadcast revenues, expenses and income, 1953

[In thousands]

Item	4 networks and their 16 owned and operated TV stations	244 other TV stations	Total 4 networks and 260 TV stations [1]
A. Revenues from the sale of time:			
1. Network time sales:			
a. Nationwide networks	$126,541	$45,270	$171,811
b. Miscellaneous networks and stations		89	89
Revenue from network time sales	126,541	45,359	171,900
2. Nonnetwork time sales to:			
a. National and regional advertisers and sponsors	36,870	87,448	124,318
b. Local advertisers and sponsors	19,576	68,898	88,474
Total revenues from nonnetwork time sales	56,446	156,346	212,792
Total revenues from time sales	182,987	201,705	384,692
3. Deduct commissions to regularly established agencies, representatives, brokers and others	[2] 34,999	27,462	62,461
Net revenues from time sales	147,988	174,243	322,231
B. Revenues from incidental broadcast activities:			
Talent	60,888	9,681	70,569
Sundry broadcast revenues	22,792	16,185	38,977
Total revenues from incidental broadcast activities	83,680	25,866	109,546
Total broadcast revenues	231,668	200,109	431,777
C. Total broadcast expenses of networks and stations	213,661	146,853	360,514
D. Broadcast income before Federal income tax	18,007	53,256	71,263

[1] Excludes data for 74 stations with less than $25,000 in time sales. Such stations report only total revenues and total expenses.
[2] Of this amount $26,211,189 is applicable to the total sale of network time.

TV investment in tangible broadcast property, 1953

Item	Number of stations	Investment in tangible broadcast property	
		Original cost	Depreciated cost
		Thousands	*Thousands*
4 networks and their owned and operated stations	16	$71,622	$50,401
Prefreeze stations	91	87,361	55,960
Total Prefreeze	107	158,983	106,361
Postfreeze stations:			
VHF	109	40,913	38,123
UHF	109	33,238	30,703
Total Postfreeze stations	218	74,151	68,826
Grand Total	[1] 325	233,134	175,187

[1] Nine TV stations (1 prefreeze and 8 postfreeze) reported no ownership of tangible broadcast property.

Radio [1] broadcast revenues, expenses, income and investment, 1952–53

[In thousands]

Item	4 nationwide networks and their stations [2]		3 regional networks and their stations [2]		All other stations [3]		Industry total	
	1952	1953	1952	1953	1952	1953	1952	1953
Total broadcast revenues	$95,824	$92,654	$4,796	$4,679	$367,972	$377,252	$468,592	$474,585
Total broadcast expenses	85,590	83,220	3,807	3,702	315,119	331,867	407,516	418,789
Total broadcast income (before Federal income tax)	10,234	9,434	989	977	49,853	45,385	61,076	55,796
Investment in tangible broadcast property:								
Original cost	28,241	24,602	976	1,712	[4] 238,124	[4] 249,926	267,341	276,240
Depreciation to date	15,375	13,480	862	1,209	100,394	113,258	116,631	127,947
Depreciated cost	12,866	11,122	114	503	137,730	136,668	150,710	148,293

[1] Excludes independently operated FM stations, 56 in 1952 and 45 in 1953.
[2] Includes the operations of 25 network owned stations in 1952 and 22 network owned stations in 1953.
[3] Includes 2,299 stations in 1952 and 2,412 stations in 1953.
[4] Data available from 2,289 stations in 1952 and 2 400 stations in 1953.

Field Engineering and Monitoring

*"Have authority to inspect all radio installations. * * * "—(Sec. 303 (n) of the Communications Act).*

" * * prevent interference between stations * * * "—(Sec. 303 (f) of the Communications Act).*

" * * require the painting and/or illumination of radio towers. * * * "—(Sec. 303 (q) of the Communications Act).*

" * * prescribe the qualifications of station operators * * * "—(Sec. 303 (l) of the Communications Act).*

GENERAL

The Field Engineering and Monitoring Bureau operates a field organization extending throughout the United States and its Territories to provide on-the-spot service to industry, the public, and Government agencies; to enforce radio laws, treaties, and regulations; and to answer radio station and operator questions at field level. Surveillance is maintained by station inspection and by monitoring. Complaints of radio interference are investigated and radio operator examinations are given.

These field units locate and close unauthorized radio stations; perform special monitoring and engineering tasks for military and civil agencies; participate in rendering direction-finding assistance to lost or disabled aircraft and ships; and, in general, act as fact-finding units to provide the Commission with technical data for domestic and international use.

The bureau processes application data regarding radio antenna construction to insure that the towers will present a minimum hazard to air navigation. It also administers the Commission's rules pertaining to restricted and incidental radiation devices, and to radiating industrial, scientific, and medical equipment.

Regional offices have been reduced from 9 to 7 and, together with 24 district offices, 6 suboffices, 2 ship offices, and 18 monitoring stations, are supervised by the bureau's Field Operating Division. Three other staff divisions (Monitoring, Inspection and Examination, and Engineering) advise the bureau chief regarding standards, procedures, and evaluation of field work.

MONITORING

Monitoring Facilities

The monitoring and direction-finding network continued to operate with 10 primary and 8 secondary monitoring stations (see list in appendix to this report). All monitoring stations are equipped with high-frequency, long-range direction finders. In addition, 7 of the stations have low-frequency direction finders.

The Anchorage, Alaska, monitoring station was changed during the year from primary to secondary, and relocated locally, because of personnel shortages. The Lexington, Ky., secondary station is being moved to Chillicothe, Ohio. Forty acres were added to the Allegan, Mich., primary station, and 37 acres to the Fort Lauderdale, Fla., secondary station.

The Commission pursued its plans to eventually locate all of its monitoring stations on Government-owned lands. Close liaison is maintained with the General Services Administration and other Government agencies so that the Commission may be aware of Government sites which might be suitable for relocating monitoring stations now occupying leased properties.

Propagation characteristics on the frequencies used for television broadcasting are such that only a small percentage of the TV stations in operation can be received at the Commission's monitoring stations. Mobile facilities are, therefore, necessary to provide a means of assuring that video transmissions are of good technical quality.

To meet this need, the Commission obtained funds in 1954 for the establishment of one such unit which can be driven to the service area of the station being checked. It will be equipped with precision frequency-measuring equipment as well as instruments for determining the engineering quality of both monochrome and color TV signals.

Other equipment purchased during fiscal 1954 included some needed receivers covering the ultra high and super high frequency ranges, a number of field intensity meters to provide additional facilities for obtaining propagation and coverage data required by the Commission for making decisions concerning matters of frequency allocations and establishment of engineering standards, a panoramic recording receiver for use in making channel occupancy surveys, and a panoramic analyzer which will be the basic unit for a new spectrum analyzer to determine bandwidths of emissions of stations in the various services.

Monitoring for Defense

The demand for FCC monitoring and direction-finding services in connection with military defense projects increased considerably. The staff and facilities were not sufficient to handle all the work requested. However, it was possible to undertake three assignments amounting to

a total cost of $136,960. This sum, received by transfer of funds from the requesting agencies, was expended mainly for personal services. The Commission's monitoring and direction-finding network is the only one in existence which can perform certain work required in defense projects.

The largest contract ($129,000) provided for tracking of high-altitude weather balloons for the Air Force Cambridge Research Center. A still larger contract ($132,000) will continue this work in fiscal 1955. Other contracts were with the Naval Research Laboratory, also for tracking high-altitude weather balloons, and with the Air Force Rome Air Development Center.

Monitoring Surveys

The Commission made 45 monitoring surveys relating to problems of international frequency usage and allocations. This is 8 more than last year.

Some surveys involved only a few days' work but others required periodic observations at frequent intervals by all monitoring stations. One survey extended for 10 months and covered all 6 of the Atlantic City ship telegraph high-frequency calling bands. This was the first step in the implementation of newly allocated frequencies for the various services.

Monitoring for ITU

The United States is one of the principal participants in furnishing technical data concerning the usage of radio frequencies and band occupancy to the International Telecommunication Union at Geneva (ITU). This information is essential to a logical frequency allocation plan for global communication and intercommunication between countries. It also provides protection from interference, and assures that radio transmissions are conducted within allocated bands.

The Field Engineering and Monitoring Bureau was designated by the ITU as the centralizing office for monitoring in the United States. The Commission's monitoring stations were the only domestic source of data for the International Frequency Registration Board (IFRB) of the ITU during the past year; however, one of the large communication companies will start participation in the program. This year, monitoring index slips were forwarded by the FCC to the IFRB each month, a total of 23,317 slips.

Monitoring for Interference

Resolution of radio-interference problems frequently requires monitoring operations on a large geographical scale. Requests for such services were received during the past 2 years as follows:

	Fiscal year 1953	Fiscal year 1954
U. S. Air Force	200	150
U. S. Army	125	109
U. S. Navy	40	52
U. S. Coast Guard	78	66
Civil Aeronautics Administration	125	88
Other Government agencies	30	26
Law enforcement agencies	15	13
Commercial airlines	256	186
Commercial concerns	410	398
Foreign governments	35	13
Miscellaneous	[1] 400	1,898
Total	1,714	2,999

[1] Estimated.

The following are examples of interference problems solved by monitoring:

One of the large commercial airlines complained of serious interference to its radio communication at Memphis, Nashville, and Cincinnati. By coordinating monitoring stations and mobile units, the source was traced to a plywood plant in Tennessee where an electronic heater was found to be operating outside the assigned frequency band.

A United States Armed Forces broadcast station in Morocco requested identification of a station causing interference to one of its channels. Through long-range monitoring and direction finding, the interfering station was located in a southern European country.

The monitoring network intercepted a steady unidentified signal on the international radiotelephone distress frequency. This signal was a hazard to use of the channel for distress purposes, as well as interfering with normal operations. Direction-finding bearings placed its origin in the San Pedro, Calif., area. The mobile investigative unit at Los Angeles traced the cause to a blocked transmitter relay at a local public coast radiotelephone station.

Monitoring for Small-Boat Interference

An extensive monitoring program was conducted during the year and is still in progress to identify small boats radiating second harmonics from their radiotelephone transmitters on 2738 kilocycles and thus blocking the aeronautical service from shifting to its new Atlantic City assignment of 5476.5 kilocycles. The problem was serious because other frequency shifts were held up until the aeronautical stations released their old frequency. The monitoring effort was also directed towards seeing that small-boat transmitters using 2738 kilocycles are certified as free of harmful harmonic radiation from that frequency. The 5476.5-kilocycle channel was sufficiently cleared of interference by June 1954 to permit the aeronautical service shift.

Other Monitoring Cases

Interference is responsible for the majority of monitoring cases. However, other cases involve location of illegal radio transmitters, and special survey or other factfinding assignments. The number of major noninterference cases handled during the year totaled 519 compared to 448 in 1953. In addition, 4,655 local cases were handled by individual field units without reference to the entire net or to Washington.

Direction Finding

Long-range direction-finder bearings are the only means of definitely determining the source and type of an unknown signal. For example, the FCC was requested by the British monitoring system to identify a "printer system." Through the use of special monitoring equipment and analysis of the multiplex emission, the FCC found that it came from a European country. But that country denied knowledge of the use of the particular frequency, and the British asked for further observations. However, the Commission confirmed its previous identification.

Monitoring stations in fiscal 1954 obtained a total of 104,480 bearings compared to 80,208 for the preceding year. The increase was made possible by the new remote controlled type of direction finders in use. As part of the Commission's participation in the air-sea search and rescue program, the direction-finder network obtained 1,877 bearings on lost or disabled aircraft and seacraft. There were 100 requests for emergency assistance compared to 130 for the previous year. Typical cases were:

The fishing vessel *Queen Mab*, while near Hawaii, asked through the Coast Guard for a radio direction-finder fix to assure that it was following the most direct course in rushing two sick men to a shore hospital. The FCC net obtained a fix which enabled the vessel to speed its mercy errand.

The CAA at Oakland, Calif., requested assistance in locating a disabled Air Force plane. The plane, inbound from Hawaii, was about 300 miles offshore. Bearings were obtained, and two fixes were reported to the CAA within 20 minutes of the initial transmissions. An escort plane then conducted the disabled plane to the mainland.

The FCC was requested by the Coast Guard to help locate an Air Force C–47 plane lost between Florida and the Bahama Islands. The first of four fixes was reported to the Coast Guard within 8 minutes. As a result, the lost plane was enabled to return safely to base.

The Coast Guard requested assistance in locating the *O. S. Mary Adeline* which was in distress off southern California. The Coast Guard cutter *Morris* was searching for the stricken vessel with

the aid of a plane and a patrol boat. The cutter had been running all day on "dead reckoning" in a heavy fog with her radar out of order. Since it was near dark, the cutter was about to give up and wait for the next day, but FCC fixes enabled her to locate and save the vessel and crew. The master of the rescued ship sent the FCC a letter of appreciation.

Additional Monitoring Statistics

	Fiscal year 1953	Fiscal year 1954
Alerts, unknown or suspicious signals	6,500	8,111
Identification cards made	56,950	83,523
Cases referred to other agencies	33	7
Citations served (monitoring)	8,762	6,839

INVESTIGATIONS

Investigative Facilities

During fiscal 1954, direction-finding-equipped cars were assigned to two more offices, though without additional personnel, bringing to 33 the total number of field offices and monitoring stations so equipped. These special cars are used in tracking down unlicensed stations and interference sources localized to a particular area by the Commission's monitoring stations, or which are under investigation as the result of reports or complaints from the public, radio stations, and Government agencies.

Interference Complaints

The number of interference complaints received by investigative units during the year was 18,037 as compared to 21,749 in 1953. Of these, 16,089 concerned AM, FM, and TV broadcast, principally the latter, as compared to 19,992 in 1953. The decrease in the number of complaints of interference to TV is due in part to the effectiveness of Commission-sponsored TV interference committees which resolve such complaints locally. The number of TVI committees has increased to 370 in 351 communities, as compared to 293 in 282 communities in 1953. Amateur radio operators, TV set owners, manufacturers' representatives, and others concerned thus work together to solve TV interference problems at a local level.

Because of their large number, it was not possible to accord prompt or complete attention to each and every interference complaint. As in the past, priority was given those which imperiled safety services, such as aviation, and to cases involving illegal radio activity.

Restricted radiation devices, such as "community antenna systems" and radiating receivers, continued to present an interference problem. Radiation from the growing number of community antenna systems—

i. e., cable systems which distribute TV programs by wire directly to subscribers' receivers in poor reception areas—invites interference complaints from persons attempting direct reception of TV stations in the vicinity of such cables.

Unfortunately, interference to aural and TV reception continues to be caused by radiations from broadcast receivers in the neighborhood, At the same time that a person may be complaining of interference to TV reception, his own TV receiver may, unknown to him, be causing interference to TV or AM broadcast reception of his neighbors—or may even be radiating on a frequency assigned a safety service, such as aviation. The following cases indicate the extent to which some receiving equipment can cause interference to reception by others.

A single excessively radiating FM receiver resulted in a complaint from 42 TV receiver owners at Wardensville, W. Va. A TV receiver booster in Beaumont, Tex., interfered with an estimated 3,000 TV receivers within the range of more than a mile. An amplifier associated with an apartment building master TV antenna at Buffalo, N. Y., was defective. Its interfering oscillations were stronger than the signal of the local TV station. Complaining calls jammed the telephone switchboard at the TV station and at a nearby hospital as viewers mistakenly blamed equipment at the hospital for the interference.

Examples of interference from restricted and incidental radiation devices are illustrated by the following:

Interference to a marine-calling and distress frequency, reported by the Coast Guard, was traced to an electric fence on an inland farm. Interference to a telephone company's carrier current system in Oklahoma was caused by a carrier-current telemetering circuit of another service. In Chicago, TV interference was traced to the complainant's own electronic garage door-opening device.

In 1954 there were 576 cases of interference from industrial, scientific, and medical equipment as compared to 641 in 1953. The fact that interference may be caused to important radio services hundreds of miles away, even though no complaints may have been received, is evinced by the following cases:

An illegal diathermy machine heard in Oregon, Washington, California, and many other States was traced to a doctor's office in Miami, Fla. When a check was made on a radiating diathermy machine at Portland, Oreg., it was no surprise to find that it could be heard as far as the Atlantic coast. In neither of these instances was the owner aware of the transcontinental effect of his equipment.

Serious interference to military and other communication in the New York area was considerably alleviated after mobile units traced the cause to inadequately shielded industrial-heating equipment in a number of plants manufacturing plastic products such as toys, raincoats, pocketbooks, etc.

Interference from other equipment brought complaints involving aircraft communication near Bellingham, Wash., the cause being traced to arc welders utilizing radio frequency energy, while interference to Civil Air Patrol communication at Tulsa, Okla., was due to radiations from an electronic "health machine".

Sometimes radio stations get out of adjustment and cause interference. For example, in Oregon disruption of railroad switchyard radio communication was found to be caused by a "spurious" emission from a local taxicab company radio station. The taxicab company promptly remedied it.

Also, interference complaints may arise against a radio station though the station is not at fault. For instance, when an additional TV station was established in San Diego, Calif., rendering improved service to viewers within its normal range, complaints were received from some San Diego residents that it was interfering with reception of a Los Angeles station more than 100 miles away which was not intended to serve San Diego.

Control of manmade interference is discussed in the chapter dealing with "Technical Research and Laboratory".

Unlicensed Stations

Mobile investigative units located and closed 52 illegal stations in 1954 as compared to 92 in 1953. This continued decrease is due in part to growing awareness of inevitable apprehension, and in part to concentration on the heavy workload of interference complaints and similar problems. Another contributing factor is the introduction of the Novice and Technician types of amateur license, whereby youngsters and others interested in radio operation can qualify to go on the air prior to acquiring the greater knowledge and skill necessary to obtain a General type amateur license.

An operator previously apprehended for operation of an illicit station at one Florida racetrack was arrested at another track on the same charge, even though litigation concerning his first operation was still pending.

INSPECTIONS

Fewer inspections were made of radio stations during fiscal 1954 as compared to the previous year. This was due to field personnel and budgetary limitations.

Broadcast Station Inspections

Commission field engineers inspect broadcast station transmitting equipment. Technical operation of the station, observed throughout the various operational phases, and the station's records of past technical operations are reviewed to assure that it is and has been operating efficiently and in compliance with technical rules, standards, and terms

of its authorization. These inspections do much to maintain adequate technical service to the listening and viewing public. Also, inspections reveal whether the station's tower (some TV towers are over a quarter of a mile in height) create a hazard to air navigation due to improper marking or lighting and whether interference to other broadcast stations through improper technical adjustments is imminent.

During the year, 533 broadcast station inspections were made, and 181 discrepancies were noted, as compared to 881 inspections and 366 discrepancies the year previous.

Ship Radio Inspections

Marine radio equipment must be both accurate and reliable to promote safety of life and property. Therefore, inspections of radio equipment on board passenger ships and certain freight vessels are made by Commission engineers under the provisions of the Communications Act and the Safety of Life at Sea Convention.

Adequate installation, protection, and maintenance in a state of full effectiveness and readiness for emergency operation is required. Furthermore, the inspection is to assure that qualified operators are in charge of the installation at all times when safety of life and property could be endangered.

During the past 2 years ship inspections were made as follows:

	U. S. ships		Foreign ships		1954 total
	1953	1954	1953	1954	
Number of inspections	5,923	2,823	2,942	501	3,324
Number of deficiency notices served	3,564	1,417	1,243	150	1,567
Violations cleared during inspection	2,844	2,297	554	319	2,616
Total	12,331	6,537	5,739	970	7,507

The Commission continued to furnish small-boat owners, yacht clubs, flotillas, and squadrons with informative pamphlets to assist them in the achievement of maximum usefulness in the operation of their radio communication equipment.

Further steps taken in connection with the small-boat owners' "self-education" program enabled them to check each other's installations upon request, for the purpose of discovering and correcting improper operating practices or conditions and mutually eliminating unnecessary interference.

Other Radio Station Inspections

Inspections of other than broadcast and ship radio stations totaled 6,622 contrasted with 7,134 such inspections made during 1953. Technical discrepancies totaling 1,514 were discovered as compared to 1,360 the year previous.

COMMERCIAL RADIO OPERATORS

All radio transmitters in the United States and its Territories (except Government) are required to be licensed by the Commission and, in general, to be operated by persons who must also be licensed by the Commission. The grade of license which a radio operator must possess is determined by the type and complexity of the station and the extent to which the station's operations contribute to the safety of life and property. Radio operator requirements for certain "pushbutton" types of transmitters have been waived by the Commission.

Radio operator licenses are issued only to citizens of the United States. On June 10, 1954, the Commission proposed to deny commercial operator licenses to members of subversive groups (see chapter on "National Defense").

Operator Examinations

Radio-operator examinations are given quarterly, semiannually, or annually at 88 examintion points throughout the United States and its Territories. The locations and times of these examinations are published in a schedule obtainable from any of the district engineering field offices listed in the appendix to this report.

A decrease was noted in the number of amateur operator examinations given during the year. A total of 42,004 such examinations were conducted in 1954 as compared to 44,685 in 1953. (See section of the chapter on Safety and Special Radio Services which deals with amateurs.)

As of February 1, 1954, the Commission discontinued its special aircraft radiotelephone authorizations. Used by private fliers, this permit was instituted in 1946 when there was a postwar boom in aviation interest. As a convenience, it was issued by CAA flight examiners in the field. Equivalent operating authority is now covered by the restricted radiotelephone permit, the term of which was extended for life as of November 15, 1953.

On April 16, 1954, the Commission proposed to discontinue its temporary limited second-class radiotelegraph operator license. This class of license was established to meet the demand for radio operators during the Korean hostilities, but is no longer needed.

Commercial Radio Operator Authorizations

Commercial-operator authorizations exceeding 179,000 were issued in 1954 as compared to over 176,000 in 1953. This represents a slight increase, bringing the total of outstanding commercial licenses of all classes to more than 842,000 at the close of the year.

Comparative figures by grades of licenses follow:

Class	June 30, 1953	June 30, 1954	Increase or (decrease)
Radiotelegraph:			
1st class	5,477	5,628	151
2d class	9,694	9,538	(156)
3d class	1,930	1,992	62
Temporary limited: 2d class	644	641	(3)
Radiotelephone:			
1st class	47,221	49,602	2,831
2d class	30,297	29,540	(757)
3d class	13,218	18,027	4,809
Restricted radiotelephone operator permit	525,685	649,121	123,436
Aircraft radiotelephone operator authorizations	95,970	77,999	(17,971)
Total	730,136	842,088	111,952

No allowance made in these figures for decreased operators.

FIELD ENGINEERING PROJECTS

Activity involving field-intensity recording and record analysis to obtain propagation data was materially reduced during 1954. On an average, 20 recorders were operated as compared to 39 during the previous fiscal year.

Reduction in the number of VHF recorders was partially offset by increased emphasis on recording TV stations in the UHF bands. Special field-intensity surveys were conducted to obtain propagation data and to determine the effective service area of each of three UHF stations.

Field-intensity measurements were also made of industrial heaters, radio-frequency-stabilized arc welders, and various types of carrier-current systems to determine the extent of radiation and interference potentialities of such equipment; of emissions of marine coastal stations and certain long-range, low-frequency stations to determine their coverage capabilities; and of harmonic emissions of transmitters installed in commercial fishing vessels in connection with enforcement of the limitations on harmonic emissions.

Many field functions require the use of special equipment which is not commercially available, and such equipment must be developed and fabricated either by the Commission's field personnel or its laboratory. For example, the Field Engineering and Monitoring Bureau is required to fix the location of illegal radio transmitters and sources of interference to authorized services. This necessitates continuing development of new direction-finding equipment and improving the accuracy and efficiency of existing direction finders.

Considerable progress was made during the year by placing in service a new remote-controlled rotating adcock direction finder. Experience gained with this installation indicates that it represents a worthwhile improvement over the older equipment which it will eventually replace at other stations. The new direction finder combines the proven accuracy and operating features of the older device and makes use of a truly symmetrical all-metal housing for the remote equipment.

INDUSTRIAL, SCIENTIFIC, AND MEDICAL SERVICE

The beginning of the fiscal year marked the end of the period when older types of medical diathermy and industrial heating equipment could be operated without meeting the technical requirements of the Rules Governing Industrial, Scientific, and Medical Service (Part 18). However, it was apparent that much obsolete equipment continued in operation either because of a reluctance on the part of operators to spend money for new equipment or for conversion, or because they were unaware of the hazards to life and property that result from noncompliance.

The Commission inaugurated an extensive program to further publicize the necessity and importance of compliance. This accelerated the replacement of obsolete diathermy machines with type-approved equipment and efforts were intensified to acquaint users of old equipment with their interference potentialities.

Replacement of obsolete medical diathermy equipment is made in most instances by machines type approved by the Commission, rather than by machines certified by an engineer. In a few instances, doctors require the use of out-of-band frequencies or spark-type emissions, and since type approval is not applicable to out-of-band operation, these special kinds of equipment can meet the requirements of the rules only through certification.

Obsolete industrial-heating equipment is generally modified by shielding and filtering to comply with the rules rather than by being replaced with new equipment. Modification and conversion of heaters require planning, testing, and contracting for materials and professional services before the equipment can be certified. Consequently a longer time is required to bring a heater into compliance than is required to replace a diathermy machine with an FCC type-approved model.

In order to eliminate serious interference to military and other radio communication caused by industrial-heating equipment used in the manufacture of plastic products, it was necessary to issue nine show-cause orders. In all of these cases except two, the operators brought their offending equipment into compliance. In one of the two remaining cases, the operators had their equipment shielded but had not completed certification by the end of the year. In the other case, it was necessary for the Commission to obtain a Federal court injunction to enforce its cease-and-desist order. Although obliged to commence formal action in the aforementioned cases, the Commission has been successful in obtaining voluntary compliance in many cases.

The Commission delegated authority to the Chief of its Field Engineering and Monitoring Bureau on September 30, 1953, to require

operators of industrial, scientific, and medical equipment believed to be in violation of the rules to show cause why a cease-and-desist order should not be issued, and to issue, in certain cases, such orders. This greatly facilitated the enforcement of part 18.

Electric arc-welding devices using radio-frequency energy, manufactured prior to September 1, 1952, continued to be exempt from part 18 provided no interference results to authorized radio services. These older type welders were permitted to continue to be operated in order to give the welding industry additional time to develop equipment that can meet the technical requirements. Because radio-frequency-stabilized welders generally use spark-gap oscillators, and because long torch leads are employed, special problems are involved in designing equipment which will not cause interference.

Welders manufactured after September 1, 1952, are subject to the technical limitations and standards established for industrial heating equipment, with some exceptions, and require certification. In a number of instances the older types of welding equipment caused interference which resulted in complaints to FCC, but these situations were promptly corrected.

Because there was considerable confusion on the part of electrologists as to the rules governing epilators (hair-removal instruments utilizing radio-frequency energy), the Commission extended the final date of applicability of part 18 to June 30, 1954, for epilators manufactured before December 31, 1950, and to December 31, 1955, for epilators manufactured between December 31, 1950, and June 1954, provided interference is not caused to authorized radio services.

Inquiries indicate considerable interest in medical ultrasonic equipment. The Commission has proposed to classify ultrasonic equipment used for scientific, therapeutic, industrial, and other purposes as miscellaneous equipment under part 18 with conditions for type-approval to prevent interference. This kind of equipment generally operates at around 1000 kilocycles and on lower frequencies.

RESTRICTED RADIATION DEVICES

Reports from field offices indicate that there are thousands of electronic devices in use designed for operation under the rules governing restricted radiation devices (part 15). Among these are garage-door openers, burglar alarms, phonograph players, electronic "baby-sitters", intercommunication systems, also highway traffic, power and telephone line, and "college campus" carrier current systems. Field-intensity measurements indicate that college carrier current systems operating in the standard broadcast band tend to exceed the radiation limitations specified in part 15 in an endeavor to cover as large an area

as possible. Carrier current systems operating below 550 kilocycles caused no serious problem during the year.

There have been many inquiries, particularly from rural areas, as to what regulations apply to interference to broadcast reception caused by horizontal sweep circuit radiation from TV receivers and by electrical noise from high voltage power transmission lines. The Commission is seeking the cooperation of manufacturers to build TV receivers that have a minimum of radiation. With regard to radio interference by powerlines, the Commission invites cooperation in eliminating this kind of interference.

Many inquiries have also been received as to what regulations are applicable to the fast-growing TV "community antenna" systems. Though there is no transmission on the air, in many instances, because of improper design or operation, such cable systems radiate energy and interfere with nearby TV receivers. The Commission's efforts toward encouraging cooperation of community antenna operators to eliminate this interference have resulted in improvement, but many systems still cause trouble.

Rules applicable to community antenna systems, carrier-current systems, receiver oscillators, and the myriads of restricted and incidental-radiation devices are contained in proposed amendments to part 15 (docket 9288), released April 15, 1954.

ANTENNA OBSTRUCTION MARKINGS

The Communications Act stipulates that the Commission require painting and/or illumination of radio towers if and when in its judgment such towers do or may constitute a menace to air navigation. Pursuant to this stipulation, the Commission has rules concerning the construction, marking and lighting of antenna structures (part 17).

The Antenna Survey Branch in the Engineering Division administers part 17. Its primary functions are to apply the criteria set forth in subpart B of part 17 to proposals for new or modified antenna structures, to refer all antenna proposals that exceed these criteria to appropriate Regional Airspace Subcommittees (ASP) of the Air Coordinating Committee (ACC) for special aeronautical study by aviation interests outside the Commission, to approve antennas that do not exceed these criteria, and to prescribe, when necessary, obstruction markings for antenna towers.

Some TV-transmitting antennas exceed a thousand feet in height structurally; one new one (KWTV, Oklahoma City) rises 1,572 feet.

The number of antenna proposals processed by the Antenna Survey Branch for all services during fiscal 1954 increased approximately 500. Notwithstanding this increase, the number referred to ASP

for special aeronautical study decreased to less than 50 per month, a consequence of a reduction of approximately 40 percent in the number of TV tall-tower proposals. The quantity of referrals to ASP would have been larger but for a procedure mutually acceptable to the Commission and to the ASP, whereby an applicant may request an ASP Regional Subcommittee to make a preliminary aeronautical study of an antenna proposal prior to the filing of the application. The Commission takes cognizance of ASP preliminary recommendations which result from such direct requests.

During the year the Commission, through its membership on the Subcommittee on Aerodromes, Air Routes, and Ground Aids (AGA) of the Air Coordinating Committee (ACC), participated in drafting national standards on obstruction lighting and marking. Pursuant to these standards, the Commission amended part 17 to provide for markings other than standard painting and lighting for tall antenna towers where standard painting and lighting is considered inadequate to safeguard air navigation. An example of such markings is the "HAZ" symbols to be installed on the ground adjacent to the anchor foundations of the tower guy wires to designate the area encompassed by the guy wires.

Currently, a Government-industry ad hoc group, in which the Commission is participating, is set up under the ACC/AGA Subcommittee to determine if there is a requirement for amending existing standards on obstruction lighting and marking so as to make special provisions for tall structures and, in particular, guy-wire marking for tall guyed structures, and to recommend appropriate action if there is such a requirement. Concurrently, a technical group established by the same subcommittee has prepared a proposed national standard for determining obstructions to air navigation. This draft is now under consideration by the subcommittee.

Antenna Statistics

Statistics of antenna construction proposals processed by the Antenna Survey Branch for the fiscal year follow:

Services	Pending July 1, 1953	Received in ASB	Cleared by ASB	Pending June 30, 1954 [1]
Broadcast:				
AM	29	536	537	28
FM	7	124	131	0
TV	405	916	1,292	29
International	0	0	0	0
Experimental	0	1	1	0
Total broadcast	441	1,577	1,961	57
Safety and Special	255	5,357	5,453	159
Common Carrier	11	457	463	5
Total	707	7,391	7,877	221

[1] Totals in this column include totals shown in last column of the next table.

The number of proposals referred to the Airspace Subcommittee for special aeronautical study was:

Services	Pending at Airspace July 1, 1953	Sent to Airspace during year	Received from Airspace during year	Pending at Airspace June 30, 1954
Broadcast:				
AM	5	103	90	18
FM	0	6	6	0
TV	131	299	409	21
International	0	0	0	0
Experimental	0	0	0	0
Total broadcast	136	408	505	39
Safety and Special	14	128	124	18
Common Carrier	0	36	34	2
Total	150	572	663	59

Research and Laboratory

*"Study new uses for radio, provide for experimental uses of frequencies * * * "—(Sec. 303 (g) of the Communications Act).*

*"The Commission * * * shall keep itself informed * * * as to technical developments and improvements in wire and radio communication and radio transmission of energy to the end that the benefits of new inventions and developments may be made available to the people of the United States."—(Sec. 218 of the Communications Act).*

TECHNICAL RESEARCH DIVISION

General

The Technical Research Division deals with problems relating to technical standards, miscellaneous radio-frequency devices, wave propagation, experimental operations, equipment specifications and approval, and allied subjects. Technical information obtained from within the Commission, other Government sources, colleges and universities, and private industry is used in connection with its studies. The division maintains current lists of equipment approved for use by the various services, and administers the Experimental Radio Services.

Division personnel participated in Panel II of the Telecommunications Planning Committee, with the division chief being chairman of that panel. This panel is concerned with the coordination of development and application of new and improved systems of communication. Staff members serve on several panel committees in liaison between the Commission and other Government and private organizations.

Ground conductivity map.—From the work started last year, a new official ground conductivity map was completed. It has been incorporated in part 3 of the rules and a larger version may be purchased separately from the Superintendent of Documents, Government Printing Office (see list of publications in appendix). This large-scale map is being used extensively by consulting engineers and others in plotting the service areas of AM and other radio stations.

Sunspot cycle recording.—Information accumulated during a complete sunspot cycle in this field strength recording project has been useful to Commission studies of clear-channel and daytime-skywave interference problems. Nearly 11 years are required to complete a sunspot cycle. To determine whether variations in long-distance

propagation on AM broadcast frequencies are due entirely to sunspot activity, or in part to other natural phenomena, data covering at least two complete sunspot cycles for the same propagation paths are required. These recordings are being continued on a reduced scale at two FCC monitoring stations and the recorder charts are being stored for later analysis because of the pressure of more urgent work in connection with VHF and UHF propagation research.

Technical consultation and advice.—The amount of time devoted to technical problems encountered by other divisions of the Commission increases each year. This activity requires numerous staff conferences, participation in the work of Government and industry committees, attendance at hearings, and preparation of memoranda and formal reports. In some cases, the information and procedures developed in this work have been adopted by foreign administrations through conferences arranged by the United States.

Among technical subjects investigated and reported on during the fiscal year were the following:

Calculation of 0.5-millimho groundwave field intensity curves for the AM broadcast band.

Investigation of daytime skywave transmission in the AM broadcast band.

Investigation of the relationship between signal coverage, power, and transmitting antenna heights, utilizing latest available propagation data, for use in the development of TV rules and standards.

Preparation of new allocation curves concerning distance of TV transmitted from principal city in relation to antenna height and power.

Derivation of information showing distances to the "Grade A service contour" as related to transmitted power and antenna height for study of TV station overlap.

Investigation of skip distances and maximum usable frequencies for fixed services.

Study of frequencies from 2848 to 7640 kilocycles and participation in a related hearing.

Derivation of propagation data for consideration in connection with the shifting of aviation frequencies.

Government-industry propagation committees.—Several meetings were held of the Radio Propagation Advisory Committee, which was organized last year. This committee seeks to speed the resolution of new problems involving radio-wave propagation, particularly those concerning VHF and UHF television, and standards for measurement and frequency allocations. The committee is composed of engineers

from the Commission and other Government agencies, from the industry, and consulting engineers who practice before the Commission.

The division participated on various committees of URSI (International Scientific Radio Union), CCIR (International Radio Consultative Committee), and the Executive and Budget Committees for CRPL (Central Radio Propagation Laboratory), which are also concerned with propagation studies.

Field measurements of VHF and UHF propagation.—Many special studies have been made of the data previously obtained in a project financed by the Central Radio Propagation Laboratory of the National Bureau of Standards. This support was concluded in June 1953. However, new data have since been accumulated by FCC monitoring stations, but on a reduced scale, and close cooperation is being maintained with the CRPL. Effort is being made to obtain information regarding the nature of UHF propagation by recording the field strengths of new UHF television stations. The special types of antennas used yield results which do not appear to agree with those previously obtained with older types of antennas. There is urgent need for UHF propagation information based on actual measurements.

The division, under a contract with the Signal Corps of the Army, is also supervising a VHF field intensity recording and study program.

Special VHF–UHF propagation studies.—Special measurements, in a program which began several years ago, are being continued to obtain further information on certain aspects of VHF ionospheric transmissions. The project is now supported financially by the Department of Defense, which has enabled the Commission to increase this particular activity. New VHF and UHF television propagation curves are being prepared and the problem of predicting VHF and UHF field intensities over different types of terrain is being studied.

Experimental Radio Services

In encouraging radio experimentation and development, the Commission provides for the operation of experimental stations. During fiscal 1954 the rules governing these stations were amended so as to spread the work of renewing licenses throughout the 12-month period (part 5).

The rules provide for two classes of experimental stations, namely: Experimental (Research) stations and Experimental (Developmental) stations. Research stations are for the use of persons engaged in fundamental or general research, experimentation and developmental of radio in general; or for the development, testing, or calibration of radio equipment not relating to an existing service. Developmental stations are for the development of equipment, engineer-

ing data, or techniques for an existing or proposed radio service. Approximately 60 percent of the experimental authorizations are of the research type. However, during the past year the number of developmental stations increased 172 percent.

There are several subclasses of research stations. Those in greatest use are "contract developmental" and "export developmental" stations. The former classification includes stations for developing equipment or techniques under contract with various Federal agencies. The latter classification is for the development of equipment intended for export and eventual use in stations under foreign jurisdiction.

The majority of research stations are operated by manufacturers of equipment and by research and development organizations. These stations are engaged in evolving new equipment and improving existing equipment, perfecting new techniques, and fundamental studies of radio propagation or similar phenomena. Developmental work is being continued on narrow-band equipment which will effect a more efficient use of the radio spectrum. New and improved radio aids to navigation are being evolved, also radiolocation and microwave equipment.

Experimental work continues in ionospheric investigations and propagation studies on various frequency bands, particularly in the upper range where information is meager. Several experimental stations operate on frequencies above 30,000 megacycles, which space was previously considered unusable for radio purposes.

The Commission's rules provide for the experimental use of various bands of frequencies above 25,000 kilocycles, on condition that harmful interference is not caused to the services to which these frequencies are regularly assigned.

Research stations are used extensively by manufacturers and sales engineers for making field-intensity or coverage surveys in areas where it is proposed to establish radio systems. These surveys provide information useful in determining the operating frequency, power, and antenna location for best performance. Normally, a special temporary authorization is issued for each survey.

Applications for developmental stations (formerly known as class 2 experimental stations) include new uses of radio and types of operation not provided for in other parts of the rules. Hence, the experimental service is a proving ground for new radio equipment and techniques. Such developments as radar and microwave relay systems grew out of experimental authorizations.

Due to the rapid expansion of the radio and electronics industry and the ever-increasing number of companies entering the field, the number of experimental authorizations has increased rapidly over the past few years, as shown in the following table:

Class of experimental station	June 30, 1952	June 30, 1953	June 30, 1954	Percent increase in 2 years
Research	322	384	417	29
Developmental	47	60	169	259
Total	369	444	586	59

Control of Manmade Interference

One of the important problems facing the Commission is the control of manmade radio interference, as indicated by the interference complaints reported in the chapter of "Field Engineering and Monitoring". This interference comes from two general sources. First and most important are devices which generate radio-frequency for various noncommunication purposes, such as medical diathermy, industrial heating, scientific, and other apparatus. This energy is used at or very close to the point of its generation. Any energy that escapes as radiation represents a loss in the effectiveness of the apparatus. Moreover, it is this wasted energy that causes interference. Such radiation must be controlled to prevent disruption of radio communication.

Many of these devices employ power far in excess of the maximum (50 kilowatts) permitted AM broadcast stations, and their combined power exceeds the total transmitter power for all forms of radio communication. There have been cases where the energy emitted by apparatus of this type has skipped-jumped clear across the continent to bound up into the ether to disrupt communication for safety purposes thousands of miles away.

The other important source of manmade interference arises from the countless electrical devices and "gadgets" upon which we have become so dependent. Every switch that closes or opens an electric circuit is a potential source of interference. Every spark plug in every automobile can cause interference. Interference has even been traced to oscillations from the filament in an oldstyle electric light bulb.

Restricted radiation devices.—The Commission has long recognized that steps to prevent interference before it happens are more satisfactory than trying to seek out and eliminate the interference after it occurs and becomes widespread. As early as 1938, it formulated rules to govern the operation of certain low-power radio-frequency devices then used for remote control purposes. These rules provided, basically, that such devices could be operated without a license if the radiated field did not exceed a specified value. They were applied with a fair amount of success to other radio frequency devices which do not depend on radiation for their operation, such as carrier current sys-

tems, or which are capable of operating with extremely limited radiation, such as wireless microphones or garage door-openers.

Recognizing the inadequacy of the then existing rules, the Commission, in 1949, proposed broad administrative and engineering factors to be considered in controlling the interference hazard of millions of unlicensed radio-frequency generating devices. As a result of comments and study, the Commission, on April 15, 1954, proposed specific radiation limitations for devices subject to part 15 of the rules which govern restricted radiation devices.

Subpart A of this proposal sets forth a table of radiation limitations which varies with the frequency of operation. This table is applicable to all devices subject to this part unless specifically exempted. Subpart B contains provisions for devices that are exempt from the general requirement, chiefly carrier current systems, including campus broadcasting and community TV antenna systems. These exempted devices would require certification before they may be operated.

In order to establish a suitable limit for community TV antenna systems, the Commission made a detailed study of existing systems as well as the equipment used—particularly the different types of cables. This study dealt basically with the technical problems involved in establishing a system and stressed the radiation aspects.

The proposed rulemaking of April 1954 also looks to establishing a certification procedure for receivers that operate on frequencies above 25 megacycles, such as FM, TV, and most land mobile. This certification, made by the manufacturer or an independent laboratory, would assure the user that radiation from the certified receiver met the requirements of part 15.

Industrial, scientific, and medical devices.—Even in the early 1930's certain devices seriously interfered with long distances point-to-point, with ship-to-shore, and with other similar communication services. The chief offenders were identified as medical diathermy and industrial heating devices. As early as 1938 the Commission contacted the persons concerned in an effort to enable the diathermy and heating equipment to operate but, at the same time, eliminate or at least minimize the interference.

The outcome of these conferences was the adoption in 1947 of part 18 of the rules governing the Industrial, Scientific, and Medical Service. These rules provided several bands within which the diathermy and industrial heating equipment could operate with unlimited radiation without affecting radio communication, and imposed fairly stringent limitations on radiation on bands used by regular radio services.

Diathermy and miscellaneous equipment are type approved by the Commission through tests at the Commission's laboratory.

June 30, 1953, marked the end of the 6-year period provided for replacement of noncomplying equipment. During the fall of that year it was necessary to engage in an extensive educational campaign to secure the cooperation of manufacturer and user in complying with these requirements.

A new type of medical equipment came into the picture during the year when the Electro Medical Manufacturers Association petitioned the Commission to provide for type approval of medical ultrasonic apparatus. Ultrasonic equipment has been used in industry for some time for such purposes as agitating solutions while cleaning metal parts. Its use for medical purposes is new. Acting on the petition, the Commission initiated rulemaking to establish radiation limitations and to provide for type approval of ultrasonic devices.

While the diathermy problem was being dealt with, the Commission received a petition requesting an extension in the effective date of part 18 with respect to epilation (hair removing) equipment. The Commission granted the petition insofar as to permit the use of certain noncomplying equipments until December 31, 1955, with the proviso that any interference that may be caused will be promptly corrected.

One problem still confronting the Commission is the use of radio-frequency energy for stabilizing the arc when welding stainless steel or certain nonferrous metals, such as aluminum, in an inert gas atmosphere. These arc welders use spark-gap-type oscillators and, as a consequence, produce a broad range of interference. The Commission has successively postponed the effective date of part 18 as it pertains to such arc welding stabilizers, while working with industry to develop mutually satisfactory standards. In April 1954 the Commission joined with the Navy Department in an interference study of arc-welding equipment. This may point the way to a permanent solution of this problem, either by developing methods to meet the requirements of the rules or by establishing limits that can be met by arc welders.

Equipment performance standards.—Further progress was made in promulgating equipment performance standards for various classes of stations. The increasing occupancy of the radio spectrum has emphasized equipment performance which will minimize interference between stations. Other aspects which relate to safety and reliability were also considered in specifying equipment performance requirements. Proposed rules specifying spurious emission limitations were issued for international broadcast stations, and for ship radiotelegraph and radiotelephone stations.

These spurious emission requirements generally provide for relatively greater attenuation at higher levels of power output, with consideration given to an orderly schedule for compliance of existing equipment. The urgency of reducing harmful interference on 5476.5 kilocycles, an aeronautical mobile frequency, caused by ship stations operating on 2738 kilocycles led to a Commission order limiting use of the latter frequency to stations using equipment certified to have second harmonic (5476 kc) emission 40 decibels (0.01 percent) or more below the power on the fundamental frequency (2738 kc).

Equipment Type Approval and Type Acceptance

The "type approval" and "type acceptance" procedures are designed to assure that certain items of transmitting equipment meet the equipment performance standards for the class of station where it is used, and that interference from other radiating devices is minimized.

Type approval is based on tests made by the Laboratory Division. Type acceptance is based on test data submitted by the manufacturers and evaluated by the Technical Research Division. Lists of type-approved and type-accepted equipment are compiled by the latter. These lists show equipment acceptable for licensing in various services, thereby avoiding the necessity for review of the technical characteristics of equipment proposed in each application for license.

In addition to the type-acceptance and type-approval procedures previously adopted for AM and FM broadcast, citizens, and certain marine services, type-acceptance procedures were proposed for the domestic public, public safety, industrial and land transportation services, and the remainder of the marine service. Type approval was proposed for frequency and aural modulation monitoring equipment in the TV broadcast service.

Proposed amendments to the rules would provide the basis for more uniform treatment of type approval and type acceptance in the various services and for further expanded use of these procedures. Other proposed rules would type accept TV transmitters and change the nomenclature in AM and FM broadcast from type approval to type acceptance so as to be consistent with other services.

One list of equipment acceptable for licensing and three supplements were issued. The list was expanded to include equipment previously type approved or type accepted under parts 7, 8, and 19 of the rules.

The following tabulation summarizes the type-acceptance and type-approval activity, excluding equipment used for industrial, scientific, and medical purposes discussed previously:

	Type acceptance	Type approval	Specifications filed
Received	16	23	141
Issued	14	13	0
Pending	9	10	0

LABORATORY DIVISION

General

The Laboratory Division, which maintains a laboratory near Laurel, Md., makes technical measurements and studies essential to the Commission's engineering work, and tests certain types of equipment for compliance with service and noninterference functioning.

Exacting technical information is required as a basis for allocating frequency bands to the different radio services, establishing engineering standards for the individual services, and regulating the emissions of noncommunications equipment.

The laboratory studies, among other things, various methods of transmission and reception to determine their utility and interference factors; and the degrees of interference produced by radio-frequency energy employed by industrial, scientific, and other equipment.

It tests transmitters—to determine whether they give interfering signals on frequencies other than those assigned; receivers—to determine how close together stations may be located without interfering with one another and what interference one receiver may produce in other receivers; apparatus involving safety of life and property at sea—for reliability of operation; and frequency and modulation monitors—for accuracy.

Also, the laboratory develops special monitoring equipment used by Commission engineers in the field, and calibrates the signal generators, field intensity sets, and other apparatus used in field enforcement and investigation activities.

In endeavoring to anticipate interference problems and have remedial measures taken prior to the manufacture and distribution of a large number of units, the laboratory mainly tests types of proposed equipment rather than individual units already in use.

In addition to type tests required by the rules, the laboratory tests other equipment which may involve service and interference problems. Such testing often discloses shortcomings in the submitted apparatus not anticipated by the manufacturer. Making any needed change before quantity production is less expensive to the manufacturer than correcting a large number of units in actual operation.

Following are examples of particular activities of the laboratory during the year:

Broadcast

Laboratory work in the broadcast field largely concerned tests of receiver oscillator radiation and the various spurious responses of receivers, with especial attention to the impact of these problems on the implementation of the UHF television band. Studies were made of a number of proposed UHF tuners and receivers submitted by manufacturers.

In order to obtain propagation data for the UHF band, the laboratory made continuous field-intensity recordings of two UHF stations. Studies were made of the coverage of three UHF stations in Roanoke, Va., Reading, Pa., and Charleston, W. Va., by means of mobile field-strength-measuring equipment. Special UHF field-strength recording equipment was developed and furnished for installation in six monitoring stations for use in accumulating more UHF propagation data.

Work was begun on the development of TV monitoring techniques to be employed in a mobile TV monitoring unit of the Field Engineering and Monitoring Bureau.

The laboratory conducted tests on color TV receivers made available by four manufacturers to determine the susceptibility of the color system to interference, and to compare color set susceptibility with that of monochrome receivers. It was found that color TV will have a greater probability of interference than monochrome. This information was considered by the Commission in adopting color TV standards. The laboratory's technical findings were further made available to industry through the presentation of a paper at the 1954 spring television conference of the Institute of Radio Engineers.

Nonbroadcast

The laboratory was consulted in connection with the program of listing various classes of radio transmitters as being acceptable for licensing by the Commission, in order to determine the adequacy or accuracy of technical information supplied by the manufacturers in applying for listing.

Type-approval tests were conducted on a marine radiotelegraph auto alarm, 2 auto alarm keying devices, and 2 nonportable lifeboat transmitters, in addition to 2 marine radar equipments. This equipment is related to the safety of life and property at sea.

Tests for type approval were made on a number of devices using the citizens' radio band. These include three transmitters for use in automobiles, a transmitter intended for paging doctors in hospitals, and a portable "walkie-talkie" unit.

Noncommunication Equipment

The laboratory tests industrial, medical, diathermy, and other devices using radio-frequency energy which, as explained in sections of this report dealing with interference, can play havoc with regular radio services.

During the year, 36 diathermy machines were submitted for test, 2 of which operated in the 2450 megacycle band. In the same period, 12 diathermy machines and 16 kinds of miscellaneous equipment were type approved.

In the mutual Government-industry effort to reduce interference, the Laboratory Division is represented on the following committees: IRE Industrial Electronics Committee; AIEE Subcommittee on Induction and Dielectric Heating; AIEE Subcommittee on Radiation Measurements above 300 Megacycles; IRE Oscillator Radiation Subcommittee; ASA Technical Subcommittee No. 1 of Committee C63; and CCIR Study Groups.

Frequency Allocation

*"Assign bands of frequencies to the various classes of stations * * * "—(Sec. 303 (c) of the Communications Act).*

" * * carry out * * * any international radio or wire communications treaty or convention * * * "—(Sec. 303 (r) of the Communications Act).*

GENERAL

The radio spectrum must be studied continuously so that channels can be allocated and used in conformity with advancements in electronics and rendition of maximum public service.

Portions of the spectrum have different characteristics. For that reason, one group of frequencies may be useful to a particular service but not to others. Consequently, bands must be allocated to those services for which they are most suitable. In some instances these bands have to be subdivided to serve more specific purposes.

Since radio transmissions extend beyond national boundaries, there must be cooperation by nations to minimize interference by stations of one country with those of other countries. Also, there must be international agreement on the designation of frequencies for the many radio services, and universal practice in their use. Since the United States is the world's largest user of radiocommunication facilities, international concord and coordination is essential to protecting our interests.

INTERNATIONAL FREQUENCY ALLOCATION

In the international radio field the Commission has been chiefly concerned with carrying out domestically the provisions of the Geneva Agreement (1951), to which some 65 countries are parties. Progress in this connection has been made for six principal radio services in the high-frequency spectrum as follows:

Aeronautical mobile (R) is the designation for frequencies used by the civil aviation industry for control and operation of aircraft on domestic and international routes. The R (route) designation includes stations on the ground and stations on board the aircraft.

Eighty percent of all of the aeronautical mobile (R) frequencies called for by the Geneva Agreement have been cleared for activation.

The prospect for additional clearances is encouraging. A year ago only 53 percent of the frequencies were available for aviation use.

Changeovers were completed during the year by all countries involved in the establishment of scheduled new communication systems for the North Atlantic (R) and European-Mediterranean (R) areas. Aviation communication in these areas has been improved substantially as a result.

Similarly, a communication plan identified as Atlantic-Middle East Meteorological Broadcast has been placed in effect with a resulting improvement in quality of service for transmission of essential weather information.

In the Caribbean area, all (R) plan frequencies in which civil aviation has an interest have been cleared of conflicting assignments and are available for use by the aviation industry as required.

Aeronautical mobile (R) plans for the North, Central, and South Pacific areas are being studied with a view toward placing them in effect during fiscal 1955. When this is done it will represent substantial completion of all such plans internationally agreed upon. Domestically, there are 64 frequencies available for assignment in the aeronautical mobile (R) service. Of these, 51 were clear of conflicting assignments at the close of the year.

Aeronautical mobile (OR) is the designation for frequencies used primarily for Government aeronautical operations. The Commission does not at this time license any stations in the aeronautical mobile (OR) (off route) service but it does recognize the importance of clearing these bands for use at the earliest possible date. A year ago, 29 of 41 conflicting assignments had been cleared. At the close of fiscal 1954, all but two conflicting assignments had been cleared, and these two are scheduled for deletion by December 1, 1954.

Amateur service.—All adjustments in the frequency allocations for the amateur service envisaged by the Atlantic City conference were completed in early 1952. No additional action is required of the United States with respect to amateur frequencies.

Fixed service.—The fixed service presents a serious frequency problem. This service is allocated more spectrum space between 4 and 25 megacycles under the Atlantic City allocation table than all the other services combined. It represents our major use of the high-frequency spectrum.

Fixed stations provide rapid communication by telegraph, telephone, facsimile, radiophoto, and other transmissions to most of the principal countries. Yet there is no international plan of time and frequency sharing for this vital radio service, nor will there be until agreement is reached by the various countries on the International Frequency List. Drafts of this list are being prepared by

the International Frequency Registration Board (IFRB), based on the in-band fixed-service occupancy now developing as the result of the Geneva Agreement procedures.

Of the 166 assignments in the fixed service which were out-of-band with respect to the Atlantic City allocations, all have been deleted or replacement frequencies have been found and the remaining few are planned for deletion not later than December 1, 1954.

Completion of the fixed-service adjustments represents the end of the most complex reassignment program ever undertaken by the Commission. It could not have been achieved without the cooperation of the licensees and Federal agencies using frequencies in this part of the spectrum. It is a significant achievement because the adjustments have been made without the necessity of holding hearings on modification or cancellation of licenses. Making the necessary adjustments has occasioned some hardship and financial sacrifice on the part of the Commission's fixed-service licensees, but that is their contribution to overall service benefits.

HF broadcast service.—All high-frequency broadcast stations licensed by the Commission are now assigned frequencies within the Atlantic City broadcast bands.

However, the Geneva Agreement provides that the IFRB adjust the Mexico City basic plan and the draft plans prepared by the Technical Plan Committee at Paris, and prepare such additional plans as are considered necessary to deal with seasons and phases of solar activity. These plans have not yet been completed by the IFRB. The various countries will have to reach agreement on precise frequencies and hours for high-frequency broadcast operation. At the present time there is no international channeling of the high-frequency broadcast bands and no specifications as to hours of their use.

Although some constructive steps can be taken, it does not appear that an international plan for use of frequencies for HF broadcasting which would be acceptable to the United States can be placed in effect so long as Russian jamming of United States HF broadcasts continues.

Maritime mobile service.—The Atlantic City radio regulations provide the maritime mobile service with exclusive bands for each of four classes of stations—ship telephone, ship telegraph, coast telephone, and coast telegraph.

The Geneva Agreement anticipates the introduction of the ship telegraph bands in successive steps as follows: Calling bands, cargo working bands, and passenger working bands. Introduction of these three subbands at 4, 6, 8, 12, and 16 megacycles, in the order listed, is to be followed by the introduction of the Atlantic City ship telephone bands. The Commission has completed all of the frequency changes envisaged by the Geneva Agreement for the entire spectrum between 20 and

27.5 megacycles. The Geneva Agreement anticipates the introduction of coast telegraph and coast telephone assignments, one at a time, as clearances can be effected.

Use of the Atlantic City ship telegraph calling bands was introduced on September 1, 1953, as scheduled. However, the next phase of adjustment, introduction of the Atlantic City cargo-ship working bands, had to be postponed from March 1, 1954, to July 1, 1954. These bands (4187–4238, 6280.5–6357, 8374–8476, 12561–12714, 16748–16952, and 22270–22400 kilocycles) were activated successfully on the latter date. Most countries have completed similar action and cargo ships now are able to operate with comparatively little interference from stations in other services.

The Commission has not yet completed its part of the third phase of the adjustment, namely, clearance of the passenger-ship working bands for ship telegraph stations. Appropriate announcements will be made as these clearances occur, and the shipping industry and affected licensees will be kept advised in a manner similar to that employed for the clearance and introduction of the ship calling bands and the cargo ship working bands. The target date for opening of the passenger-ship working bands is January 1, 1955.

As regards coast telegraph stations, there are 127 assignments to be activated between 4 and 20 megacycles and 22 coast telegraph assignments in the 22-megacycle band, making a total of 149 assignments between 4 and 27.5 megacycles. By the year end, 136 of these (91 percent) had been cleared for activation and the licensees notified. Additional clearances are being arranged on a continuing basis and affected licensees are being kept informed.

In the matter of maritime mobile telephone service for public correspondence, a substantial portion of the frequency adjustments resulting from the Geneva Agreement has been made and this service to ships is now provided on 85 percent of the planned ship assignments and 81 percent of the planned coast assignments.

NATIONAL FREQUENCY ALLOCATION

Commission actions during the past year concerning the allocation of frequencies on a national scale were directly or closely related to carrying out the international commitments of the United States.

Some of the major domestic frequency allocation actions were:

Following an extensive survey of high-frequency radiotelephone communication on the Mississippi River system, frequency adjustments were made to minimize out-of-band operations.

Held a hearing on the proposed deletion of certain high frequencies presently available to stations in the Fixed Public Agricultural service.

Amended part 8 of the rules to prohibit use of 2738 kilocycles by

vessels unable to restrict their harmonic radiation below a specified level to protect the activation of aeronautical mobile frequencies.

Proposed to amend part 2 of the rules to permit non-Government radiolocation stations (used principally for radiopositioning and radiosurveying) to use frequencies in the 10–14- and 90–110-kilocycle bands if no harmful interference is caused to radionavigation stations operating in the same bands.

The Commission also began a comprehensive study of the effect on existing allocations which can be expected to result from exploitation of certain new techniques of radiocommunication involving the VHF and UHF portions of the spectrum.

The Commission completed about 80,000 individual studies of frequency assignments proposed in that portion of the spectrum which is used jointly by Government agencies and Commission licensees. The majority of these studies resulted directly or indirectly from steps taken to implement the Atlantic City frequency allocations. As a result, 18,000 formal actions were taken jointly by the Commission and the Frequency Assignment Sub-Committee (FAS) of the Interdepartment Radio Advisory Committee. In addition, some 2,400 separate frequency studies were made and coordination effected for applications filed under the Commission's rules governing the Experimental Radio Services.

Approximately 300 cases of interference between Government and non-Government stations were reported during the year. They were resolved by interfering users agreeing to share time or by one or both shifting frequency.

The Commission participated in approximately 200 Government interagency meetings relative to formulation of domestic frequency policy, frequency-management and frequency-assignment problems.

INTERNATIONAL FREQUENCY COORDINATION

In connection with Commission activities concerned with the worldwide program for bringing into force the Atlantic City allocation table, some 33 foreign administrations were contacted to determine their plans for moving to in-band frequencies some 221 of their active assignments which were operating out of band. Similarly a few administrations requested information relating to the change in frequency of Commission-licensed stations operating out of band. This international contact is pursuant to the Geneva Agreement which prescribes the methods and procedures for implementing the Atlantic City regulations.

Most of the assignments which were the source of conflicts have been cleared. Nearly a thousand letters, telegrams, and radiograms were exchanged between the Commission and foreign administrations in this cooperative effort.

The exchange of technical data concerning proposed frequency assignments in portions of the VHF and UHF spectrum continued between the Commission and the Canadian Department of Transport. This procedure, announced in 1950, permits an effective exchange of engineering comments on proposed United States and Canadian assignments in border areas. Its effectiveness is demonstrated by the fact that no insoluble case of harmful interference exists between stations of the two countries in these portions of the spectrum. Approximately 600 letters on this subject were exchanged.

During the year approximately 43,000 fanfolds (records of frequency assignments giving particulars designed to assure protection of United States interests) were forwarded to the International Frequency Registration Board. They related to assignments to United States stations between 14 kilocycles and 76 megacycles, of which approximately 23,000 fanfolds involved assignments between 14 kilocycles and 27,500 kilocycles. Most of the latter dealt with changes in assignments of existing stations required in implementing the Atlantic City allocation table.

Additionally, machine records (IBM) were processed for every frequency assignment made by the Commission throughout the year, regardless of the part of the spectrum involved. In printed form, this record runs to three volumes and contains approximately 115,000 entries. The IRFB reported approximately 85 unsatisfactory findings relative to United States stations due to prior cochannel or adjacent frequency registration by another country. These were resolved through coordination with the users.

INTERNATIONAL INTERFERENCE AND INFRACTION

One of the fundamental responsibilities of the Commission in carrying out the radio provisions of treaties is to take action in cases of complaints of interference involving a domestic licensee and a foreign station. During the year, approximately 300 instances of reported harmful interference came to the Commission's attention, either from foreign sources or from domestic stations, most of which were resolved satisfactorily. In general, an international interference case is much more difficult of solution than a comparable situation involving United States stations.

Approximately 600 cases of infractions of international radio agreements by foreign stations and by foreign radio operators, which are detected by the Commission's monitoring and inspection activities, were screened and reported to appropriate foreign administrations. Most of these involved spurious emissions, harmonic radiations, off-frequency operation, or some other technically improper operation, all of which constitute sources of harmful interference to radio com-

munication or involve the safety of life and property afloat and in the air.

INTERNATIONAL CONFERENCES AND MEETINGS

The Commission assisted in the United States preparation for and participation in 13 international conferences and meetings during the year. These were worldwide, regional, or bilateral in nature. Most of the major conferences were convened under the auspices of the International Telecommunication Union (ITU) or the International Civil Aviation Organization (ICAO). Approximately 90 nations participate in the activities of the ITU and some 62 participate in the activities of the ICAO.

The Commission furnished 3 delegation chairmen or vice chairmen and 15 representatives to the following 8 conferences and meetings:

Name	Place	Date
United States-Mexico Bilateral Meeting on Frequency Implementation Problems.	Mexico City	Aug. 18, 1953.
CCIR Plenary Meeting—7th Session	London	Sept. 1–Oct. 9, 1953.
United States-Mexico Informal Meeting on Standard Broadcasting.	Washington	Mar. 29–Apr. 2, 1954.
United States-Canada Meeting on Frequency Problems Relative to Implementing EARC Agreement.	Ottawa	Apr. 12–13, 1954.
ICAO Communications Division—5th Session	Montreal	Mar. 9–Apr. 9, 1954.
United States-Cuba Meeting on CONELRAD	Havana	Apr. 21–23, 1954.
ICAO Special Middle East Regional Communications Meeting.	Rhodes	May 11–29, 1954.
CCIT Study Group XI—International Telegraph Problems.	Geneva	June 30, 1954.

In addition, the Commission engaged in preparatory or followup work directly connected with these 5 conferences and meetings:

Name	Place	Date
United States-Venezuela Discussions Concerning Frequency Implementation Problems.	Washington	August 1953.
URSI Technical Meeting	Ottawa	Oct. 5–8, 1953.
United States-Canada Informal Discussion on Civil Aviation.	Washington	Dec. 12–14, 1953.
ITU Administrative Council—9th Session	Geneva	May 1–29, 1954.
ICAO Assembly—8th Session	Montreal	June 1, 1954.

The following 25 conferences and meetings are projected for the future:

Name	Place	Date
ICAO Informal South American Communications Meeting	Lima	July 1954.
URSI—11th General Assembly	Amsterdam	Aug. 23, 1954.
CCIF—General Switching Program	Geneva	Sept. 1–5, 1954.
CCIR—Study Group IX	do	Sept. 10–23, 1954.
2d International Congress on Communications	Undetermined	October 1954.
United States-Mexico Meeting on Standard Broadcast	Mexico City	Do.
CCIF—XVII Plenary Assembly	Geneva	Oct. 4–12, 1954.
United States-Libyan Arrangement To Resolve Frequency Problems.	Undetermined	1954.
ICAO—Air Navigation Conference 2d Session	Montreal	Fall 1954.
ICAO—North Atlantic Regional Air Navigation Meeting—3d Session.	do	Do.
United States-Bahama Meeting on CONELRAD	Undetermined	1954.
United States-Bermuda Meeting on CONELRAD	do	1954.
United States-Canada Meeting on CONELRAD	do	1954.
United States-Haiti Meeting on CONELRAD	do	1954.
United States-Jamaica Meeting on CONELRAD	do	1954.
United States-Mexico Meeting on CONELRAD	do	1954.
ITU Administrative Council—10th Session	Geneva	Apr. 23, 1955.
ICAO—Search and Rescue Division	Montreal	1955.
ICAO—Personnel Licensing Division—5th Session	do	1955.
5th Plenipotentiary Inter-American Telecommunications Conference.	Rio de Janeiro	1955.
CCIR—8th Meeting	Undetermined	1955.
ICAO—North Pacific Regional Air Navigation Meeting	do	1956.
ICAO—South Pacific Regional Air Navigation Meeting	do	1956.
ITU International Telegraph and Telephone Conference	Geneva	1956.
CCIT—8th Plenary Assembly	do	1956.

Appendix

FIELD OFFICES

The Commission maintains 61 field offices. Fifty-seven of these constitute the major force of the Field Engineering and Monitoring Bureau, and the other four are accounting offices of the Common Carrier Bureau.

The field engineering offices consist of 7 regional offices, 24 district offices with 6 suboffices and 2 ship offices, and 18 monitoring stations—10 primary and 8 secondary.

A list of all Commission field offices follows:

FIELD ENGINEERING AND MONITORING BUREAU

Regional Offices	*Headquarters*
Region 1	954 Federal Bldg., New York 14, N. Y.
Region 2	411 Federal Annex, Atlanta 3, Ga.
Region 3	323–A Customhouse, San Francisco 26, Calif.
Region 4	802 Federal Office Bldg., Seattle 4, Wash.
Region 5	P. O. Box 1142, Lanikai, Oahu, T. H.
Region 6	832 U. S. Courthouse, Chicago 4, Ill.
Region 7	1029 New Federal Bldg., Detroit 26, Mich.

District Offices	*Address*
1	1600 Customhouse, Boston 9, Mass.
2	748 Federal Bldg., New York 14, N. Y.
3	1005 New U. S. Customhouse, Philadelphia 6, Pa.
4	500 McCawley Bldg., Baltimore 2, Md.
5	402 Federal Bldg., Norfolk 10, Va.; (ship office) 200 Post Office Bldg., Newport News, Va.
6	411 Federal Annex, Atlanta 3, Ga.; (suboffice) 214 Post Office Bldg., Savannah, Ga.
7	312 Federal Bldg., Miami 1, Fla.; (suboffice) 409–410 Post Office Bldg., Tampa 2, Fla.
8	400 Audubon Bldg., New Orleans 16, La.; (suboffice) 419 U. S. Courthouse and Customhouse, Mobile 10, Ala.
9	324 U. S. Appraisers Bldg., Houston 11, Tex.; (suboffice) 329 Post Office Bldg., Beaumont, Tex.
10	500 U. S. Terminal Annex Bldg., Dallas 22, Tex.
11	539 U. S. Post Office and Courthouse Bldg., Los Angeles 12, Calif.; (suboffice) 15–C U. S. Customhouse, San Diego 1, Calif.; (ship office) 326 U. S. Post Office and Courthouse, San Pedro, Calif.
12	323–A Customhouse, San Francisco 26, Calif.

District Offices	*Address*
13	433 New U. S. Courthouse, Portland 5, Oreg.
14	802 Federal Office Bldg., Seattle 4, Wash.
15	521 New Customhouse, Denver 2, Colo.
16	208 Uptown Post Office and Federal Courts Bldg., St. Paul 2, Minn.
17	3100 Federal Office Bldg., Kansas City 6E, Mo.
18	826 U. S. Courthouse, Chicago 4, Ill.
19	1029 New Federal Bldg., Detroit 26, Mich.
20	328 Post Office Bldg., Buffalo 3, N. Y.
21	502 Federal Bldg., Honolulu 1, T. H.
22	322–323 Federal Bldg., San Juan 13, P. R.
23	53 U. S. Post Office and Courthouse Bldg., Anchorage, Alaska; (suboffice) 7–8 Shattuck Bldg., Juneau, Alaska.
24	Briggs Bldg., 22d & E Sts., NW., Washington 25, D. C.

Primary Monitoring Stations	*Secondary Monitoring Stations*
Allegan, Mich.	Searsport, Maine
Grand Island, Nebr.	Spokane, Wash.
Kingsville, Tex.	Twin Falls, Idaho
Millis, Mass.	Fort Lauderdale, Fla.
Santa Ana, Calif.	Chillicothe, Ohio
Laurel, Md.	Muskogee, Okla.
Livermore, Calif.	Anchorage, Alaska
Portland, Oreg.	Fairbanks, Alaska
Powder Springs, Ga.	
Lanikai, Oahu, T. H.	

COMMON CARRIER BUREAU FIELD OFFICES

Atlanta, Ga., 733 Hurt Bldg.
New York, N. Y., 90 Church St.
St. Louis, Mo., 815 Olive St.
San Francisco, Calif., 180 New Montgomery St.

PUBLICATIONS

The Commission's printed publications are sold by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., and are not distributed by the Commission.

A purchaser of any part of the rules and regulations is furnished with a form by the Superintendent of Documents which, when filled out and forwarded to the Commission, entitles him to receive any subsequent changes or amendments to the part purchased until a complete revision is printed.

A list of printed publications available from the Superintendent of Documents follows:

Title	*Price*
Communications Act of 1934, with Amendments and Index, revised to May 1954	$0.70
Amendments *only* from January 1954 to May 1954	.15

Title	*Price*
Federal Communications Commission reports (bound volumes of decisions and reports exclusive of annual reports):	
Volume 5, November 16, 1937, to June 30, 1938	$1.50
Volume 6, July 1, 1938, to February 28, 1939	1.50
Volume 8, March 1, 1940, to August 1, 1941	1.50
Volume 11, July 1, 1945, to June 30, 1947	3.75
Volume 12, July 1, 1947, to June 30, 1948	3.50
Annual reports of the Commission:	
Thirteenth Annual Report—Fiscal year 1947	.25
Fourteenth Annual Report—Fiscal year 1948	.30
Fifteenth Annual Report—Fiscal year 1949	.35
Sixteenth Annual Report—Fiscal year 1950	.40
Seventeenth Annual Report—Fiscal year 1951	.40
Eighteenth Annual Report—Fiscal year 1952	.40
Ninteenth Annual Report—Fiscal year 1953	.50
Twentieth Annual Report—Fiscal year 1954	.50
Statistics of the communications industry:	
For the year 1943	.35
For the year 1945	.50
For the year 1946	.55
For the year 1947	.75
For the year 1948:	
Sections A and B	1.00
Section B—Broadcast only	.35
For the year 1949, Sections A and B	1.00
For the year 1950 (Common Carrier only)	.50
For the year 1951 (Common Carrier only)	.40
For the year 1952 (Common Carrier only)	.50
Report on Public Service Responsibility of Broadcast Licensees (Blue Book), 1946	.40
An Economic Study of Standard Broadcasting, 1947	.40
Study Guide and Reference Material for Commercial Radio Operator Examinations	(2)
Digest of Radio Regulations and Instructions for Restricted Radiotelephone Operators	.05
Standards of Good Engineering Practice Concerning Standard Broadcast Stations, revised to October 30, 1947	1.25
Figure M3, Estimated Ground Conductivity in the United States—set of 2 maps	3.50
Rules and Regulations:	
Part 0, Organization, Delegation of Authority, etc	(1)
Part 1, Practice and Procedure	(2)
Part 2, Frequency Allocations and Radio Treaty Matters; General Rules and Regulations, revised to July 30, 1952	.25
Part 3, Radio Broadcast Services, revised to June 30, 1953 (includes FM and TV engineering standards)	.50
Part 4, Experimental and Auxiliary Broadcast Services, revised to October 30, 1950	.15
Part 5, Experimental Radio Services, revised to March 17, 1953	.10
Part 6, Public Radiocommunications Services, revised to April 27, 1949	.10

See footnotes at end of table.

Title	*Price*
Rules and Regulations—Continued	
Part 7, Stations on Land in the Maritime Services, revised to July 20, 1954	$0.25
Part 8, Stations on Shipboard in the Maritime Services, revised to July 20, 1954	.35
Part 9, Aviation Services, revised to July 14, 1953	.10
Part 10, Public Safety Radio Services, revised to December 18, 1953	.15
Part 11, Industrial Radio Services, revised to July 29, 1953	.15
Part 12, Amateur Radio Service, revised to November 20, 1953	.20
Part 13, Commercial Radio Operators, revised to June 27, 1950	.05
Part 14, Radio Stations in Alaska (other than Amateur and Broadcast), revised to November 20, 1953	.05
Part 15, Restricted Radiation Devices, recodified to July 21, 1948	[3]
Part 16, Land Transportation Radio Services, revised to January 7, 1953	.10
Part 17, Construction, Marking, and Lighting of Antenna Structures, revised to June 3, 1953	.05
Part 18, Industrial, Scientific and Medical Service, revised to September 4, 1953	.10
Part 19, Citizens Radio Service	[2]
Part 20, Disaster Communications Service, effective March 21, 1951	.05
Part 31, Uniform System of Accounts for Class A and Class B Telephone Companies, revised to May 12, 1948	.40
Part 33, Uniform System of Accounts for Class C Telephone Companies, revised to May 12, 1948	.30
Part 34, Uniform System of Accounts for Radiotelegraph Carriers, revised to October 14, 1949	.20
Part 35, Uniform System of Accounts for Wire-Telegraph and Ocean-Cable Carriers, revised to October 14, 1949	.25
Part 41, Telegraph and Telephone Franks, revised to December 4, 1947	.05
Part 43, Reports of Communication Common Carriers and Their Affiliates, revised to September 21, 1953	.05
Part 45, Preservation of Records of Telephone Carriers, effective October 1, 1950	.10
Part 46, Preservation of Records of Wire-Telegraph, Ocean-Cable and Radiotelegraph Carriers, effective October 1, 1950	.10
Part 51, Occupational Classification and Compensation of Employees of Class A and Class B Telephone Companies, effective October 10, 1951	.05
Part 52, Classification of Wire-Telegraph Employees, effective July 11, 1944	[3]
Part 61, Tariffs, Rules Governing the Construction, Filing, and Posting of Schedules of Charges for Interstate and Foreign Communications Service, revised to August 1, 1946	.10
Part 62, Applications Under Section 212 of the Act to Hold Interlocking Directorates, revised to May 23, 1944	.05
Part 63, Extension of Lines and Discontinuance of Service by Carriers, revised to December 30, 1946	[3]
Part 64, Miscellaneous Rules Relating to Common Carriers, revised to July 16, 1948	.10

[1] In the process of printing—available at Government Printing Office at a later date.
[2] Being revised—not available at present.
[3] Obtainable temporarily from the Federal Communications Commission without charge.

The Commission is unable to furnish lists of radio stations but, upon request, will supply a fact sheet about commercial sources of such lists, also one on communications publications and services.

Also available from the Commission are the following nonprinted information primers concerning the FCC and its various fields of activity:

"An ABC of the FCC."
"A Short History of Electrical Communication."
"Regulation of Wire and Radio Communication."
"Radio Broadcast Primer."
"Safety and Special Radio Services Primer."
"Common Carrier Primer."
"Use of Broadcast Facilities by Candidates for Public Office."

Though none of these can be supplied in quantity, a single copy of any of the above-listed subjects may be obtained upon individual request to the "Secretary, Federal Communications Commission, Washington 25, D. C."

TREATIES AND OTHER INTERNATIONAL AGREEMENTS

For informational purposes, the applicable Federal laws, international treaties, agreements, and arrangements in force relating to radio, and to which the United States is a party, are here listed. Under "Series", the abbreviation "T. S." means Treaty Series; "E. A. S.", Executive Agreement Series; and "TIAS", Treaties and Other International Acts Series.

Unless otherwise indicated, copies of these documents may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Date	Series	Subject
1910		Ship Act of 1910, as amended July 23, 1912, relating to radiocommunication for ships navigating the Great Lakes. (Not available at the Government Printing Office.)
1925	T. S. 724-A	Arrangements with Great Britain, Canada, and Newfoundland for the prevention of radio interference by ships. Entered into force Oct. 1, 1925. (Not available at the Government Printing Office.)
1928 and 1929	T. S. 767-A	Arrangements with Canada governing radio communication between private experimental stations. Entered into force Jan. 1, 1929.
1929	T. S. 777-A	Arrangement with Canada, Cuba, and Newfoundland relating to assignment of high frequencies on the North American continent. Entered into force Mar. 1, 1929. Cuba ceased to be a party on Oct. 5, 1933. Arrangement still in force with respect to the others. (Not available at the Government Printing Office.)
1934		Communications Act of 1934.
1934	E. A. S. 62	Arrangement with Canada relative to radio communication between private experimental stations and between amateur stations. Entered into force May 4, 1934. (Not available at the Government Printing Office.)
1934	E. A. S. 66	Arrangement with Peru concerning radio communication between amateur stations on behalf of third parties. Entered into force May 23, 1934.
1934	E. A. S. 72	Arrangement with Chile relative to radio communication between amateur stations on behalf of third parties. Entered into force Aug. 17, 1934.
1937	E. A. S. 109	Agreement with Canada relating to the exchange of information concerning issuance of radio licenses. Largely superseded by notification procedure established in NARBA (T. S. 777-A, T. S. 982, E. A. S. 227, and TIAS 1553) and Inter-American Radio Communications Convention (T. S. 938). (Not available at the Government Printing Office.)

Date	Series	Subject
1937	T. S. 938	Inter-American Radio Communications Convention between the United States and other powers. Signed Dec. 13, 1937 (First Inter-American Conference). (Not available at the Government Printing Office.)
1937	T. S. 962	North American Regional Broadcast Agreement (NARBA) between the United States, Cuba, Dominican Republic, Haiti, and Mexico. Signed Dec. 13, 1937. E. A. S. 227 and TIAS 1553 supplement this agreement. (Not available at the Government Printing Office.)
1938	T. S. 949	Regional Radio Convention between the United States (in behalf of the Canal Zone) and other powers. Signed Dec. 8, 1938. (Not available at the Government Printing Office.)
1938	E. A. S. 136	Arrangement with Canada relative to broadcasting. Effected by exchange of notes signed Oct. 28, and Dec. 10, 1938. (Not available at the Government Printing Office.)
1938	E. A. S. 142	Agreement with Canada concerning radio communication. Effected by exchange of notes signed in June–Dec. 1938.
1939	E. A. S. 143	Arrangement with Canada concerning use of radio for civil aeronautical services. Effected by exchange of notes signed Feb. 20, 1939. (Not available at the Government Printing Office.)
1940	E. A. S. 196	Agreement with Mexico regarding broadcasting. Entered into force Mar. 29, 1941. (Not available at the Government Printing Office.)
1941	E. A. S. 227	Supplementary North American Regional Broadcasting Agreement signed Jan. 30, 1941. Entered into force Mar. 29, 1941. (See T. S. 962 and TIAS 1553.) (Not available at the Government Printing Office.)
1944	E. A. S. 400	Agreement with Canada regarding broadcasting stations in Northwestern Canada. Effected by exchange of notes signed Nov. 5 and 25, 1943, and Jan. 17, 1944. Agreement to "cease with termination of war". (Not available at the Government Printing Office.)
1946	TIAS 1527	Agreement with the U. S. S. R. on commercial radio teletype communication channels. Entered into force May 24, 1946.
1946	TIAS 1553	North American Regional Broadcasting Interim Agreement (Modus Vivendi). Entered into force Mar. 29, 1946. (See T. S. 962 and E. A. S. 227.) Amended by an arrangement between the United States and Canada concerning engineering standards.
1947	TIAS 1652	Agreement with the United Kingdom of Great Britain and Northern Ireland concerning standardization of distance measuring equipment. Entered into force Oct. 13, 1947.
1947	TIAS 1670	Interim arrangement with Canada with respect to mobile radio stations. Entered into force Aug. 20, 1947.
1947	TIAS 1676	Agreement with the United Nations. Entered into force Nov. 21, 1947. Its provisions were also made Public Law 357, 80th Cong., approved Aug. 4, 1947.
1947	TIAS 1726	Agreement with Canada concerning frequency modulation broadcasting. Entered into force Oct. 15, 1947. (Not available at the Government Printing Office.)
1947	TIAS 1901	International Telecommunication Convention, Final Protocol and Radio Regulations. Signed at Atlantic City, Oct. 2, 1947, superseding International Telecommunication Convention, Madrid, 1932. Radio regulations entered into force Jan. 1, 1949. The effective date for effecting art. 47 has been superseded by the agreement signed at the Extraordinary Administrative Radio Conference, Geneva, 1951. (This printing does not contain the additional radio regulations since the United States is not a party thereto. Copies of the Final Acts of the Atlantic City Conference, which include the additional radio regulations, are available only from the International Telecommunication Union, Geneva, Switzerland.)
1948	TIAS 1802	Arrangement with Canada concerning broadcasting engineering standards. Entered into force Apr. 1, 1948. (Not available at the Government Printing Office.)
1948	TIAS 2495	International Convention for the Safety of Life at Sea and Annexed Regulations. Entered into force Nov. 19, 1952.
1949	TIAS 1995	Agreement with Mexico concerning weather stations cooperative program. Entered into force Oct. 20, 1949.
1949	TIAS 2175	Telegraph Regulations (Paris Revision, 1949), annexed to the International Telecommunication Convention (Atlantic City, 1947) and Final Protocol to the Telegraph Regulations. Entered into force with respect to the United States Sept. 26, 1950. (Not available at the Government Printing Office.)
1949	TIAS 2435	Agreement with certain British Commonwealth Governments regarding telecommunications. Entered into force Feb. 24, 1950.
1949	TIAS 2489	Inter-American Radio Agreement with Canada and other American republics. (Fourth Inter-American Radio Conference.) Entered into force Apr. 13, 1952.
1950	TIAS 2433	Arrangement with Ecuador concerning radio communication between amateur stations on behalf of third parties. Entered into force Mar. 17, 1950.
1951	TIAS 2223	Agreement with Liberia regarding radio communication between amateur stations on behalf of third parties. Entered into force Jan. 11, 1951.
1951	TIAS 2259	Agreement with Ceylon concerning the use of facilities of Radio Ceylon. Entered into force May 14, 1951.
1951	TIAS 2366	Agreement with Mexico concerning television frequency channel assignments within 250 miles of the border. Entered into force Sept. 26, 1951. (TIAS 2654, an amendment, entered into force June 25, 1952.)
1951	TIAS 2459	Agreement with Cuba concerning control of electromagnetic radiation. Entered into force Dec. 18, 1951.

Date	Series	Subject
1951	TIAS 2753	Agreement signed at the Extraordinary Administrative Radio Conference to effect the table of frequency allocations and other provisions of the radio regulations (Atlantic City, 1947). Entered into force Mar. 1, 1952. (Available only from the International Telecommunication Union, Geneva, Switzerland.)
1952	TIAS 2508	Treaty with Canada relating to mutual recognition of certain radio station and operator licenses issued in either country. Entered into force May 15, 1952.
1952	TIAS 2520	Agreement with Cuba regarding radio communication between amateur stations on behalf of third parties. Entered into force Feb. 27, 1952.
1952	TIAS 2548	Agreement with Denmark regarding registration of frequencies used in Greenland by United States authorities. Entered into force Apr. 4, 1952.
1952	TIAS 2594	Agreement with Canada concerning assignment of television frequency channels within 250 miles of the border. Entered into force June 23, 1952. (Not available at the Government Printing Office.)
1952	TIAS 2654	Amendment to TIAS 2366. Amends the agreement with Mexico on the allocation of television channels along the border. Must be used with TIAS 2654 as TIAS 2654 is an amendment only. Entered into force June 25, 1952.
1952		Communications Act of 1934, as amended by Public Law 554, 82d Cong., approved July 16, 1952.
1952	TIAS 2695	Agreement with Mexico concerning weather stations cooperative program. Extends the agreement of 1949. Entered into force Aug. 22, 1952, retroactive to July 1, 1951.
1952	TIAS 2701	Agreement with Haiti regarding short range aid to navigation. Entered into force Aug. 29, 1952.
1952	TIAS 2705	Revision of the London Telecommunication Agreement (1949) between the United States and Canada and certain British Commonwealth Governments. Entered into force Oct. 1, 1952. (Not available at the Government Printing Office.)

In addition, the United States is bound by certain treaties and agreements which are generally considered as superseded because some of the contracting countries other than the United States did not become a party to subsequent treaties and agreements. The United States is, in such instances, bound to the original document with respect to our relations with these particular countries. These include the following:

Date	Series	Subject
1912	T. S. 581	International Radiotelegraph Convention, Final Protocol and Service Regulations. Signed at London July 5, 1912. (Not available at the Government Printing Office.)
1927	T. S. 767	International Radiotelegraph Convention and General Regulations. Signed at Washington, D. C., Nov. 25, 1927.
1932	T. S. 867	International Telecommunication Convention, General Radio Regulations annexed to the International Telecommunication Convention. Signed at Madrid Dec. 9, 1932. (Not available at the Government Office.)
1937	E. A. S. 200	Inter-American Arrangement concerning Radiocommunications and Annex. Signed at Habana Dec. 13, 1937. This arrangement was replaced by the Inter-American Agreement concerning Radiocommunications signed at Santiago Jan. 26, 1940 (E. A. S. 231). Countries which approved the 1937 arrangement but which have not yet approved the 1940 arrangement are: Haiti, Mexico, Panama, and Peru. (Not available at the Government Printing Office.)
1938	T. S. 948	General Radio Regulations (Cairo Revision, 1938) and Final Radio Protocol (Cairo Revision, 1938) annexed to the International Telecommunication Convention of Madrid, 1932. Superseded by the Radio Regulations annexed to the International Telecommunication Convention (Atlantic City, 1947).
1940	E. A. S. 231	Inter-American Radio Communications Agreement between the United States of America, Canada, and Other American Republics. (Second Inter-American Radio Conference.) Signed at Santiago Jan. 26, 1940.

The following treaties, agreements, and arrangements have been signed by the United States and are included for informational purposes because of their importance, or for the imminence of their effective dates:

Date	Series	Subject
1950		New North American Regional Broadcasting Agreement. Subject to ratification procedure in the United States. (Available only from the Department of State Telecommunications Policy Staff, Washington 25, D. C.)
1952	TIAS 2666	Agreement with Canada promoting safety on the Great Lakes by means of radio. Applies to vessels of all countries. Enters into force Nov. 13, 1954.
1952		Buenos Aires International Telecommunication Convention. A revision of the Atlantic City Convention of 1947. Subject to ratification procedure in the United States. (Available only from the International Telecommunication Union, Geneva, Switzerland.)

There are, in addition to the foregoing, certain treaties, agreements, or arrangements primarily concerned with matters other than the use of radio but which affect the work of the Federal Communications Commission, insofar as they involve communications. Among the most important of these are the following [available only from the Secretary General of ICAO, International Aviation Building, 1080 University St., Montreal, Canada]:

Date	Series	Subject
1944	TIAS 1591	International Civil Aviation Convention. Signed at Chicago, Dec. 7, 1944. Entered into force April 4, 1947.
1946 to present		ICAO Regional Air Navigation Meetings, Communications Committee Final Reports.
1946		ICAO Communication Division, 2d Session, Montreal.
1949		ICAO Communication Division, 3d Session, Montreal.
1951		ICAO Communication Division, 4th Session, Montreal.
1954		ICAO Communication Division, 5th Session, Montreal.

PAST AND PRESENT COMMISSIONERS

Past and present members of the Federal Communications Commission, and their terms of service, are listed below:

Commissioners	*Terms of service*
*Eugene O. Sykes	July 11, 1934–Apr. 5, 1939
Thad H. Brown	July 11, 1934–June 30, 1940
*Paul A. Walker	July 11, 1934–June 30, 1953
Norman S. Case	July 11, 1934–June 30, 1945
Irvin Stewart	July 11, 1934–June 30, 1937
George Henry Payne	July 11, 1934–June 30, 1943
Hampson Gary	July 11, 1934–Dec. 24, 1934
*Anning S. Prall	Jan. 17, 1935–July 23, 1937
T. A. M. Craven	Aug. 25, 1937–June 30, 1944
*Frank R. McNinch	Oct. 1, 1937–Sept. 1, 1939
Frederick I. Thompson	Apr. 13, 1939–June 30, 1941
*James Lawrence Fly	Sept. 1, 1939–Nov. 13, 1944
Ray C. Wakefield	Mar. 22, 1941–June 30, 1947
Clifford J. Durr	Nov. 1, 1941–June 30, 1948
**Ewell K. Jett	Feb. 15, 1944–Dec. 31, 1947
*Paul A. Porter	Dec. 21, 1944–Feb. 25, 1946
*Charles R. Denny	Mar. 30, 1945–Oct. 31, 1947
William H. Wills	July 23, 1945–Mar. 6, 1946

See footnotes at end of table.

Commissioners	*Terms of service*
*Rosel H. Hyde	Apr. 17, 1946–
Edward M. Webster	Apr. 10, 1947–
Robert F. Jones	Sept. 5, 1947–Sept. 19, 1952
*Wayne Coy	Dec. 29, 1947–Feb. 21, 1952
George E. Sterling	Jan. 2, 1948–Sept. 30, 1954
Frieda B. Hennock	July 6, 1948–
Robert T. Bartley	Mar. 6, 1952–
Eugene H. Merrill	Oct. 6, 1952–Apr. 14, 1953
John C. Doerfer	Apr. 15, 1953–
Robert E. Lee	Oct. 6, 1953–
*George C. McConnaughey	Oct. 4, 1954–

*Served as Chairman.
**Served as Interim Chairman.

As of its 20th anniversary, four of the then commissioners were associated with the original Commission. Chairman Hyde transferred from the Federal Radio Commission as an attorney. Commissioner Webster who, as a lieutenant commander in the Coast Guard was a member of the interdepartmental committee which recommended unification of electrical communication regulation, joined the Commission as a member of its engineering staff. Commissioner Sterling came from the Federal Radio Commission as an engineer. Commissioner Bartley was director of the Commission's first Telegraph Division.

○

FEDERAL COMMUNICATIONS COMMISSION

21st Annual Report

For Fiscal Year 1955

With introductory summary and notations
of later important developments

UNITED STATES GOVERNMENT PRINTING OFFICE · WASHINGTON · 1956

COMMISSIONERS

Members of the Federal Communications Commission

(As of June 30, 1955)

GEORGE C. MCCONNAUGHEY,[1] *Chairman*
(Term expires June 30, 1957)

ROSEL H. HYDE
(Term expires June 30, 1959)

EDWARD M. WEBSTER
(Term expires June 30, 1956)

FRIEDA B. HENNOCK [2]
(Term expired June 30, 1955)

ROBERT T. BARTLEY
(Term expires June 30, 1958)

JOHN C. DOERFER
(Term expires June 30, 1961)

ROBERT E. LEE
(Term expires June 30, 1960)

[1] Succeeded George E. Sterling, resigned, as a Commissioner, and Rosel H. Hyde, as Chairman, October 4, 1954.

[2] Succeeded by Richard A. Mack, July 7, 1955. Term of latter expires June 30, 1962.

LETTER OF TRANSMITTAL

FEDERAL COMMUNICATIONS COMMISSION,
Washington 25, D. C.

To the Congress of the United States:

The twenty-first annual report of the Federal Communications Commission is herewith submitted pursuant to section 4 (k) of the Communications Act of 1934, as amended.

In compliance with the 1952 amendments, it endeavors to point up the Commission's problems in dealing with the development of new radio services, expansion of or difficulties experienced by existing services, and regulation of telegraph and telephone carriers which now make extensive supplemental use of microwave and coaxial cable facilities.

For convenience and timeliness, this report includes notations of subsequent developments since the close of the fiscal year ending June 30, 1955, up to the time of going to press.

Required biographical data concerning persons taken into the Commission's employ during the fiscal year, together with the names of those who have left it, are being transmitted as a nonprinted supplement to this report.

Respectfully,

GEORGE C. MCCONNAUGHEY, *Chairman.*

Table of Contents

NATIONAL DEFENSE—Continued

RADIO'S EXPANDING HORIZONS 31

COMMON CARRIER SERVICES 37

COMMON CARRIER SERVICES—Continued

SAFETY AND SPECIAL RADIO SERVICES—Continued

SAFETY AND SPECIAL RADIO SERVICES—Continued

RESEARCH AND LABORATORY—Continued

Introductory Summary

NEW PEAKS

The accelerated pace maintained by radio communication is reflected in the fact that the Federal Communications Commission now has more than 1,400,000 authorizations in this field, which is an increase of 200,000 since last year. They represent about 60 different kinds of land, sea, and air radio services, as well as the operators who man the 800,000 transmitters involved.

To serve the public, business, industry, and individuals are authorizations in these general groups:

Marine.—More than 50,000 stations and 51,000 transmitters,
Aviation.—Nearly 44,000 stations and 42,000 transmitters,
Industrial.—Nearly 25,000 stations and over 180,000 transmitters,
Land transportation.—More than 20,000 stations and nearly 161,000 transmitters,
Public safety.—Over 18,000 stations and 201,000 transmitters,
Amateur.—Nearly 140,000 stations and over 127,000 transmitters,
Broadcast.—Nearly 6,300 stations and their auxiliaries,
Common carrier.—Nearly 2,000 stations, and
Miscellaneous.—Over 3,000 stations.

To operate the transmitters of these stations, more than 1,100,000 radio operator licenses and permits of different grades are outstanding—over 986,000 commercial and 136,000 amateur.

People talk more over the telephone than ever before. Nearly 200 million calls are handled daily by 54 million telephones. Six million miles of telephone circuit is in microwave. Telephone facilities also relay radio and TV programs. Mobile radiotelephone systems exceed 600. There is radiotelephone connection with a hundred overseas and foreign points, over which more than a million messages go in a year. The first long-distance submarine telephone cables are being laid between North America and Europe, and to connect the United States with Alaska. Another one will link Hawaii. In substance, the telephone industry has tripled in size since 1940. Its gross investment is $16 billion and its annual revenues exceed $5 billion.

The only domestic telegraph carrier (Western Union) reported a new high of $209 million in landline revenue. Speed in handling telegrams has improved through mechanization and direct connections. Business customers are using 20,000 "deskfax" and 23,000 teleprinter tielines. International telegraph carriers serving this country carried more than 520 million words and their revenues climbed to $63 million. Western Union announced plans to sell its cable system in compliance with the terms of its merger with Postal Telegraph.

Whether by radio or wire or cable, communication systems are depending upon automatic devices to an increasing degree. This is particularly evinced in the "automation" of the telephone and telegraph industries, and in the "push-button" operation of transmitters and other radio apparatus. In fact, as far as the radio industry is concerned, "radiomation" might be a more expressive word.

HIGHLIGHTS

National Defense

The Commission continued to collaborate on various defense projects which cannot be reported because of the security classifications given them by their originating Federal agencies.

Its unclassified activities included extension of the CONELRAD (control of electromagnetic radiation) program to additional services in the national endeavor to prevent radio transmissions from being used as possible guides by an attacking enemy. About 1,300 AM broadcast stations are cooperating.

At the request of the Office of Defense Mobilization, the Commission set up a priority system for telephone and telegraph communication in event of a national emergency.

Oral argument was heard on a proposal to deny amateur or commercial radio operator licenses to any member of a communist group. The Commission set up a line of succession for its officials to act for it during war or other emergency. Other defense activities are related in sections of this report dealing with individual services.

Frequency Allocation

Domestic implementation of the Geneva Agreement was completed as far as Commission licensees in the aeronautical, mobile, amateur, fixed, and maritime mobile services are concerned. In the high frequency broadcast service, all stations licensed by the Commission are now within the internationally agreed broadcast bands.

In bringing into force the Atlantic City table of frequency allocations within the United States, the rules governing radio operation in Alaska were revised.

The Commission's table of frequency allocations was amended to permit testing a new technique called "troposphere scatter" which

permits over-the-horizon communication on frequencies normally considered limited to line-of-sight transmission. An experimental authorization permits such telephone transmission from Florida to Cuba.

The Commission was represented at or otherwise participated in 10 international meetings during the year, and was preparing for 28 projected meetings.

Common Carriers

Telephone.—With over 54 million telephones in operation at the end of fiscal 1955, the telephone industry is expanding at the rate of 2 million telephones a year. Now three times the size it was at the end of 1940, that industry has a gross investment of $16 billion and produces annual revenues of over $5 billion. The Bell System does about five-sixths of the business.

The entire industry handled 186 million local calls and 6.8 million long distance calls a day compared to 179 and 6.6 million respectively the year before.

The Commission made 126 wire line and 381 microwave radio grants for construction of long distance telephone circuits during fiscal 1955. The Bell System now operates 6.2 million miles of toll circuits over microwave paths. It also furnishes 67,000 miles of broad-band channels, mostly radio, to provide network service to 363 TV stations in 200 cities. Over 600 mobile radiotelephone systems are in service.

The Bell System made two changes in its rates for TV program relay which were designed to benefit using stations. On October 1, 1954, a package rate was established for video and audio channels for TV transmission on a monthly contract basis with a minimum daily service period of eight hours. Previously these channels were offered only in separate tariffs, with the charges for video channels being on an eight-hour daily basis and the audio channels on a 16-hour daily basis. A simpler TV transmission service also was made available at a lower rate for broadcasters who do not desire the higher quality service furnished under the regular tariff. The new service consists of off-the-air pick up of programs of one broadcast station and transmitting them to another station for rebroadcasting. By eliminating network interconnections and monitoring, the new service is provided at a lower rate.

Telegraph.—Western Union, the single domestic telegraph carrier, reported an alltime high of $209 million in landline revenue for calendar 1954. It handled fewer domestic telegrams—152 million compared to 162 million the previous year—but this was more than offset by revenues from the growth of private line telegraph service and by increases in rates.

Effective July 15 and August 1, 1954, Western Union increased rates for domestic message services which it estimated would add

revenues of $10 million a year for combined interstate and intrastate traffic. Later in 1954 rates to Canada were increased by $316,000 a year and rates for domestic press messages by $150,000 a year. It was after study of the company's revenue requirements and operations that the Commission permitted these increases to go into effect.

The speed of handling telegrams improved due largely to the extensive mechanization of the telegraph system and direct connections with customers. The carrier now has 20,000 "deskfax" and 23,000 teleprinter tielines in business use.

International.—International telegraph and telephone carriers regulated by the Commission furnish service between this country and nearly every point on the globe. Telegraph carrriers reported substantial improvement in revenues and earnings. The volume of message traffic amounted to 521 million paid words in calendar 1954, an increase of 2.1 percent over the previous year. Total revenues climbed to $63 million, or 6.8 percent more than 1953. Earnings before deducting Federal income taxes advanced to $9 million, a 40.7-percent increase.

International radiotelephony also reached a new high, with 1.1 million calls between the United States and outside points in calendar 1954. Work was started on twin submarine cables across the North Atlantic and between this country and Alaska. There will be similar linkage with Hawaii. These will be the first long-distance submarine cables for telephone service.

On June 22, 1955, the Commission reaffirmed a grant of applications by Mackay Radio and Telegraph Company to establish radiotelegraph circuits to The Netherlands and Portugal in competition with existing circuits operated by RCA Communications, Inc. This proceeding had been remanded to the Commission by the Supreme Court for further consideration.

The Commission, on December 20, 1954, issued an initial decision proposing to direct Western Union to divest itself of its international cable system promptly. Subsequently, the company announced that it was negotiating to sell these facilities.

Safety and Special Radio Services

The Safety and Special Radio Services is the largest and fastest-growing group of radio users. Its total authorizations, for the first time, topped the 300,000 mark. The nearly 50 different classes of radio stations employ almost 770,000 fixed and mobile transmitters.

They provide communication between ships and ship-to-shore; aircraft-to-ground; by police, fire and highway departments; disaster organizations; public utilities; petroleum production and distribution; many types of industry; in railroad, bus, truck, and taxicab operations; and by amateurs and other individuals.

The most extensive growth of radio has been in the fields of industry and commerce. Its use ranges from small portable equipment for directing warehouse crews or steam-shovel operators to complex radio facilities to control big pipeline operations.

Action was taken to establish a permanent licensing policy for private microwave systems.

Broadcast Services

Broadcast authorizations collectively, for the first time, passed the 6,000 mark. Of these, more than 4,000 were for program outlets and the remainder comprised pickups and other adjuncts.

Of general broadcast interest during the year was action by the United States Court of Appeals for the District of Columbia in holding that the Commission's multiple ownership rules were invalid to the extent that they impose maximum limits on interests in broadcast stations, which the Commission has appealed to the Supreme Court; appropriation of $80,000 by Congress to enable the Commission to initiate a study of radio and TV network broadcasting in fiscal 1956; adjournment of Congress without taking action on legislation proposed by the Commission for relief from a 1952 amendment to the Communications Act which has been interpreted by the courts to stay new station grants pending hearing on protest by any "party-in-interest"; and further steps to simplify and speed up the hearing procedure on competitive applications.

TV.—Of 582 authorized commercial TV stations, 458 were on the air. Over 90 percent of the people of the country were within service range of at least one TV station, and about 75 percent were served by 2 or more stations.

The Commission is taking various steps to assist UHF stations to operate on a comparable basis with VHF stations and to help TV in general. These include authorization of "satellite" stations, low power operation, liberalization of the multiple ownership rules to permit joint operation of seven TV stations by the same interest if at least two of the stations are UHF, and amending its chain broadcasting rules to remove a restraint on station competition for the same TV network programs; also, proposals to authorize UHF "booster" operation to fill holes in service areas, to permit an increase in maximum power of UHF stations from 1 to 5 megawatts, to allow broadcasters to establish their own intercity relay systems, and to require transmitters to be located within 5 miles of the station's "home" city. It is not considering petitions for local deintermixture of UHF and VHF channels pending a general rule-making proceeding to consider possible solutions, on a nationwide basis, to the difficulties now hindering expansion of TV service.

359964—55——2

Of 34 educational TV stations, 11 were operating. The first and only such station to surrender its permit was KTHE, which had been operated by the University of Southern California. The number of TV channels reserved for education increased to 258. Thus far the Commission has denied requests to transfer educational channels to commercial use. For the first time, it instituted rule making to change an educational reservation from VHF to UHF (Des Moines, Iowa).

AM.—There was a net gain of 143 AM stations for the year, bringing their total to 2,840, of which 2,732 were on the air.

The North American Regional Broadcasting Agreement, submitted to the Senate in 1951, was still unratified and there were indications that this delay was causing some countries to depart from the interim policy of not making new assignments or changing existing assignments contrary to its provisions. Seperate negotiations continued with Mexico, which is not a party to NARBA.

Dependent upon NARBA ratification is the outcome of the clear channel proceeding, from which rule making concerning daytime skywave interference had been severed. A tentative decision on the latter was made by the Commission in early 1955, subject to comments whether the restrictions should apply to existing stations.

The Commission amended its so-called "10 percent rule" relating to the degree of interference which proposed stations may receive in their normal service areas from existing stations.

FM.—Commercial FM stations continued to decrease. At the year end, 552 were authorized and 540 were on the air. However, educational FM stations continued to gain. Of 127 authorized, 124 were operating.

To enable commercial FM broadcasters to obtain additional revenue, the Commission permitted them, beginning July 1, 1955, to apply for special nonbroadcast authorizations to furnish "functional music" and other special programming to stores, factories, restaurants, street cars and buses and other places subscribing to this supplemental service.

Field Engineering and Monitoring

The Commission's field engineering work is conducted through 6 regional offices, 24 district offices, 1 ship office, 6 suboffices, and 18 monitoring stations. Besides rendering technical services, these field installations give radio operator examinations, license radio operators and certain classes of radio installations, inspect radio stations, locate and close unlicensed transmitters, investigate interference complaints, and furnish bearings on aircraft and ships in distress.

With the aid of mobile units, 105 unlicensed transmitters were uncovered as compared to 52 the previous year. They ranged from

illicit operation at racetracks to juvenile "pranks." The more serious cases were referred to other Federal jurisdiction for prosecution.

Budget limitations have reduced the number of radio station inspections. Even so, the year's total exceeded 7,200 including 661 broadcast, 2,200 ships, and 4,200 miscellaneous.

Much trouble was caused by small boat operators using a radiotelephone distress frequency for idle chit-chat, often with obscene and profane language. The Commission is considering ways to stop such widespread violation.

Investigation of interference complaints was centered on important cases, largely those jeopardizing safety and other radio communications. Of the nearly 18,000 complaints handled, more than 15,700 involved broadcast, and most of these concerned TV. Commission encouragement of local TV interference committees has resulted in 437 such groups functioning in 412 communities.

Commercial radio operator authorizations issued during the year totaled more than 188,500. This brought the number of such outstanding authorizations to over 986,000, which is 144,000 more than the year previous.

Antenna proposals processed to see if they conform to aviation safety requirements exceeded 9,100, of which number nearly 7,700 were nonbroadcast. AM and TV accounted for some 700 and 600 cases, respectively. At the year's end 28 TV towers 1,000 feet or more in height were in operation and 13 others were under construction, including a 1,521-foot tower at Dallas. Proposal for a 1,993-foot tower at Selma, Ala., was designated for hearing. Another applicant proposes one 2,003 feet high at Louisville, Ky.

Research and Laboratory

Research activities relate to technical standards for the various radio services, and miscellaneous radio-frequency devices, equipment specifications, and wave propagation, interference and other special studies. The Experimental Radio Services are in the research category.

Much time was spent in developing VHF-UHF tropospheric propagation curves as well as techniques for predicting service signal strengths under different terrain conditions. A study is in progress on the relative merits of line-of-sight microwave relays as compared with tropospheric scatter relays over greater distances.

Rules were finalized for type acceptance of certain radio equipment. This is apart from type approval of other equipment through tests at the Commission's laboratory at Laurel, Md.

The laboratory assists in various phases of the technical work, particularly where actual performance data is required. It studies

various methods of transmission and reception in their service and interference aspects, interference to radio reception from electrical equipment and new uses for radio. Also, it develops and calibrates equipment used by FCC field engineers.

Commission

On October 4, 1954, George C. McConnaughey became a member and also Chairman of the Commission, to fill out the unexpired term of George E. Sterling, resigned. On July 7, 1955, Richard A. Mack succeeded Frieda B. Hennock as a member.

The Commission operated during the fiscal year on appropriations of $6,911,769 and with a personnel of 1,094, of which one-third were engaged in field engineering work.

PROBLEMS

The current report emphasizes the plight of the Commission in trying to regulate radio's tidal-wave expansion with about the same money but with less personnel than it has had in any year since World War II. In the last 5 years, for example, its administrative burden has not only more than doubled but has become more complex.

As a result, the Commission has difficulty in keeping up with its mounting routine and lacks the manpower to deal with many important matters which need policy determination. Any special projects which demand immediate consideration necessitate taking staff members off processing and other work and backlogs develop.

One handicap that is particularly detrimental to expeditious functioning stems from the present ban on the Commission consulting its own keymen on adjudicatory cases in which the latter have no participating connection. In other words, a 1952 amendment to the Communications Act prevents the Commissioners, as a body or individually, from seeking legal, engineering or accounting advice from its respective office heads on problems involved in pending proceedings. Being denied the benefit of the views of these top staff experts, who advise the Commission on other matters falling within their respective fields, causes unnecessary delay and prevents proper utilization of staff services. No other Federal agency is under such an extraordinary separation of functions mandate; it goes far beyond the provisions of the Administrative Procedure Act.

New competitive and economic injury considerations have also added to the Commission's burdens. In addition to hearings required by competitive applications, the Commission must now, under court interpretation of another 1952 amendment to its act, hear protests by

"parties-in-interest" however remote. Until requested legislative relief is afforded, this new requirement clogs its processes besides holding up grants for new stations. Also, there is a mounting number of petitions and counterpetitions, and exceptions and other filings in docket cases, all voluminous, complicated and requiring painstaking consideration.

Requests for new or expanded services pose problems with respect to the "housing shortage" in some portions of the spectrum and changes in frequency allocation and use. These considerations are complicated by the fact that frequency allocations have international as well as domestic impact which necessitates exacting engineering study and industry-Government cooperation.

The mounting number of radio stations not only give but are subject to interference. The interference problem is aggravated by the production of many new electronic devices and "gadgets" which, though not used for communication, release waste energy which can play hob with radio transmission and reception. Projected new equipment must be studied, and some of it approved as meeting radiation limits before being manufactured and put into use.

In the nonbroadcast field, rules must be recast frequently to keep up with new developments—such as, currently, the growing use of microwaves, the expansion of mobile operations, new industrial services, and "split-channel", and other techniques to get greater use from available channels. In this field, too, the utilization of radio for private purposes has progressed to such an extent that the many newcomers must be made to understand and conform to the operating rules.

Then there are problems peculiar to common carrier regulation. That industry is becoming larger and more complex, and its rates and services require constant attention. Its increasing use of radio, extending into mobile operation, and TV program relay, involve many considerations.

Broadcasting presents its own special problems. TV has a critical situation in UHF, subscription TV has been proposed amid much debate, and questions must be resolved about private intercity relay links, and community antenna systems. In AM, certain clear channel problems and, to some extent, questions relating to daytime skyware interference, hinge on ratification of the North American Regional Broadcasting Agreement. Commercial FM stations continued to decrease, causing certain other services to eye unused frequencies in the FM band and elsewhere as a possible avenue for expansion. Increasing use by the military of aural and TV broadcast frequencies is also giving the Commission some concern.

The economic straitjacket in which the Commission must operate has hit its field activities especially hard. Many have had to be curtailed drastically. While monitoring stations continue to police the spectrum, only a sampling job can be done in inspecting radio installations and interference investigation has to be limited to the more serious cases. By the same token, data collected on certain long-range engineering studies have had to be put aside for more pressing current work.

ADDENDA

As of September 30, 1955 the number of broadcast authorizations (not including auxiliary and experimental) had increased to 4,185. Of this number 3,921 were on the air. A breakdown follows:

Service	Authorized	Licensed	On Air
TV commercial	581	144	473
TV educational	24	1	15
AM commercial	2,884	2,757	2,771
FM commercial	555	521	538
FM educational	131	121	124
Total	4,185	3,544	3,921

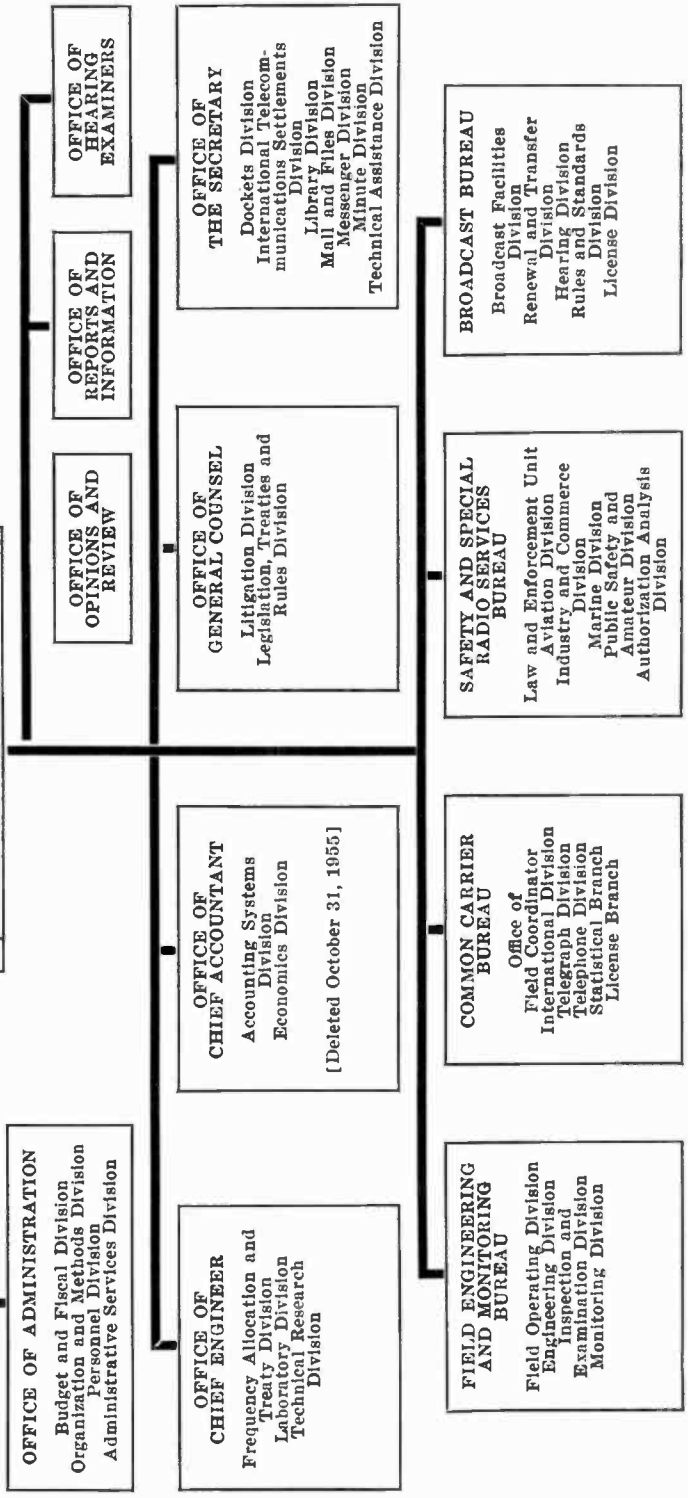
At the same time, the number of authorizations in the nonbroadcast services had risen to:

Marine	52,908	Amateur	139,628
Aviation	44,183	Common Carrier	2,001
Industrial	26,357	Experimental	661
Public safety	19,153	Miscellaneous	2,704
Land transportation	21,608		
		Total	309,203

These nonbroadcast authorizations reflect the use of about two and one-half times that number of transmitters.

FEDERAL COMMUNICATIONS COMMISSION

Organization Chart as of June 30, 1955



General

PREFACE

The Federal Communications Commission, in brief, regulates wire and radio communication between states, and between this country and foreign points.

The soaring use of electrical communication is reflected in the fact that the close of fiscal year 1955 saw our nation dotted with some 800 thousand transmitters in about 60 different kinds of radio services, over 54 million telephones and over 200 million miles of telephone and telegraph wires in domestic use, and more than 80 thousand nautical miles of submarine cables operated by United States cable telegraph companies. In addition, the radio communications industry accounted for more than 1,100,000 radio operator authorizations of different grades.

AUTHORITY

The Federal Communications Commission is an independent Federal agency which was created by Congress and, as such, reports directly to Congress. It operates under the authority of the Communications Act of 1934, as amended. Established in 1934, it unified electrical communication regulation that was formerly done by various Government agencies.

Commission jurisdiction extends over the continental United States and its territories and possessions, but not the Canal Zone, or to communication facilities operated by the Federal Government.

PURPOSE

As stated in the Communications Act, the Commission was formed for

> *". . . the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all the people of the United States a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense, for the purpose of promoting safety of life and property through the use of wire and radio communication, and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communication . . ."*

REGULATION

The Communication Act applies

> *". . . to all interstate and foreign communication by wire or radio and all interstate and foreign transmission of energy by radio, which originates and/or is received within the United States, and to all persons engaged within the United States in such communication or such transmission of energy by radio, and to the licensing and regulating of all radio stations . . ."*

The major activities of the Commission include allocating bands of frequencies to the different radio services and assigning specific frequencies to individual radio stations; regulating those radio services and licensing radio stations and radio operators; regulating common carriers engaged in interstate and foreign communication whether by wire, cable or radio; promoting safety through the use of radio on land, water, and in the air; encouraging more effective and widespread use of radio; and helping coordinate wire and radio communication with the national defense program.

Further information about regulation will be found in the chapters dealing with the different services.

COMMISSION

The Commission is composed of seven Commissioners who are appointed by the President and confirmed by the Senate. The normal term of a Commissioner is seven years. Their terms are staggered so that not more than one expires in a year. Not more than four Commissioners may be members of the same political party.

The President designates one of the Commissioners to serve as Chairman. This appointment is not subject to Senate confirmation. The duration of a chairmanship is at the pleasure of the Chief Executive.

The Commissioners function as a unit, directly supervising all FCC activities, and making all policy determinations. The Chairman is responsible for administering the internal affairs of the Commission.

Commission practices conform to the Communications Act of 1934, as amended, to the Administrative Procedure Act, and to other applicable laws.

The following changes occurred in Commission membership during the year:

On September 25, 1954, President Eisenhower appointed George C. McConnaughey to be a member and also Chairman of the Commission. Under recess appointment, Chairman McConnaughey took office on October 4 thereafter. As a Commissioner, he fills out the term of Commissioner George E. Sterling, who resigned as of September 30, 1954, which expires June 30, 1957. Designated Chairman,

he succeeded Commissioner Rosel H. Hyde in that office. His appointment as a Commissioner was confirmed by the Senate on March 14, 1955.

On May 27, 1955, President Eisenhower nominated Richard A. Mack to succeed Commissioner Frieda B. Hennock, whose term expired June 30 of that year. Confirmed by the Senate on June 17, Commissioner Mack took office on July 7.

A list of Commissioners as of June 30, 1955, with their terms of office, appears on the back of the title page to this report. Past and present members, and their tenure of service, are listed in the appendix.

STAFF ORGANIZATION

As a result of a reorganization completed in 1952, the Commission staff is now on a functional and industry basis instead of on professional lines.

In other words, instead of having to relay and coordinate matters between separate legal, engineering and accounting units with consequent delay, as previously, the Commission's four chief operating bureaus—Common Carrier, Safety and Special Radio Services, Broadcast, and Field Engineering and Monitoring—are self-contained administrative units with their own lawyers, engineers, accountants, and other necessary personnel. They can take actions in individual cases that are covered by established rules and policies. But matters of policy, including new broadcast grants, are referred to the Commission.

In addition to these operating bureaus there are seven offices—Secretary, Administrative, Chief Engineer, General Counsel, Hearing Examiners, Opinions and Reviews, and Reports and Information.

The Secretary's office is the designated funnel for incoming and outgoing correspondence, and is responsible for the Commission's records to the inclusion of its minutes and dockets. The Administrative office is the housekeeping unit, dealing with budget and fiscal matters, personnel, organization and methods, and supply. It is under the Chairman.

The Hearing Examiners hear contested and other proceedings in their initial stages, and render initial decisions which the Commission must review, often with additional oral argument, for final determination. The Opinions and Review office summarizes hearing cases and intermediate petitions for the Commission, and drafts appropriate decisions and findings for and at the Commission's direction. The Reports and Information office is the central contact for general information and copies of documents and public notices.

The Offices of Chief Engineer and General Counsel are largely advisory to the Commission. However, the Chief Engineer handles frequency allocation and international treaty matters, engages in technical research, and operates a laboratory. The General Counsel engages in litigation and legislative work, and looks after the legal aspects of treaties and rules.

Further authority was delegated to bureaus and offices during the year so as to relieve the Commissioners of certain routine actions which are largely automatic under the rules and which do not involve policy considerations.

An organization chart of the Commission as of June 30, 1955 appears as a separate page of this chapter.

Subsequently, because its accounting functions are largely integrated into the duties of its operating bureaus, the Commission abolished the Office of Chief Accountant, effective October 31, 1955. Its two divisions were transferred to the Common Carrier and Broadcast Bureaus.

PERSONNEL

Commission employees numbered 1,094 at the close of the fiscal year, which was 52 less than the previous year. Approximately one-third were engaged in field engineering work. Distribution was as follows:

	Washington	Field	Total
Commissioners' offices	45	0	45
Office of Opinions and Review	18	0	18
Office of Hearing Examiners	24	0	24
Office of Reports and Information	4	0	4
Office of Administration	81	0	81
Office of Secretary	58	0	58
Office of General Counsel	20	0	20
Office of Chief Accountant	19	0	19
Office of Chief Engineer	66	20	86
Common Carrier Bureau	73	28	101
Safety and Special Radio Services Bureau	114	0	114
Broadcast Bureau	155	0	155
Field Engineering and Monitoring Bureau	60	309	369
Total	737	357	1,094

A Communications Act amendment of 1952 requires the Commission to supply Congress with biographies of Commission employees added during the year, as well as a list of employees leaving during the year. This information is being furnished as a mimeographed supplement to the printed report.

APPROPRIATIONS AND EXPENDITURES

The Commission received appropriations amounting to $6,911,769 from Congress in fiscal 1955. In addition to the regular appropriation of $6,694,400, there were supplements of $85,000 and $132,369.

The former was to meet a deficiency; the latter provided for retroactive personnel pay increases voted by Congress.

Obligations against the 1955 appropriations were:

Appropriations		*Obligations*	
Regular appropriation (salaries and expenses)	$6,694,400	Personal services	$6,213,901
Supplemental (deficiency)	85,000	Travel	63,280
Supplemental (pay increase)	132,369	Transportation of things	13,577
		Communication services	182,918
		Rents and utilities	51,790
		Printing and reproduction	29,678
Total	6,911,769	Other contractual services	110,044
		Supplies and materials	123,884
		Equipment	118,552
		Land and structures	3,795
		Awards and indemnities	270
		Total obligations	6,911,689
		Savings, unobligated balance	80
		Total	6,911,769

The sources of these funds and the authority for expenditures thereunder were Public Laws 428, 83d Congress; and 24 and 94, 84th Congress.

HEARINGS

The Commission has taken various steps to expedite its hearing process. These include refusal to hear repetitious applications; time-saving procedures when cases are designated for hearing; time limits on motions to enlarge or change issues; provision for the Commission, under certain circumstances, to grant or deny on the basis of written evidence instead of oral testimony; hearing conferences at the start of hearings, and an exchange of written exhibits and information to curtail later oral testimony.

The volume of formalized paper requiring exacting attention in hearing matters is indicated by the fact that as many as 500 exceptions have been filed in a single case, not to mention frequent and often repetitive motions.

Also, in cooperation with the Federal Communications Bar Association, the Commission has drafted a manual to help its hearing examiners achieve more uniformity in rulings on evidentiary matters and avoid the delays and confusion that sometimes arise.

The Commission has asked Congress to amend a section of the Communications Act, inserted in 1952, which established the so-called "protest rule" under which a party in interest is entitled to a hearing on any grant made without hearing. This provision has been used to

keep competitors off the air with resultant delay in starting new broadcast service. Since adding the protest provision, 80 grants have been challenged by claimed parties of interest—72 in broadcast (32 TV and 40 AM), 4 in safety and special services, and 4 in common carrier services.

The Commission will also seek clarification of that portion of the act which created the review staff, so that there will be no question as to its role in assisting the Commissioners in adjudicatory matters. It intends to propose further act changes which will permit the Commissioners to consult with staff officers on legal, engineering and accounting matters when these keymen are not engaged in investigating or presenting an adjudicatory case.

Television cases continued to account for most of the Commission's hearing load. Docket statistics for fiscal 1955 follow:

Class	Pending June 30, 1954	Designated for hearing	Disposed of without hearing	Disposed of following hearing	Pending June 30, 1955
TV broadcast	189	26	18	72	125
AM broadcast	115	114	86	18	125
FM broadcast	0	0	0	0	0
Other broadcast	5	4	5	0	4
Total broadcast	309	144	109	90	254
Common carrier	51	46	19	39	39
Safety and special	29	37	50	1	15
Joint and general	45	43	36	1	51
Total nonbroadcast	125	126	105	41	105
Petitions and rulemaking	27	81	50	0	58
Grand total	461	351	264	131	417

The Commission had 12 hearing examiners at the close of the year, which was five less than at the end of fiscal 1954.

LEGISLATION

Two bills amending the Communications Act were enacted by Congress during the fiscal year. Both had been recommended to Congress as part of the Commission's legislative program.

Public Law 584, 83d Congress, 2d session, was approved on August 13, 1954. It extensively amended part II of title III of the act, which concerns radio equipment and radio operators on board ships, to reflect the requirements of the Safety of Life at Sea Convention (London, 1948).

Public Law 590, 83d Congress, 2d session, was also approved on August 13, 1954. It amended the act to reflect the provisions of the agreement concluded by the United States and Canada for promoting safety on the Great Lakes by means of radio, which came into force

on November 13, 1954. The law also repealed remaining provisions of the Ship Act of 1910 which were no longer necessary.

The following proposals were submitted to the 84th Congress in connection with the Commission's legislative program:

An amendment to section 309 (c) of the act, designed primarily to prevent protests from being used by competitors for the purpose of delaying the institution of new radio and television services. The proposal would give the Commission authority to deny a protest without holding a full evidentiary hearing, where the Commission found that the facts alleged by the protestant, even if proven true, would not constitute grounds for setting aside the grant being protested. It would also give the Commission some discretion to keep a protested grant in effect pending the outcome of the protest hearing. This proposal was introduced as H. R. 5614 and S. 1648. Hearings were held by both the House and Senate Committees on Interstate and Foreign Commerce, and reported favorably by both. H. R. 5614 was passed by the House on July 25, 1955, but no action was taken by the Senate.

Amendments to sections 503 and 504 (b) of the act, to give the Commission authority to impose small monetary forfeitures for violations of the Commission's rules and regulations relating to radio stations other than those in the broadcast service. This proposal was introduced as H. R. 5613 and S. 1549. Hearings were held by the Senate Committee on Interstate and Foreign Commerce.

Amendments to sections 212, 219 (a), 221 (a), and 410 (a) of the act, relating to the Commission's regulatory authority over communications common carriers. The Senate Committee on Interstate and Foreign Commerce held hearings on this proposal (S. 1456), and it was introduced in the House as H. R. 4939.

In addition to legislative proposals recommended by the Commission, numerous other legislative matters affecting the Commission were considered by Congress. Among the more important of these were:

H. R. 4090, which would require the installation of an automatic radiotelegraph call selector on United States cargo ships carrying less than two radio operators. The Commission testified on this proposal before the House Committee on Interstate and Foreign Commerce.

Several bills designed to prevent the use of interstate communications facilities for the transmission of gambling information. Also:

H. R. 4814 and S. 1208, which would amend section 315 of the act so as to prohibit liability from being imposed upon a licensee because of defamatory statements made in a broadcast by a political candidate unless the licensee participated in the broadcast with intent to defame.

S. 636, which proposed a series of amendments to the Federal Corrupt Practices Act dealing with election campaigns. The Commission was heard on this proposal before the Subcommittee on Privi-

leges and Elections of the Senate Committee on Rules and Administration.

Several bills concerning the interception of communications and the admissibility into evidence of intercepted communications. The Commission testified on these proposals before the House Committee on the Judiciary.

The Commission submitted comments to Congress and the Bureau of the Budget concerning more than 55 legislative proposals which had been referred to the Commission for comment. As mentioned elsewhere in this report, it also commented and reported to a Subcommittee of the Senate Committee on Interstate and Foreign Commerce examining problems relating to UHF television stations.

LITIGATION

Section 401 of the Communications Act confers upon the district courts of the United States jurisdiction to enforce the Communications Act and the orders of the Commission. Judicial review of Commission actions is provided for in section 402 of the act. Section 402 (a) gives jurisdiction to the courts of appeals (under Public Law 901, 81st Cong., effective January 28, 1951) over suits to enforce, enjoin, set aside, annul or suspend any Commission order with the exception of orders granting or refusing applications for licenses. Section 402 (b) provides for direct appeal from such other orders of the Commission to the United States Court of Appeals for the District of Columbia Circuit. The great majority of cases involving review of Commission action is instituted in the latter court.

During the fiscal year there were 72 cases in which the Commission was a party in the Federal courts. Forty-seven of these were instituted during that period—40 in the Court of Appeals for the District of Columbia Circuit, 4 in the Supreme Court of the United States, 1 in the District Court for the Northern District of Illinois, and 2 in the District Court for the District of Columbia. The other 25 cases were pending at the beginning of the year.

Due to confusion as to whether appeals from denials of protests are properly appealable under sections 402 (a) or 402 (b) of the act, in 5 instances review of the same Commission order was sought in separate actions brought under each subsection. Since these were separate actions, they are listed separately in the discussion and chart. In *Metropolitan Television Company* v. *Federal Communications Commission*, noted thereafter, the court held that appeals from denials of protests are properly under section 402 (b) and not under section 402 (a).

In addition to cases in which the Commission was a party, 10 cases initiated by the Commission which involved criminal violations of the

act were pending in the Federal courts. In disposing of 6 of these, the courts imposed 2 prison sentences, 2 fines totaling $2,600, deferred prosecution of 1 defendant, and acquitted another. Four criminal cases were pending at the end of the year. Forty-two other criminal matters were referred to the Department of Justice.

In the Supreme Court the Commission was affirmed in 3 separate actions, in 2 instances by denial of petitions for writ of certiorari by 2 petitioners, and in 1 instance by reversal of the lower court's findings. In the courts of appeals the Commission was affirmed in 7 cases. Ten decisions were reversed or remanded, 5 cases were dismissed on jurisdictional grounds, 1 was remanded without decision on the merits, and 17 were dismissed by agreement of the parties or as being moot. The District Courts for the Northern District of Illinois and the District of Columbia each dismissed one case on jurisdictional grounds, and in the Southern District of New York the Commission was affirmed by the sentencing of the defendant.

As of June 30, 1955, there were 24 cases pending in the Court of Appeals, 1 in the Supreme Court, and 1 in the District of Columbia Court. A tabulation follows:

	Supreme Court	Court of Appeals (402b)	Court of Appeals (402a)	District courts	Total
Total	4	55	9	4	72
Decisions affirming Commission	3	6	2	3	14
Decisions reversing case		7	2		9
Dismissed on jurisdictional grounds		3	2		5
Remanded without decision on merits		1			1
Dismissed by agreement of parties or as being moot		15	2		17
Cases pending June 30, 1955	1	23	1	1	26

Of the 24 cases pending in the Court of Appeals, 6 were submitted but undecided at the end of the fiscal year.

On account of the death of Paul V. McNutt, a partner in the appellant in *Anthony Wayne Broadcasting* v. *Federal Communications Commission*, No. 12,452, C. A. D. C.; after Commission decision and before decision by the appellate court, the case was remanded to the Commission for determination of the effect of the death upon the Commission's decision preferring Radio Fort Wayne, Inc., for a new TV station on Channel 69 in Fort Wayne, Ind.

Decisions during the year included:

In *Federal Communications Commission* v. *Allentown Broadcasting Corp.*, decided June 6, 1955, the Supreme Court reversed a decision of the appeals court which in turn had reversed a Commission decision granting the application of Easton Publishing Company for a new standard broadcast station in Easton, Pa., and denying the mutually exclusive application of Allentown Broadcasting Corp. The Supreme Court remanded the case to the court of appeals for further

consideration freed from rulings of the lower court found to be erroneous by the Supreme Court. The Commission had made a grant to the Easton applicant on the ground that, since Easton had only 1 local station and Allentown had 3, the need of Easton for a choice of locally originated programs was decisive. The Supreme Court sustained the Commission's position that where mutually exclusive (because of prohibitive interference) applicants seek authority to serve different communities, the Commission must first determine which community has the greater need for additional service and then determine which applicant can best serve that community's need. The court of appeals had ruled that the Commission could select one community over the other only if the applicants were approximately equal in their ability to serve their respective communities.

The Supreme Court also reversed the ruling of the lower court that findings of a hearing examiner based on the demeanor of a witness are not to be overruled by the Commission without a very substantial preponderance in the testimony. The Supreme Court held that this ruling was in error because it adopted for examiners of administrative agencies the "clearly erroneous" rule of the Federal Rules of Civil Procedure applicable to courts, and that findings of fact made by the Commission were to be judged by the test of whether they are supported by substantial evidence in the whole record as that test was set forth in *Universal Camera Corp.* v. *Labor Board*, 340 U. S. 474.

In *Storer Broadcasting Company* v. *United States and Federal Communications Commission*, No. 12,065, decided February 24, 1955, the Court of Appeals for the District of Columbia held invalid that part of the Commission's multiple ownership rules which provides maximum limitations on the number of broadcast stations in which any person may have an interest. While this case specifically pertained to the TV rule, the ruling of the court also has the effect of invalidating the limitations contained in the rules governing the AM and FM services. The court based its decision on the ground that the rule illegally deprives an applicant of the right to a hearing afforded by section 309 (b) of the act, and stated that "the statutory provision means that any citizen who seeks a license for the lawful use of an available frequency has the undoubted right to a hearing before his application may be rejected". The court did not hold that the policy bases of the rules were beyond the Commission's proper consideration, and its decision permits the Commission to determine on a case-to-case basis whether any multiple station owner should be granted an additional license. A petition for a writ of certiorari was filed in the Supreme Court, on the ground that the decision of the Court of Appeals is contrary to existing authority sustaining the Commission's power to make general rules which govern the disposition of individual license applications. The petition was granted October 10, 1955.

In a subsequent case, *City of New York Municipal Broadcasting System* v. *Federal Communications Commission*, No. 12,465, decided May 5, 1955, the same court, upon the authority of the *Storer* decision, held that a Commission rule regulating transmitter equipment could not be enforced without a hearing where a waiver of the rule was requested.

In several cases during the fiscal year the Court of Appeals interpreted section 309 (c) of the act, which, as part of the 1952 amendments, added a new provision providing for the protest of grants made without hearing. The court adopted a liberal interpretation of who is a party in interest with standing to file a protest, reversing certain Commission decisions on this question.

The court held that an existing station is a party in interest to the transfer of control of another station in the same community where it is alleged that the

existing station will be adversely affected by comparison from the new station. *Camden Radio, Inc.* v. *Federal Communications Commission*, 220 F. 2d 191.

The court also held that existing TV stations were parties in interest to the change in transmitter site of another TV station, where it was alleged that this action would result in a change in network affiliations and would result also in a signal of increased strength being transmitted to the city in which a protesting station was located. *Greenville Television Company* v. *Federal Communications Commission*, and *Wilton E. Hall* v. *Federal Communications Commission*, 221 F. 2d 870.

In another radio case, the court held that one station was a party in interest to a Commission action authorizing a change in frequency and an increase in power for another station a considerable distance away, where it was alleged that this would deprive the protesting station of listeners through electrical interference, although this interference was not protected against under the Commission's rules. *Metropolitan Television Company* v. *Federal Communications Commission*, 221 F. 2d 879. The court also decided in this case, as urged by the Commission, that an appeal from the denial of a protest is properly brought under section 402 (b) and may not be brought under section 402 (a).

Finally, in *Clarksburg Publishing Company* v. *Federal Communications Commission*, decided June 9, 1955, the court construed that part of section 309 (c) which provides for a hearing on a protested grant where the facts, matters and things relied upon by the protestant as showing that a grant would not be in the public interest are set forth with particularity. The court held, in substance, that where serious matters involving unresolved factual questions are raised by the protest, an evidentiary hearing must be held, and the Commission may not resolve the questions after oral argument limited to the precise facts alleged in the protest.

In *Music Broadcasting Company* v. *Federal Communications Commission*, 217 F. 2d 339, the Court of Appeals sustained a Commission decision directing radio station WGRD, Grand Rapids, Michigan, to cease pre-sunrise operation pending a hearing on the question of whether the prohibition should be made permanent, because of an undue interference caused to station WING on the same frequency in Dayton, Ohio. Station WGRD was licensed to operate only between local sunrise and local sunset, and was permitted to operate pre-sunrise by a Commission rule which also provides that upon notice from the Commission that undue interference is being caused to another station, the daytime station must refrain from such pre-sunrise operation. The court held that the Commission rule permitting pre-sunrise operation did not give WGRD an absolute authority to do so, and that the Commission order requiring the station to cease such operation was not a modification of its license but merely a requirement that it operate within the terms of its authorization. The court stated that WGRD was entitled to a hearing as to whether it was in fact causing interference to WING, but it was not entitled to a comparative hearing on the question of whether its pre-sunrise operation or that of WING was more in the public interest merely because a Commission rule permitted it to operate during that period in the absence of undue interference to other stations.

In *Chicago Board of Trade* v. *United States and Federal Communications Commission*, decided June 2, 1955, the Court of Appeals sustained a Commission decision permitting new tariff schedules of Western Union Telegraph Company to go into effect. These tariff schedules were for the leasing of facilities consisting of tickers, loops, and circuits. The Chicago Board of Trade, which leases these facilities, petitioned for review. Among the several points on which the

court sustained the Commission, it held that the Commission was correct in determining that the proposed charge was reasonable, in not using the standard for systemwide determinations because that standard is inapplicable to the determination of a single rate among many rates. This is one of many Western Union services and concerns a very small segment of the carrier's business. Therefore, said the court, the reasonableness of the single rate involved depended upon the value, volume, etc., of the particular service involved, and was not to be figured upon the basis of a fair rate of return for the whole system. In sustaining the Commission, the court also held that it was proper for the Commission to accept summary exhibits based upon great quantities of underlying material, since the underlying material was inspected by opposing counsel. The court held that the Commission properly overruled an objection that the exhibits were not the best evidence, since the procedure used fully serves the purposes of the best evidence rule, affords ample opportunity for cross-examination, and at the same time eliminates unnecessary delay and expense. This sort of procedure has also been recommended by the Judicial Conference of the United States and by the President's Conference on Administrative Procedure, as the court pointed out.

In *United States* v. *Everett Frankel* (D. C. R. I.), the defendant was convicted on 2 counts of violating sections 301 and 318 of the act, 47 U. S. C. 301, 318, by operating a mobile radio station without either station license or operator's license. In a significant interpretation of the act, the court instructed the jury that a station license is required for a mobile station irrespective of whether the transmissions from the station are shown to have any interstate effects or interfere with any other interstate signals. The court also pointed out that the defendant acted wilfully and knowingly if he showed complete disregard for the law or failed to make reasonable efforts to discover the nature of the law.

FEES

The Commission has not in the past, and does not now, exact any charge in connection with its licensing or regulatory functions. In compliance with Title V of the Independent Appropriations Act of 1952, augmented by Bureau of the Budget Circular A–25 of 1953, the Commission in early 1954 proposed rule making looking toward the establishment of fees to cover certain of these costs. Thereafter the Senate Interstate and Foreign Commerce Committee resolved that the Commission should suspend this proceeding until July 1, 1955.

CEASE AND DESIST ORDERS

The Commission utilized additional cease and desist orders during the year. Most of these were in connection with nonbroadcasting cases involving interference and other infractions not meriting or not subject to revocation proceedings. This use of cease and desist orders was authorized by an amendment to the Communications Act in 1952. Prior to that time section 312 (a) of the statute provided only for revocation of licenses. The change enables cease and desist orders to be issued in appropriate cases, thus reserving the sterner revocation proceeding for Commission licensees who fail to comply with the initial order to stop.

AUTHORIZATIONS

As of June 30, 1955, the Commission had more than 1,400,000 radio authorizations on its books. The largest group—over 1,123,000—consisted of operator authorizations (over 986,000 commercial operators and over 136,000 amateur operators). Authorizations in the safety and special services passed the 300,000 mark for the first time. Broadcast authorizations approximated 6,300, common carrier radio authorizations approached 2,000, and there were more than 600 experimental authorizations for research and development. These radio authorizations collectively covered the use of about 800,000 fixed and mobile transmitters.

APPLICATIONS AND OTHER FILINGS

About 430,000 applications of all kinds were received by the Commission during the year. The largest group—over 264,000—concerned radio operators (213,000 commercial and 51,000 amateur). The next largest category was in the safety and special services—over 151,000. Broadcast accounted for nearly 7,700, common carriers 5,000, and miscellaneous 1,500.

In addition, the Commission had to consider thousands of petitions and other legal filings in connection with hearing and rule-making proceedings, also more than 18,100 tariffs and 1,600 annual and monthly reports of common carriers and holding companies.

CORRESPONDENCE

More than 1,200,000 separate letters, etc., were received or dispatched through the Commission's Mail and Files Division during the year. Of this number, over 853,000 were incoming and 370,000 were outgoing. These figures do not include mail handled in the field offices, or outgoing correspondence of the Washington office of the Field Engineering and Monitoring Bureau.

Under a law of 1953 which requires Federal agencies to reimburse the Post Office Department for carrying penalty mail, the Commission's annual payment amounted to nearly $30,000.

RELEASES AND PUBLICATIONS

The Commission issues no press releases as such, but reports its business by means of public notices made available each work day at its Washington office. Copies of formal documents (orders, decisions, opinions, etc.) besides being served on the parties involved, are furnished others interested on request. Commission rule making is published in the Federal Register. The Commission does not distribute its printed publications, but they are sold by the Superintendent of Documents (see list in appendix).

Mimeographing in connection with the Commission's regulatory and administrative procedure required nearly 41,600 stencils, 9,400,000 sheets of paper, and 13,400,000 impressions during the year. This volume comprised public notices and documents, also material required for the Commission's own use.

TECHNICAL ASSISTANCE ACTIVITY

The Commission continued its assistance in planning technical study programs for foreign nationals interested in telecommunications. There was more than a 100-percent increase in the main activity and arranging for visits to private industry of recipients of grants from the Foreign Operations Administration, the United Nations, and the International Educational Exchange Service of the Department of State.

As of July 1, 1954, 15 projects were in operation for representatives of 8 countries. During the year, 16 additional projects were started, 7 of which affected additional countries. At the year's close, 23 projects had been completed and 8 others were in operation for nationals of 6 countries.

Because the FOA now presents certificates for completion of these studies, the Commission discontinued its issuance of separate certificates. Since the establishment of this activity in fiscal 1952, more than 50 foreign nationals have completed studies under FCC auspices.

National Defense

GENERAL

"For the purpose of the national defense" is one of the stated objects of the Communications Act which created the Federal Communications Commission. In addition to centralizing regulation of wire and radio communication in the interests of safety of life and property, Congress provided for the control of communication facilities and radiation devices in time of national emergency.

Because quick communication is vital to the national defense, the Commission must see to it that radio and wire services are related to the military and civil defense programs, that communication systems be able to serve the Nation's productive capacity and the public under any eventuality, that illegal and improper operations are discouraged, and that the channels of communication are protected from disturbing interference.

POWERS OF PRESIDENT

In time of war or threat of war, or in other national emergency, the Communications Act gives the President special powers over electrical communication.

In 1951 this authority was extended to include electromagnetic radiations. This was necessary because a great variety of electronic equipment and gadgets, though not used for communication purposes, can give off emissions which not only disrupt regular communication services but could be used as "beams" to guide enemy aircraft, guided missiles and other devices of attack.

Later that same year (1951), the President authorized the Federal Communications Commission to enforce regulations in this connection. Several years previously the Commission had, at the request of the Department of Defense, initiated a program for regulating such radiation in the interests of the defense effort.

CONELRAD PROGRAM

One result is the Commission's "CONELRAD" program, which takes its name from the words "CONtrol of ELectromagnetic RADiation". .This system is being set up to govern the procedure of the various radio services in an emergency.

The first service covered in the CONELRAD plan was broadcast. This was announced by the White House in late 1952 and made effective the following May. On an air alert, FM and TV broadcast stations would go off the air, but designated AM stations would broadcast official news, information, and civil defense instructions over 640 or 1240 kilocycles. This procedure would make it impossible for the enemy to get a bearing on any patricular station. At the present time about 1,300 AM stations are voluntary participants in the CONELRAD program, and at their own expense insofar as equipment changes and test operations are concerned.

CONELRAD was extended to the aviation and amateur radio services in early 1954.

On September 24, 1954, a temporary plan was established for voluntary compliance by the international, noncommercial educational FM, experimental and auxiliary broadcast services, and by experimental, public, maritime, public safety, industrial, land transportation, and disaster radio services pending the completion of regulations for those services. It provides an interim system whereby, in event of hostile action, some stations in these services would be enabled to continue essential operation under controlled conditions.

In January 1955 the international and noncommercial educational FM broadcast services, and the citizens and public safety radio services entered the regular CONELRAD plan, followed by the land transportation radio service the following August.

CITIZENSHIP REQUIREMENTS

Oral argument was held in March 1955 on a Commission proposal of June 10, 1954, to make ineligible for licensing any amateur or commercial radio operator who is a member of the Communist Party or of any organization which is required to register as a communist front or which advocates or teaches the overthrow of the Government. The argument was on a proposed report of the Commission of the previous January 21 which looked toward amending the application forms accordingly but eliminating an original proposal to require the submission of fingerprints with applications.

Under the Communications Act, FCC licenses are a privilege of citizenship. They are denied to foreign governments and their representatives, and to any corporation having any officer or director who is an alien, or of which more than one-fifth of the capital stock is owned or controlled by foreign interests.

CLASSIFIED DEFENSE PROJECTS

The Commission is collaborating on certain defense projects which cannot be reported here because of the security classifications given

them by their originating agencies and its own authority under the Communications Act to withhold publication of records or proceedings containing secret information affecting the national defense.

In general, these activities involve the joint efforts of various Federal bodies and the communication industry to cope with potential emergencies, to see that wire and radio media are harnessed to the defense effort and that attack would not deprive us of circuits, and, further, that essential communication facilities are adequately safeguarded.

OTHER DEFENSE ACTIVITIES

The impact of defense activity is felt in all fields of electrical communication.

In the matter of common carrier services, the Commission must see to it that the augmented needs of Government, business and industry are met. At the request of the Office of Defense Mobilization, the Commission has set up priority systems for communication over telephone and telegraph carriers in event of a national emergency.

Also, there are defense aspects in the operation of the safety and special radio services because their stations are largely concerned with protecting life and property on the land, on the sea, and in the air, and in directing the transportation of passengers and products.

Particular defense activities are engaged in by the Radio Amateur Civil Emergency Service, which is for civil defense purposes exclusively; the Disaster Communications Service, which enables Government and private stations to join in essential communication in an emergency; the Special Emergency Radio Service, which furnishes communication for relief organizations, doctors in rural areas, ambulances, etc.; the State Guard Radio Service, which provides radio facilities for state guards in states where the National Guard has been called into Federal service; and the Civil Air Patrol, which is composed of civilian fliers interested in rendering national defense and emergency aid.

Public safety is a major purpose of such long-established regular radio services as police, fire, forestry conservation, and automobile emergency. The amateurs have regional networks for relaying communication in time of fire, flood, or other disaster.

Further information about these individual services will be found elsewhere in this report.

In monitoring and otherwise policing the spectrum, the Commission is called upon to furnish bearings to lost aircraft, trace calls of ships in distress, and maintain constant watch to detect, locate, and close illegal radio transmitters and trace sources of interference to authorized radio services.

The Commission has its own Defense Steering Committee headed by Commissioner Robert E. Lee as Defense Commissioner with Commissioner Robert T. Bartley as first alternate and Commissioner John C. Doerfer as second alternate. Staff members include a Defense Coordinator, with alternate, and representatives of various offices and bureaus. The Commission also has a Supervisor of CONELRAD and a Security Officer.

The Commission as a whole is, of course, active in civil defense activities both in relation to the Government and the community. Its delegated authority provides a line of succession for its officials to act for the Commission during war or other emergency.

Radio's Expanding Horizons

PREFACE

This is an introduction to and an orientation for the following chapters which deal with the use of radio in various fields. It endeavors to present a word picture of the phenomenal development of radio as a whole so that the reader may have a general background for the details of the individual radio services which appear on the ensuing pages.

In substance, these chapters reveal that radio's horizons continue to be pushed back; that radio is expanding at an accelerated pace; that more individuals and businesses want to use this modern Mercury; that a serious "housing" shortage exists in some parts of the radio spectrum; that further refinements and cooperation in radio's use are inescapable; and that science and industry are working hard to evolve equipment and techniques for "doubling up" on frequencies in current use or to go "upstairs" for transmission paths once thought unworkable.

The extent to which radio is being used today is reflected in the more than 60 different classes of radio services which hold more than 300,000 authorizations covering some 800,000 fixed and mobile transmitters. Their operations safeguard life and property; speed and protect transportation on the land, on the water, and in the air; aid industry; furnish broadcast programs; augment common carrier telephone and telegraph facilities; and contribute to research and development. Many stations give localized service; others cover large areas; and still others span the oceans to reach foreign countries.

"FROM THE CRADLE TO THE GRAVE"

The tersest summation of radio's use is to say that it now extends "from the cradle to the grave".

There are radio facilities for calling and otherwise speeding doctors to the homes of expectant mothers. After a baby arrives, radio-equipped vehicles can deliver milk, pick up and deliver diapers, and perform other chores in the interest of the newcomer.

At the close of life, radio is being used for dispatching vehicles in connection with the death and burial of the departed. This includes the movement of funeral corteges at a number of large cemeteries.

These, of course, are extreme examples, for radio plays an increasingly important role in our lives from its Alpha to the Omega. Besides providing entertainment and a hobby for all ages, radio provides a vocation for many; speeds business and personal correspondence; aids industry and commerce; contributes to public protection, and directs transportation of persons and products.

GROUP USES

The extent to which radio has been harnessed for communication purposes is indicated by the following group summaries:

Public Communication.—Domestic and international communication by telephone and telegraph over radio facilities.

Public Safety.—Radio aids to police, fire, highway and forestry protection.

Transportation.—Radio navigational, safety and communication aids for ships and airplanes; radio dispatching for railroads, streetcar systems, taxicabs, buses, and trucks.

Industry.—Radio communication to control and speed the movement of personnel and material in the production and delivery process.

Entertainment.—Programing by commercial, AM, FM and TV broadcast stations.

Educational.—Programing by noncommercial educational FM and TV broadcast stations.

Experimentation.—Use of radio in research, and for the development of equipment and techniques.

DIVERSITY OF USES

The diversification of radio's uses is shown by the following miscellaneous examples:

To control city and highway traffic systems.

To direct movement of crews cleaning city streets, water mains, etc.

To expedite delivery of food, fuel, building material, etc.

To speed repair of home and business office fixtures and appliances.

To dispatch trucks to pick up garbage, dead animals, and other refuse.

To route rural school buses.

To aid beach and other recreation area patrols.

To contact workers on isolated ranches, etc.

To direct the movement of machinery on large farms.

To look for oil on land and under offshore waters.

To spot schools of fish from moving planes and radio their locations to fishing boats.

To control car placements in a parking lot.

To direct motion picture crews on location.

To aid bank and business protective patrol systems.

To relay news between reporters on assignment and their newspaper offices.

To control model airplanes, etc.

To send fingerprints and other information from one police department to another.

To control traffic lights from ambulances, fire apparatus, and police cars on emergency calls.

To communicate between the engine and caboose of long freight trains; between moving trains and wayside stations; and in yard operations.

To control railroad track switches by the engineer on a moving train.

To pick up and deliver telegrams by auto.

To relay telephone and telegraph messages, also TV programs.

To bridge gaps in disrupted wire lines.

To transmit pictures and facsimile.

To control crowds at large regattas, horse shows, golf matches, and other big outdoor events.

To transmit orders from "car hops" to kitchens of drive-in restaurants.

To page doctors and other persons.

To direct firefighters at the scene of a blaze.

To enable garage and automobile associations to provide emergency road service.

To send weather and market reports.

To supervise and control valves, pressures and fluid levels along pipe lines.

To record sunspot cycles, measure radio propagation, and study planetary reflection.

And, to provide emergency communication in time of local, regional, or national disaster.

"WIRED" RADIO AND TELEVISION

There has been a proportionate increase in the number of wire systems which furnish television and radio programs to the public, schools, and business, and other groups.

Community antennas, which operate in areas of poor or no regular TV reception, pick up programs of TV stations that are on the air and relay them by coaxial cable to the homes of subscribers.

So-called "college campus" radio systems send programs that "hug" the power wires of connecting buildings on the same frequencies used for AM broadcast so that they can be picked up by standard broadcast receivers in rooms served by the power line circuit.

Closed-circuit (wired) television operation, in particular, is entering so many new fields that its possibilities appear to be without end. Examples of its uses are:

Furnishing special programs to theaters, hotels, conventions, etc.

Demonstrating surgery and other medical techniques to doctors and students.

Instructing several classes of a school or college at the same time.

Checking signatures, etc., between branches of a bank.

Watching babies in large nurseries.

Guarding prisoners in jails.

Relaying church, concert, entertainment, and other programs to overflow or supplemental audiences.

Demonstrating new products to scattered groups of salesmen.

Observing planes takeoff and land at airports.

Supervising freight car movements.

Relaying "lineups" at police headquarters to outlying precincts.

Detecting unnecessary chimney smoke.

Checking documents in different parts of a large filing system.

Serving industry as a robot eye to follow production and handling processes—such as watching boiler, water-level and other gages from the main control room; detecting delays in the movement of material; and otherwise enabling supervisors to see into several places at the same time.

"Kibitzing" dangerous operations from a safe distance—such as those involving use of atomic energy, furnace combustion, detonation of explosives by the military, etc.

Though not licensed by the Commission, these adjuncts can, and do, cause interference to regular radio communication. For that reason they are subject to rules which limit the amount of energy they may radiate.

RADAR

The use of radar as a navigational aid was spurred by World War II. Since then its application to peacetime purposes has increased rapidly.

It is being installed on many boats, large and small, to show the relative position of a ship to other ships in the area and to the shore. Shore-based radar is used to show ship positions in a harbor and permits instructions being given to vessels not so equipped in order to prevent collisions, aid docking, etc. It is particularly advantageous during fog and other adverse weather conditions.

A form of radar is employed in searching for oil deposits under large bodies of water. These instruments, which are sensitive to variations in both the pull of gravity and the earth's magnetic field, are installed in aircraft which fly over the area. Data so obtained in coordination with land radio location equipment makes it possible to determine the location and composition of hidden deposits.

The Navy employs radar for detecting objects below as well as above water surfaces. The nation's defense is strengthened by a radar system to discern and warn approaching aircraft. Radar is also proving increasingly important in observing the approach and activity of storms for weather prediction purposes.

Radar instruments in air carriers show echo displays which enable pilots to avoid air turbulences associated with thunderstorms and guide them through "soft" spots in the weather without serious reduction of speed and with greater safety and comfort for the passengers.

Speed meters based on radar principles have been developed recently and are utilized in many ways for accurately determining the speed of moving vehicles. Some are used by police departments and insurance companies to check the speed of autos and trucks on highways, while others are employed in railroad yards to determine the speed of freight trains while they are being switched. A more recent development consists of installing radar speed meters at street intersections in such

a way that cars in each traffic lane are counted as they approach and the traffic lights change automatically according to the volume of traffic in each thoroughfare.

INDUSTRIAL, SCIENTIFIC, AND MEDICAL EQUIPMENT

As to most everything else, electronics has been a boon to industry, science, and medicine. Heating equipment using radio-frequency energy is now widely employed for the quick heating of products in the manufacturing process. Welding outfits employ like energy; also diathermy machines used for therapeutic purposes. Specific frequency bands are provided to absorb their excess radiations and so keep them from straying into the regular communication channels to disrupt radio communication locally or many miles distant. As a further precaution, certain types of apparatus in this group are approved by the Commission prior to being manufactured and marketed, thus curbing potential interference at the source.

ELECTRONIC "GADGETS"

Though not used for communication purposes, there is a growing sale of electronic "gadgets" for personal and household convenience. They range from special stoves which cook food from the inside out to garage-door-openers and other remote-control devices. Their technical operation is also governed by rules to prevent radiation which could play hob with regular radio services.

Common Carrier Services

REGULATION

The Commission regulates interstate and foreign communication by telephone and telegraph, whether by wire, cable, or radio. Communication which is purely intrastate in character is not, in general, subject to Commission jurisdiction, but comes under the authority of state utility commissions.

The Communications Act recognizes two types of carriers—carriers subject to the act, and "connecting carriers". The latter do not operate facilities crossing state or national boundaries nor engage in interstate or foreign communication except through physical connection with other non-affiliated carriers. They are exempt from most provisions of the act which apply to fully subject carriers.

The act requires every subject common carrier to furnish service at reasonable charges upon reasonable request. No carrier may construct or acquire interstate facilities or discontinue or curtail interstate service without Commission approval. All charges, practices, classifications, and regulations in connection with interstate and foreign communication service must be just and reasonable and not unjustly or unnecessarily discriminatory. Affected common carriers file tariff schedules which are subject to review and regulation by the Commission.

The Commission prescribes the forms of records and accounts kept by these carriers. Under this authority, it has established uniform systems of accounts for them to follow.

Subject carriers file monthly and annual reports with the Commission, giving specified financial and operating information, also copies of contracts with other carriers relating to traffic subject to the act.

The Commission regulates the interlocking of officers and directors of carriers, it being unlawful for any person to hold office in more than one carrier unless specifically authorized by the Commission. It also passes upon applications of domestic telephone and telegraph carriers for authority to merge or consolidate.

The Commission licenses the operation of common carrier radio facilities under provisions of the act which require the licensing of all radio transmitters. This is necessary because radio energy knows

no state or national boundaries and must be controlled among the users to prevent interference and waste of frequencies.

DOMESTIC TELEPHONE

General

The telephone industry continued its substantial growth to supply service to additional customers during calendar 1954. An estimated $1.4 billion was spent by the Bell System for plant facilities to bring its total plant book cost to more than $14 billion. This is more than 3 times the figure at the end of 1940. The independent telephone companies also expanded their services during the year to bring the telephone industry plant book cost total to more than $16 billion.

Major telephone developments during fiscal 1955 included substantial expansions of operator and customer toll dialing facilities by installing new switching systems at nine cities and constructing a microwave system to link the United States with the transatlantic telephone cable now being constructed between Newfoundland and Scotland. Work was also started on a new microwave system between Baltimore and Richmond, and a similar system between East Bay Hills, Calif., and Portland, Oreg. A new Type L3 coaxial cable was completed between Miami and West Palm Beach, Fla. The Dallas-Los Angeles coaxial cable is being converted to Type L3 operation to triple its capacity.

Additional channels were added to the nationwide microwave radio network and many new branches will bring live TV programs to additional stations. Altogether, about 20,000 broad band channel miles of coaxial cable and microwave radio were added to the Bell network. That network was being used to interconnect 363 TV stations in more than 200 cities, and was equipped to carry color TV to 232 stations in 129 cities.

The Bell System announced that expanded use of the transistor, which is designed to substitute for vacuum tubes in many electronic applications, was continued through the year and that tests were begun on a revolutionary "solar battery", which derives its energy from sunlight, that may provide electrical power for remote telephone subscribers. It also reported the development of a tiny silicon rectifier which has several times as much current-handling capacity as conventional rectifiers of the same size in converting alternating current to direct current.

At the end of calendar 1954, almost 53 million telephones were in service through the Nation, over 43 million being operated by the Bell System and almost 10 million by independent companies. The Bell System added more than 1.9 million telephones during the year and reported 263,000 held orders for main service as of June 30, 1955, as compared to 307,000 a year earlier.

During calendar 1954, the industry handled about 186 million average daily local telephone conversations, while the daily long-distance calls averaged about 6.8 million. A number of calls were reclassified from toll to local as a result of the expansion of local exchange areas. The local and toll call totals increased 3.8 and 5.4 percent, respectively, after adjusting for these reclassifications. Teletypewriter exchange calls increased about 5 percent to reach a total of over 21 million and private line service revenues rose about 22 percent.

Dial equipment usage expanded for both local and toll calls during calendar 1954. At its close, 84 percent of Bell telephones and 60 percent of independent company telephones were dial-operated. Bell operators were dialing more than one-half of all toll calls directly to destination, and 3,350 cities and towns were connected to the toll dialing network, a gain of 900 during the year. The number of large traffic centers equipped for toll dialing rose to 31. Telephone subscribers in 25 different areas could dial calls directly to 14 large metropolitan areas, while in New York, San Francisco, Oakland, and Philadelphia and other areas subscribers could additionally dial their calls directly to many nearby points. With these subscriber dialing services came automatic accounting equipment to record details of each call for subsequent billing purposes.

Bell operating revenues reached a new high of $4,784,500,000 for calendar 1954, an increase of about 8.3 percent over the previous year. Including all companies, the telephone industry total was approximately $5,440,000,000. Consolidated net income applicable to American Telephone and Telegraph Company capital stock amounted to $549,931,223, an increase of 14.9 percent over 1953. Earnings per share increased from $11.71 in 1953 to $11.92 in 1954.

The following table illustrates the expansion of the Bell System:

Year	Telephones	Plant book cost	Revenues	Employees
1940	17, 483, 981	$4, 701, 177, 364	$1, 174, 322, 517	275, 317
1952	39, 413, 889	11, 971, 435, 727	4, 039, 664, 218	579, 500
1953	41, 353, 483	13, 059, 232, 000	4, 416, 729, 614	587, 839
1954	42, 321, 849	14, 131, 277, 000	4, 784, 500, 000	578, 436

It will be noted that in 1954 the number of employees reflected a decrease for the first time in many years.

Services and Facilities

Construction of facilities.—The Bell System spent an estimated $1.4 billion for expansion and improvement of facilities during 1954, a large portion of which went to provide service to new customers with a smaller portion going for replacing older plant with more modern facilities. During the same period, the Long Lines Department spent

a near record $116 million for new plant construction, part of which went for new toll-dialing facilities together with a 5-percent increase in the number of interstate toll circuits.

During fiscal 1955 the Commission granted 126 applications involving estimated expenditures of about $83 million to construct, lease, acquire, and operate wire and cable facilities in connection with interstate and foreign telephone service. Included were six authorizations for acquisition or lease of facilities owned by other companies. The estimated amounts and cost of wire and cable construction authorized by the Commission since 1950 are here shown:

Fiscal year	Number of projects	Cost	Sheath miles of cable	Tube miles of coaxial units	Conductor miles of open wire
1950	141	$13,230,678	399.3	0	3,491
1951	218	45,795,686	957.1	2,704	5,461
1952	323	107,533,688	1,388.7	2,972	5,998
1953	358	89,228,416	1,494.0	5,678	2,006
1954	234	62,985,906	730.0	564	1,837
1955	126	82,947,707	2,669.0	2,375	185

The downward trend in the number of applications during fiscal 1955 resulted, in part, from a revision in the Commission's rules under which carriers may secure continuing authority to undertake small projects without securing prior specific authority. The revised rules provide that carriers who use such continuing authority shall file reports semiannually showing the details of the projects undertaken. For the fiscal year 1955, 226 projects involving estimated gross expenditures of about $900,000 were reported to the Commission.

The Bell System also continued its accelerated microwave construction program during fiscal 1955. The Commission granted 381 applications involving an estimated expenditure of $27 million to provide about 22,200 broad band channel miles for toll telephone and TV service. At the year's end, Bell operated about 6.2 million toll telephone circuit miles over microwave pathways, an increase of about 25 percent during the year. The microwave and coaxial cable systems were being used to provide about 67,000 channel miles of TV program circuits.

Independent telephone companies also continued to expand the use of microwave facilities. The Commission authorized six new systems with an estimated cost of $364,668 to provide 4,130 additional telephone toll circuit miles.

In October of 1954 the Commission authorized the Bell System to construct and operate twin submarine cables between Port Angeles, Wash., and Ketchikan, Alaska, to augment telephone service between the United States and Alaska. The project will cost about $13.6 million.

Curtailment of service.—During fiscal 1955, the Commission granted 5 applications to discontinue, reduce, or impair telephone service, including 2 held over from the previous year. Four of these involved the substitution of 1 carrier for another in providing exchange service, while 1 involved an area where service was no longer required. The Commission also dismissed one application where service was restored after a temporary discontinuance.

Speed of service.—The Bell System reported new attainments in speed of handling toll calls. The average time required for completing such calls dropped from 1.6 minutes in calendar 1953 to 1.4 minutes in calendar 1954 and 97 percent of all toll calls were completed while the calling party held the line.

Acquisitions and consolidations.—The Commission received 23 applications from domestic telephone carriers for authority to acquire the property of another telephone company. After public hearing, 13 of these were granted, together with 9 held over from the previous year. They represented a gross acquisition cost of about $472,000. Of those pending at the close of the year, initial decisions recommended that three be granted and another be denied. Hearings had been scheduled on six applications.

Interlocking directorates.—There were 11 applications for authority to hold positions of officer or director of more than 1 domestic carrier. These applications, together with 1 held over from fiscal 1954, were granted.

Reclassification of companies.—No petitions were submitted by telephone companies requesting classifications as "connecting carriers" under section 2 (b) 2 of the act which would render them subject only to sections 201 through 205 inclusive.

Foreign attachment case.—Final decision was still pending in the case of *Hush-A-Phone Corp. et al.* v. *American Telephone and Telegraph Company et al.* (Docket 9189), involving the lawfulness of the foreign attachment provisions of the defendants' tariffs insofar as they might be construed to prohibit the use of the Hush-A-Phone device.

Independent telephone company use of radio.—Effective April 27, 1954, section 2(b) of the Communications Act was amended to provide that the Commission should not have jurisdiction over any carrier engaged in interstate or foreign communication solely through connection by wire and radio with another carrier located in an adjoining State. The language before the amendment had been in terms of "physical connection".

In partial justification of the amendment there were allegations that fear of Commission common carrier jurisdiction had discouraged

some independent telephone companies from applying for radio facilities. Late in fiscal 1955 the Commission received and granted the first application from an independent telephone company to use radio to connect across a state line with another telephone company.

Domestic public land mobile radio service.—The number of radio systems authorized for one-way signaling (radio paging) operations increased by 65 percent. At the end of the fiscal year 57 such systems were licensed and 33 others under construction. Of these, 2 are authorized in Puerto Rico and 1 each in Hawaii and Alaska. Technical progress was highlighted by the development of a miniaturized selective-calling pocket-type receiver which is presently undergoing field tests in the New York City area.

Due to the lack of frequencies to accommodate all applicants for one-way signaling systems, it was necessary to hold comparative hearings for the Buffalo, Pittsburgh, Dayton-Cincinnati, and Cleveland-Akron areas. An initial decision was issued in the latter case and final decisions in the others. Final decisions were also made in comparative hearing cases involving the Long Beach-Los Angeles, New York City, and Philadelphia areas. A final decision was issued with respect to one of the parties in the Dallas-Fort Worth case, and the record reopened for the remaining applicants. Hearing and final decision resulted in cases involving Hartford, Conn., and Columbus, Ohio.

The number of miscellaneous (nontelephone company) common carrier land mobile radio systems for two-way communication service increased by 13 percent. As of June 30, 1955, there were 302 such systems authorized in the United States. Puerto Rico, Alaska, and Hawaii. A hearing was held on applications to establish a new system at Anchorage, Alaska. With respect to an application seeking to renew a construction permit in the Rochester, N. Y., area, which was authorized for several years but never constructed, a hearing was held and an initial decision issued denying the application.

In lieu of the usual 2-year license period, the Commission renewed, for 1 year only, the licenses of 22 miscellaneous common carrier stations in the Domestic Public Land Mobile Radio Service, advising them that examination of their annual reports indicated they are not rendering service to the general public, hence the limited renewal, during which time they must furnish public service if they are to qualify for further renewal. In seven other cases, licensees were warned that the facilities which they are authorized to operate must be used for rendering public service if favorable consideration is to be given to any subsequent renewal.

General communications common carriers (telephone companies) expanded the number of land mobile radio systems for 2-way com-

munications by 12 percent. At the end of the fiscal year there were 280 such systems.

One miscellaneous common carrier at Phoenix, Ariz., and the telephone company in the New York City area were authorized to establish developmental land mobile radio systems to be used for development of engineering data on the feasibility of splitting present radio channels in order to permit greater and more efficient use of the radio spectrum.

A rule-making proceeding (Docket 11435) was instituted looking toward establishing eligibility of wireline communication common carriers to obtain licenses in the Power Radio Service for land mobile radio facilities (on a non-common carrier basis) for use in connection with construction, maintenance and repair of public communication facilities. Rule-making proceedings (Docket 10821) instituted during the previous year, looking toward adoption of regulations applicable to domestic common carrier radio operations now authorized on an experimental basis only, have not been finalized.

Rural subscriber and short-haul toll radiotelephone services.—Further growth occurred in these experimental radio services which are intended to furnish domestic public communication service, on VHF frequencies, to points where it is impracticable to provide wireline communication. The rural subscriber radio stations showed an increase of 75 percent and the number of short-haul toll radiotelephone stations increased by 52 percent. As of June 30, 1955, there were, respectively, 84 and 76 stations in these services.

TV pickup and studio links.—Common carriers continued to provide program transmission service to TV broadcasters over TV pickup and studio-transmitter-link microwave radio facilities. At the end of June 1955, 21 and 33 such authorizations, respectively, were held by telephone companies.

Community TV antennas.—The continued expansion of community TV antenna systems in the more remote areas brought several requests by common carriers to construct microwave systems to pick up and relay programs at points near the TV broadcast station to the areas served by the community distribution system. Applications proposing eight such micvrowave relay systems were filed during fiscal 1955 and two were granted. Of those pending, two involved projected service to Rapid City, S. Dak., and a joint hearing was scheduled to determine whether either or both of the links should be authorized. Construction permits issued to J. E. Belknap and Associates for relay service from Memphis, Tenn., to points in Missouri, which were mentioned in the 1954 report, were allowed to expire by the permittee.

Rates and Tariffs

Tariff filings.—At the close of the fiscal year tariffs or concurrences were on file for 389 telephone companies. During the year, 16,465 tariff publications consisting of new or revised tariff pages, supplements, concurrences, revocations or adoption notices were received. The mobile radio tariffs of most wire telephone companies were withdrawn during the year following amendment of Section 221 (b) of the Communications Act, approved April 27, 1954.

Telephone and telegraph priorities.—At the request of the Office of Defense Mobilization, the Commission drafted a priorty system applicable to domestic and international common carriers for handling certain classes of urgent telephone and telegraph messages relating to enemy attack, national defense, or natural disaster involving widespread damage. It was placed in effect on a voluntary basis by the carriers.

Use of telephone answering devices.—Pursuant to the Commission's decision of May 7, 1954 (Dockets 9383 and 9701), the telephone companies amended their tariffs relating to unauthorized telephone attachments to permit the installation and use of customer-owned automatic answering devices in places where the use of such devices is authorized by the local regulatory agency or state commission.

Program transmission rates.—On October 1, 1954, the Bell System established a package rate for video and audio channels for TV transmission, on a monthly contract basis with a minimum daily service period of 8 hours. Prior to this, video and audio channels were offered only in separate tariffs, with the charges for video being on an 8-hour daily basis and charges for audio on a 16-hour daily basis. The charges for 16-hour daily service under both plans are essentially the same. Subsequently, on April 1, 1955, charges for Schedule A audio channels normally used for TV were established on an 8-hour daily basis.

The Bell companies have not yet established regular tariff rates and regulations in connection with the transmission of network TV color programs. They have, however, extended their "Experimental Color Systems" tariff schedules in order to cover color transmissions. In the meantime, studies are being made by the companies and the Commission of the cost of furnishing video program transmission service.

A new classification of TV relay service, designed to meet the needs of TV broadcasters in remote locations who do not desire or cannot afford the high quality service furnished under the regular tariff, was instituted. The new classification provides for the pick up of the signal of a TV station and relaying it by microwave facilities to

the customer station for rebroadcast. Savings in costs due to the off-the-air pickup and the elimination of supervision and monitoring enable the company to provide this service at a lower rate.

Other Regulatory Matters

Depreciation.—The magnitude of depreciation expense charges during any year depends not only on the depreciation rates applied but on the book costs of depreciable plant facilities in service during that year. For the year ending December 31, 1954, depreciation expense charges of the 23 Bell companies amounted to approximately $479,300,000, an increase of $38,385,000, or 8.7 percent over 1953, while the book cost of depreciable plant facilities increased by 8.9 percent.

The Commission's task of prescribing depreciation rates for telephone companies pursuant to Section 220 (b) of the Communications Act is a continuous one. Recent studies indicate that the long downward trend in depreciation rates may be at an end and that those previously prescribed should be reviewed.

One reason for this possible change appears to be that, due to the unexpectedly heavy demand for telephone service following World War II, it was necessary for the Bell companies to conserve available facilities as long as practicable, thereby prolonging service lives. In general, Bell companies have appreciably caught up with the backlog of held orders for service and production by its subsidiary, Western Electric Company, has increased to the point where desirable replacements of plant at greater volumes have begun and are expected to continue for some time. This means shorter service lives than previously forecast for plant facilities now in service.

Another factor which may justify an increase in depreciation rates is the removal cost of plant retired. This factor has had an upward trend since about 1950 coincident with wage increases with no apparent offsetting increase in gross salvage realized.

Bell representatives have indicated that the present dial central office equipment, including the latest crossbar types, will not realize service lives as long as previously assumed because of the development of a fully electronic switching system having no moving parts. This new system is expected to have important advantages over the present dial systems, such as substantial economies in building space, less costly and improved maintenance, more economical ways of handling and ticketing long-distance calls, and the ability to store and to hold a dialed number if the called line is busy and to complete the call after the line becomes released. Finally, a growing popular demand for the latest types of telephones, including sets in color, may shorten the service lives of telephones now in service.

Separation procedures.—The procedures used by Bell companies to separate and apportion their investment and expenses between inter-

state and intrastate operations have been the subject of continuing study by the Commission and the National Association of Railroad and Utilities Commissioners (NARUC) representing the state commissions. The Commission has before it a proposal of the NARUC for a revision in the existing separations procedures which, it contends, will result in a more equitable method of allocated interexchange toll lines book costs and related expenses.

Bell System Federal income taxes.—Western Electric Company was included in the consolidated Federal income tax return of the Bell System for 1954 for the first time in many years. The Bell System elected for the first time to exclude from consolidated taxable income Western's profits on sales charged to the plant accounts of the telephone companies parties to the consolidated tax return. This treatment of Western's profits reduced the consolidated tax liability by approximately $33.5 million and was recorded so as to reduce the book cost of telephone plant of the telephone companies by the same amount. The income tax liability of the telephone companies in future years will be greater than otherwise because of the decision to exclude certain of Western's profits from taxable income. This will result from lower depreciation deductions being allowed for tax purposes.

Western Electric earnings and prices.—The Commission, in cooperation with the NARUC, continued its review of the prices, earnings, and costs of Western Electric Company. Data developed are reported quarterly and annually to the various telephone regulatory commissions in order to assist them in their consideration of Western's prices insofar as they affect the revenue requirements of the affiliated Bell companies.

Pensions and relief.—Pension plans of the Bell companies were continued in effect without change. For the Bell System, including manufacturing and research activities, pension and other benefits costs (including Federal taxes for social security benefits) for calendar 1954 amounted to approximately $284 million. This is an increase of about $12 million over 1953. As of December 31, 1954, the Bell pension trust funds aggregated about $1,969 million. At the end of 1954, 35,602 retired employees were receiving service pensions.

An examination was completed of the revised actuarial data underlying certain of the basic actuarial factors used in developing the service pension accrual rates now used by the Bell companies. The report on this examination is under consideration. Of particular interest is the recent upward trend in the rate of earnings on the pension funds and the tendency of employees to retire at a higher age than assumed.

The rate of interest assumed for actuarial purposes is 2¾ percent. This compares with fund earnings of about 3 percent in 1954.

Uniform systems of accounts.—A number of interpretations with respect to the accounting rules were rendered in letters to various carriers. Among these were interpretations relating to the inclusion of standby telephone equipment in operated plant, the appropriate accounting for certain types of revenue received and amounts received as reimbursement for special plant installations. A notice of proposed rule making asked for comments as to whether the amounts of contributions for charitable, educational, social and community welfare purposes should be permitted to be charged to operating expenses. This matter has not yet been decided.

Restatement of plant accounts on basis of original cost.—The accounting for a number of current acquisitions of plant, including some mergers of small companies, was handled in accordance with the Commission's accounting regulations. In addition to accounting for current acquisitions, final disposition was made of an original cost item involving three Bell companies which had been under negotiation for a number of years with the companies and the state commissions. This resulted in a net charge to the earned surplus of the 3 companies involved of over $1,500,000.

The 1954 report mentioned that final accounting for acquisitions of private radiotelephone communications systems which the nontelephone utility or transportation common carrier vendors continue to operate as licensees under lease arrangements was suspended pending determination of the applicability of original cost accounting. It has since been decided that acquisition cost accounting may be applied to these transactions as well as to certain acquisitions of pole lines from electric utilities. However, the applicability of original cost accounting is still under consideration with respect to other acquisitions of plant from certain nontelephone companies where the acquired plant is integrated into the telephone system of the purchaser.

Continuing property records.—Additional reviews and studies were made of the continuing property records of several Bell companies. Particular attention has been directed toward the periodic reconciliations between quantities on the continuing property records and quantities on the plant engineering and other records. In an effort to reduce the costs of making reconciliations and to speed up the reconciliation work, certain of the Bell companies are now using statistical sampling methods of inventorying plant from plant records.

Internal Revenue Code of 1954.—This revised code contains several new provisions that affect both rate making and accounting for car-

riers subject to the jurisdiction of the Commission. The most significant change relates to computing depreciation charges for income tax purposes on plant additions since 1953. The declining-balance method and the sum-of-the-years' digits method are specifically mentioned as permissible for use, as well as any other method or modification of the foregoing methods that is approved by the Internal Revenue Service. The use of any of these methods will result in the payment of lower income taxes at least for a number of years in the future.

Questions have arisen as to the treatment to be accorded such tax reductions in rate proceedings and how they are to be recorded in the accounts. These matters have been the subject of study by the Commission in cooperation with the Depreciation and Accounting Committees of the NARUC. Final regulations have not as yet been issued by the Internal Revenue Service and no conclusion has been reached as to appropriate treatment for regulatory purposes.

NARUC Committee on Depreciation.—The Commission's participation in the activities of this committee consisted of (*a*) consultations and assistance in the preparation of a report, which the committee presented at the national convention of the NARUC in November 1954, dealing with the problem of "economic" depreciation *vs.* depreciation based on original cost; (*b*) special studies and development of technical data on liberalized depreciation permitted under the 1954 Internal Revenue Code; and (*c*) preparation of technical sections of a report on liberalized depreciation to be submitted by the committee at the 1955 NARUC convention.

NARUC Committee on Accounts and Statistics.—The Commission continued to cooperate with the committee on a number of accounting matters of mutual concern to state and Federal regulatory commissions, including completion of proposed accounting systems for electric, gas, and water utilities and a study of accounting problems arising from the 1954 Internal Revenue Code. Progress was made on a joint study, in cooperation with the Bell System, of simplifying the accounting for telephone station apparatus.

Annual and other reports.—The Commission's rules were amended to relieve companies controlling smaller communications common carriers from filing holding-company annual reports. Only companies controlling carriers having annual operating revenues in excess of $2,500,000 are now required to file such reports.

The rules were also amended to eliminate the requirement that communication carriers keep records of franked calls made by employees from company premises.

DOMESTIC TELEGRAPH

General

The domestic message telegraph service is provided substantially by one company, The Western Union Telegraph Company, now in its 105th year. Western Union also owns and operates a substantial ocean-cable system. Landline telegraph services offered to its users are, principally, domestic public, press, and Government message services, a money order service, and private line services.

Although Western Union's private line business increased substantially during the fiscal year, to the point where it is the second largest revenue-producing service offered by that company, the majority of private line telegraph services available nationwide is furnished by the Bell telephone system. Bell also offers teletypewriter exchange service (TWX).

Business of the landline telegraph system continued to improve, due to a full year's operation under increased rates, to generally good business conditions, and to increased sales efforts, particularly in the private line and facsimile telegraph services. Western Union's financial position has materially strengthened and, early in 1955, it adopted a $4 annual dividend rate in contrast with a $3 dividend rate maintained in the 3 previous years.

Western Union's gross landline operating revenues for the calendar year 1954 reached a peak of $209,635,000, although the traffic volume declined to 152,582,000 messages. In 1953, operating revenues amounted to $208,578,000 with 162,188,000 messages handled. Its systemwide net income for calendar 1954, including ocean-cable operations, was $6,471,000, after providing $7,725,000 for Federal income tax.

The net income for 1954 takes into account a nonrecurring net charge of $3,119,000 resulting from a change in the method of accounting, to accrue in advance for vacation pay and other employees' benefits ($6,498,000 gross charges less related Federal income tax reduction of $3,379,000). However, the section of the Internal Revenue Code permitting these advance accruals as deductions for tax purposes was repealed and the 1955 accounts of the company will reflect an increase in the accrued liability for 1954 Federal income tax by approximately $3,500,000 with a corresponding reduction in the reserve for accrued vacations.

The company reported systemwide net income for the calendar year 1953 of $14,469,000, after providing $9,417,000 for Federal income tax. The net income includes a net gain from sales of investments in subsidiary companies amounting to $6,364,000.

For the last half of fiscal 1955, Western Union reported gross operating revenues from landlines operations of $112,967,000, as compared to $109,473,000 for the first half of fiscal 1955. The message load increased slightly to a level of 76 million messages or 0.6 percent in relation to message volume of the previous six months. Systemwide earnings from current operations for the last half of fiscal 1955 amounted to $6,611,000 after providing $6,006,000 for Federal income taxes.

During the last months of fiscal 1955, the telegraph company effected substanial changes in its capital stock and debt structure in order to facilitate trading on the New York Stock Exchange and broaden ownership of its stock, to extend the maturity date of a large segment of debt, and to provide additional funds for continuing expansion of facilities.

Services and Facilities

Western Union modernization program.—As of the end of calendar 1954, Western Union had expended $59.5 million on its mechanization and modernization program which was designed to provide cheaper and more efficient methods of furnishing telegraph service. This program has resulted in estimated savings of $31 million a year at 1953 expense levels.

The construction of 15 reperforator switching centers, completed in 1950, provides for the automatic and semiautomatic relay of telegrams between cities and, in general, eliminates manual retransmission at relay points, thereby providing faster and more efficient service. In order to obtain the fullest advantages of reperforator switching, Western Union, as of June 30, 1955, had furnished 212 branch offices in nonreperforator cities with direct circuit connections to reperforator switching centers for outgoing traffic and 37 branch offices had been similarly equipped for handling both outgoing and incoming traffic. In addition, the company currently is interconnecting tielines of its larger customers into its reperforator switching centers, thereby effecting substantial economies and providing faster service.

Telegraph channel mileage in operation as of June 30, 1955, approximated 3,515,500 miles, including 143,500 miles added during fiscal 1955, which is more than double the channel mileage at the end of 1946. Over 80 percent of this channel mileage has been derived from applying carrier current systems to physical circuit facilities or voice frequency channels. Use of carrier equipment enables the company to obtain up to 20 telegraph channels from one voice frequency channel. Carrier circuits are generally superior to physical wire circuits with respect to both reliability and stability. Over 72 percent of telegraph channel miles derived from carrier are on voice

frequency channels leased from the Bell System, and the remainder are on Western Union-owned facilities.

Since World War II, Western Union has supplemented wire operation with the use of its microwave radio beam transmission system linking Washington, New York, Philadelphia, and Pittsburgh. There are 124,850 telegraph channel miles in operation on these facilities. The company has acquired tower sites in various sections of the country for extension of this system and recently announced plans to expand it to Cincinnati and Chicago.

Rapid growth has been experienced in the lease of private wire systems. For instance, Western Union now furnishes over three times as much private line service as it did in 1944. Facilities leased to subscribers for private wire telegraph service increased from 1,493,600 miles in 1954 to 1,763,000 miles in 1955, an increase of 18 percent.

The installation of deskfax (facsimile) and other direct wire connections continued at a rapid pace. A deskfax installed on the desk of the user speeds the delivery and pickup of telegrams, stimulates telegraph usage and provides maximum customer convenience. Deskfax installations were completed to 6,470 additional customers' offices, bringing to 20,000 the total number of such units. Company plans call for expansion of this figure to more than 26,000 in calendar 1955. Teleprinter-operated direct wire connections to customers were increased from 22,586 to 23,380. The large and continuing increase in direct customer connections, principally deskfax tieline installations, has reduced materially the need for messenger and telegraph office handling.

Western Union announced that, to supplement its research and development, it has purchased a one-third interest in Microwave Associates, Inc., a firm in which American Broadcasting-Paramount Theatres, Inc., also has a third interest. Microwave Associates is an organization devoted to research and manufacturing in electronics.

Construction of wire facilities.—The Commission approved five Western Union requests for wire telegraph construction and extensions. The applications involved the leasing of 222,017 telegraph channel miles at an annual rental of $233,217 and the construction of 91,625 telegraph channel miles and associated equipment at a cost of approximately $3,170,000.

Curtailment of service.—During the year, 924 applications for reductions in hours of service or closure of public telegraph offices were filed by Western Union as compared to 1,202 the previous year. In addition, 137 applications were pending at the beginning of the year. Of the total, 947 applications were granted, two were granted in part and one was denied in part, two were denied, 11 were with-

drawn and 100 were pending at the end of the year. In most cases, substitute service was made available where curtailments in service were made. Western Union estimates that savings at the rate of about $7 million a year in expenses have resulted from office closures and hour reductions from 1947 through 1954.

Speed of service.—Pursuant to Commission rules, Western Union reports monthly the average speed of service (office relay drag) attained in handling messages through 25 large message centers and the average origin-to-destination speed of service (time filed to time delivered, or first attempt) on messages terminating at those cities. A comparison of the speed of service performance reported by Western Union for 1954 and 1955 follows:

	Average speed in minutes	
	Fiscal 1954	Fiscal 1955
Origin to destination: Delivered by:		
Telephone	43.7	39.6
Messenger	47.2	43.0
Private tieline	37.9	34.4
Office relay drag	8.4	7.3

To a large extent, this improvement in speed of service is a result of the company's expediting efforts in its 15 reperforator switching centers, through which approximately 96 percent of all messages flow. For instance, the company attained during each month of the year a faster monthly average speed of service at its reperforator centers than had been reported during any previous year. At the present time, the company is studying the feasibility of establishing origin-to-destination speed objectives with a view of improving the overall service and reducing the number of excessive delays.

To the extent possible, the Commission makes spot-checks of service conditions but, due to limitations placed on personnel and funds, these investigations are, of necessity, confined to the most urgent cases. Commission field engineering personnel in 17 district offices assisted by making 34 routine inspections of speed of service performance of Western Union offices and agencies during their regular field inspection trips. Similar inspections were made by the Common Carrier Bureau field offices in New York, San Francisco, and St. Louis at 203 Western Union offices located in or near those cities. The bureau headquarters and field offices' staff made a limited number of inspections of service conditions following the closure of branch offices.

Rates and Tariffs

Domestic telegraph rates.—As reported in 1954, Western Union filed new and increased rates, to become effective July 15 and August

1, 1954, for interstate message telegraph and money order services, foreign money order service, and certain other interstate services. The revised rates were designed to produce total additional revenue of about $10 million a year from interstate and intrastate traffic.

On July 1, 1954, the telegraph company filed revised tariff schedules, effective August 15, 1954, containing certain new and increased charges and regulations applicable to the United States-Canada and St. Pierre-Miquelon Islands telegraph message and money order services. It is estimated that the United States-Canada rate revisions would produce additional annual revenues of approximately $316,000. On August 2, 1954, it filed revised tariff schedules, effective September 1, 1954, containing new and increased charges and regulations for interstate press messages between points within the continental United States. These changed press charges, according to the company, would result in about $150,000 additional annual revenue.

Western Union contended that these increased revenues were required to offset wage increases and to restore the company's earning position to the approximate level of the first half of 1953. After careful review of comprehensive data regarding the telegraph company's requirements and operations generally, the Commission permitted the tariff schedules to become effective on the dates indicated.

Ticker rental charges.—As indicated in the last annual report, the Chicago Board of Trade had appealed the Commission's decision of April 22, 1954 holding that Western Union's increased rates for normal speed "tickers" were just and reasonable and that its new rates for high speed "tickers" had not been shown to be unreasonable or otherwise unlawful (Docket 10274). On June 2, 1955, the United States Court of Appeals for the District of Columbia Circuit affirmed the Commission's decision. The court held that when rates of a minute segment of a huge business are in issue, the regulatory agency is not required to make findings relating to the rate of return for that segment. The court concluded that its study of the Commission's conclusions and underlying findings disclosed that the appeal involved chiefly matters requiring the exercise of regulatory judgment by the Commission and that the bases for these judgments were readily ascertainable and rested upon ample evidence.

Tariff schedules.—A total of 35 domestic telegraph carriers had tariffs or concurrences on file with the Commission at the end of the year. These carriers filed 939 tariff publications during the year, establishing or changing rates, regulations, practices, and classifications of service.

359964—55——5

Other Regulatory Matters

Original cost of plant and continuing property records.—Reviews were completed of (1) the methods and procedures applied and the accounting performed in connection with Western Union's restatement of its plant and equipment on the basis of original cost, (2) the reclassification of plant and equipment in conformity with primary plant accounts as prescribed in the uniform system of accounts, and (3) the concurrent establishment of a continuing property record system. These studies confirm that Western Union has complied substantially with the applicable rules and regulations.

Depreciation.—Following staff review of service lives and salvage values of Western Union's plant and equipment, in the light of existing conditions, the Commission on January 28, 1955, prescribed new depreciation rates for Western Union landlines plant, retroactively to January 1, 1955. The new rates are expected to result in annual depreciation charges of approximately $10,937,000, and represent a reduction of $273,000 annually, or 2.5 percent. The previous prescription of depreciation rates for Western Union's landlines plant was January 1, 1948.

Pensions.—To ease the burden of financing pension costs, particularly in the future, Western Union adopted, effective January 1, 1955, a plan for partial funding of employee pensions. The plan is subject to Internal Revenue Service approval as qualifying for tax exemption, and will be submitted to this Commission for its consideration. The company's previous pension plan was on a pay-as-you-go basis. Based on available actuarial data, aggregate annual pension costs under the partial funding plan are expected to be greater than the previous pension plan through the year 1965, after which time they will be less. Total pension costs are expected to reach a peak of $13,000,000 in 1973, after which they will level off.

Capital structure changes.—Toward the end of the fiscal year Western Union took advantage of its greatly improved credit and investment position and effected substantial changes in its capital stock and debt structure, whereby additional equity capital was obtained and the interest rate was reduced. The company refinanced its outstanding funded debt of $37,000,000 through private institutional sale of $38,500,000 of 4⅛ percent debentures maturing on June 1, 1980. The company split its common capital stock four for one, changed its par value from $10 per share to $2.50 per share, and increased authorized shares by 1,580,000, bringing the authorized total to 7,000,000. At the close of the fiscal year Western Union proposed, subject to Securities and Exchange approval, to offer 1,000,000 new shares of stock

to shareholders. After the proposed issue, the company will have over 6,000,000 shares of common stock outstanding.

Uniform system of accounts.—Progress has been made on a proposed combined system of accounts for wire-telegraph, ocean-cable, and radiotelegraph carriers. A partial draft has been sent to the affected carriers for comment.

Miscellaneous accounting matters.—In addition to continuing review of telegraph carriers' accounting methods and procedures, the accounting for the following special items was studied and approved: (*a*) discontinuance of the 12-year special amortization plan with respect to the unprovided-for depreciation on plant prematurely retired under the company's modernization program, and (*b*) final adjustments incident to the 1943 merger of Postal and Western Union.

INTERNATIONAL TELEGRAPH AND TELEPHONE

General

During fiscal 1955, 4 cable and 6 radiotelegraph carriers with terminals in the continental United States were engaged in international telegraph operations between this country and the rest of the world. Through these facilities and their connections with foreign carriers, the United States public was provided with telegraph message service to and from almost every place on the globe. Four of the United States carriers also provided private line service (by means of leased cable and radio channels) with a number of foreign countries. Radiotelegraph communication was available with ships at sea through the coast stations of 4 international radiotelegraph carriers and of 5 other carriers engaged exclusively in marine communication services.

International telephone service was provided by American Telephone and Telegraph Company between the United States and over 100 foreign and overseas points, more than half of which were served by direct radiotelephone circuits. There is also radiotelephone service to ships at sea.

International telegraph and telephone services were provided to and from United States territories and possessions on a basis generally comparable with the international services to and from the continental United States.

The upturn in volume of United States international telegraph message traffic which began in mid-1953 continued through calendar 1954. The message volume handled by the ten cable and radiotelegraph carriers advanced to a total of 521,827,659 paid words in 1954, representing an increase of about 2.1 percent or 10,571,166 paid words over the 1953 level. The improvement in message volume was

reflected in industry-wide message revenues (including the revenues from the foreign radiotelegraph operations of one cable carrier devoted principally to message handling), which increased to $53,277,718 in calendar 1954, or about 5.9 percent above the $50,281,291 for the previous year. Revenues from leased channels, international teleprinter exchange, and other direct customer-to-customer services continued to show substantial increases during 1954 in line with those noted for the 2 preceding years. The revenues from these services, as well as other nonmessage services furnished by the several carriers, increased about 12 percent during calendar 1954 to a total of $10,583,398.

Total industrywide operating revenues reached a new high of $63,811,116 in 1954, an increase of about 6.8 percent over 1953, while operating expenses increased only about 2.7 percent. Thus, net operating revenues of the industry, before Federal income taxes, advanced to $9,157,197 for a new postwar record high, representing an increase of about 40.7 percent over the previous high of $6,509,445 in 1953. As of December 31, 1954, the several international telegraph carriers had a total gross investment in communications plant and equipment of $133,666,677, and a net investment, after depreciation allowances, of $57,679,105.

Calendar 1954 saw a continuation of the growth in the number of international telephone calls. During that year a new high of 1,134,902 chargeable calls were handled between the United States and foreign overseas points, an increase of about 7.8 percent over 1953. The revenues for such service (including associated landline charges) amounted to $11,440,183 in 1954, or about 4.8 percent above 1953.

International Services

Telegraph.—Submarine cables operated by United States companies provide direct telegraph service to European and Latin American points. At present there are no such cables in operation to Pacific points. At the close of fiscal 1955, United States companies were operating direct radiotelegraph circuits to 85 foreign and overseas points. Through interconnection between the United States cable and radio facilities and those of foreign carriers, telegraph traffic is relayed to practically every country in the world not served by direct circuits.

The past year saw an increased trend toward use of the "customer-to-customer" type of services offered by the telegraph carriers. Representative of those services are "TEX" (international teletypewriter exchange) and "IMCO" (international metered communication). In these services the carrier furnishes a communication channel between the United States and a foreign point so that customers at both ends

of the circuit can communicate directly by means of equipment installed in their premises. Charges for these two types of service are on a "per minute" and "per letter" basis, respectively. Also widely used is the "leased line" type of service where the customer leases a channel for a given period of time, usually by the month with a minimum daily use.

Under international agreement, each country is required to provide for the settlement of accounts for vessels under its registry of tolls for radiotelegraph traffic exchanged with coastal stations of other administrations. This function for United States ships is carried out by the International Telecommunications Settlements Division of the Commission. In fiscal 1955 this division accounted for the following messages and made the following disbursements:

Messages on hand beginning of period	25,478
Messages received during period	132,641
	158,119
Messages processed during period	144,115
Messages on hand June 30, 1955	14,004
Cash on hand at beginning of period	$66,588.83
Cash received from United States companies	206,492.31
Total	273,081.14
Cash disbursed during period	213,721.82
Cash on hand for disbursement June 30, 1955	59,359.32

Telephone.—Direct international telephone service is provided to 59 foreign countries and overseas points by means of radio. Canada and Mexico are served by interconnecting wire lines and Cuba by submarine cable. Alaska is served by the Alaska Communications System. In addition, over 50 points are served by relay through various foreign facilities.

During the year work was started on installing the coaxial telephone cables referred to in last year's report. Two cables (1 for each direction) across the north Atlantic, scheduled for completion late in 1956, will provide 36 two-way telephone channels between the United States and Canada and the British Isles. Preliminary work has also started on installing two similar telephone cables between Port Angeles, Washington, and Ketchikan, Alaska. The Commission issued a cable landing license for the latter on October 20, 1954. Still another such link, authorized September 7, 1955, will extend from the Pacific coast to Hawaii.

Experiments are being conducted with "over-the-horizon" transmission on microwave frequencies. These experiments look toward

use of microwaves to provide many channels of communication, including transmission of TV programs, over paths where the use of intermediate relay stations would be impractical. The first such authorization by the Commission is for tests between the southern tip of Florida and Cuba, a distance of approximately 150 miles. The conventional "line-of-sight" microwave relay systems, as used throughout the United States, require the stations to be spaced much closer.

Applications.—Licensees in the International Fixed Public Services filed a total of 264 applications during the year for additional frequencies, points of communication, installation of additional equipment, program service, etc., as compared with 405 applications the previous year. The Commission acted on 292 applications. This reduction is due largely to the fewer number of applications for new frequencies. This results from the fact that during the year all licensees transferred their operations to "in band" frequencies and so ended the flood of applications occasioned by implementation of the Atlantic City table of frequency allocations.

Radio Interference.—The increased congestion of the high frequency radio spectrum (3 to 30 megacycles), caused by implementation of the Atlantic City table and by increasing use of radio services throughout the world, has resulted in a corresponding increase in the number of interference cases. The Commission has been instrumental in aiding the operating agencies concerned, both United States and foreign, to reach satisfactory agreements for alleviation of interference problems.

Docket Cases

Mackay circuits to The Netherlands and Portugal.—The 1954 annual report noted that further hearings had been held in the so-called "Three Circuits Case" concerning applications by Mackay Radio and Telegraph Co. to establish radiotelegraph circuits to The Netherlands and Portugal which would compete with existing circuits operated by RCA Communications, Inc. This proceeding (Docket 8777) had been remanded to the Commission for further consideration after the Supreme Court held that the Commission's grant of such authority could not be based upon a finding that there was a national policy in favor of competition in this field. On June 22, 1955, the Commission reaffirmed its grant, finding that Mackay competition to the points at issue was reasonably feasible and that there were grounds for a reasonable expectation that such competition would have a beneficial effect. The Commission noted that it was not establishing a general policy with respect to duplicate direct radiotelegraph circuits, but

would require any applicant to demonstrate at least that there is reasonable expectation that such competition may have some beneficial effect.

Western Union-Globe and Tropical contracts.—In 1954 it was reported that an appeal had been taken to the courts from the Commission's decision in Docket 9292 holding that certain contracts entered into with Globe Wireless, Ltd., and Tropical Radio Telegraph Co., respectively, by Western Union for the exchange of certain international telegraph traffic were violative of Section 222 of the Communications Act and the international formula and ordering such companies to cease and desist from the transfer of traffic pursuant to such contracts. On December 8, 1954, the United States Court of Appeals for the Second Circuit affirmed the Commission's decision. Pursuant to order of the Commission, the parties are negotiating an agreement with respect to damages due the complainants (Commercial Pacific Cable Co., Mackay Radio and Telegraph Co., The Commercial Cable Co., All America Cables and Radio, Inc., and RCA Communications, Inc.), as well as a plan of reparations.

International formula complaints.—Several complaints were filed relating to the international formula governing the distribution by Western Union, among the various international carriers, of outbound international telegraph traffic filed at Western Union offices.

By letter of April 7, 1955, RCA Communications, Inc., requested that the Commission, on the basis of the decisions in Docket 9292 (*Western Union-Globe and Tropical contracts*), require Western Union to cease handling, over its cable system via London, traffic destined to various points in the Far East included in "Area C" under the formula, and that such traffic be distributed to the carriers entitled under the formula to traffic to that area, of which Western Union was not one. Following an answer by Western Union and a reply by RCAC, the Commission on May 26, 1955 released a memorandum opinion and order denying the RCAC request, pointing out that the formula was not intended to deprive any carrier of the right to handle traffic over established routes to points it had served prior to the prescription of the formula, and that Western Union was entitled to serve the points in question. On June 24, 1955, RCAC petitioned for reconsideration.

On April 8, 1955, RCAC filed a formal complaint (Docket 11364) with respect to such traffic, requesting that the Commission order Western Union to transfer to RCAC sufficient traffic to make up RCAC's deficiency under the formula or make other restitution. Consideration of the formal complaint is awaiting disposition of the RCAC petition for reconsideration.

On March 1, 1955, RCAC filed a petition and memorandum (Docket 11298) asking a ruling by the Commission with respect to the lawfulness under section 222 of the act and the international formula of certain practices of Western Union relating to solicitation and routing of outbound international messages which tend to favor the Western Union cable division. It requested reparations. That matter is also under consideration.

In 1954 RCAC filed a petition (Docket 10984) requesting a ruling that Western Union was in violation of both the international formula as well as the formula with respect to the distribution of telegraph traffic destined to Canada, because Western Union failed to transfer to RCAC certain traffic destined for transpacific points which Western Union had received from Canadian National Telegraphs in Canada. Further pleadings were filed in January 1955. The matter is still under consideration.

On April 4, 1955, Western Union requested that the Commission prescribe certain changes in the international formula, alleging that in its present form and as interpreted by some of the carriers it is unjust, unreasonable, or not in the public interest. Western Union referred to its letter of February 27, 1951, written in response to the Commission's inquiry of the carriers in 1950 as to their views with respect to possible revision of the formula, as substantially containing its present views on how the formula should be revised. This matter is likewise under study.

Western Union divestment.—The previous annual report referred to the pendency of an initial decision in Docket 10151, which involves an investigation, on the Commission's own motion, into the requirement set forth in Section 222 of the act for the divestment by Western Union of its international telegraph operations. An initial decision issued December 20, 1954, proposed that Western Union be directed to (1) present to the Commission within 12 months a plan for divestment of its submarine cables; (2) cease its international telegraph business within 18 months, and (3) make periodic reports on its negotiations for divestment. The Commission was asked for oral argument prior to final decision. The date for oral argument has not been set. On July 5, 1955, Western Union announced that it had negotiated a plan to sell its international cable facilities. The details have not been finalized and the entire proposal is subject to Commission approval.

Metropolitan area tieline service.—Reference was made in the 1953 annual report to this consolidated proceeding involving a complaint by Western Union against effective provisions in tariffs of RCAC

(Docket 10335), and similar proposed provisions in the joint tariffs of All America Cables and Radio, Inc., The Commercial Cable Co., and Mackay Radio and Telegraph Co. (Docket 10378), for furnishing teleprinters, at the expense of the carriers, to customers located in "metropolitan areas" of New York, Washington, and San Francisco. The defendants' tariffs formerly limited furnishing teleprinters to customers located within the "corporate limits" of such cities. The issues involve the clarity and lawfulness of the tariff provisions in question and the effect of the practices upon the international formula. At a prehearing conference on March 3, 1955, the parties agreed to explore the possibility of resolving the issues without the necessity of a hearing and a few days later agreed on a satisfactory tariff provision. Accordingly, the defendants filed revised tariffs, effective June 1, 1955. providing that the carriers would furnish teleprinters to customers at Washington National Airport and to Government and intergovernmental organizations whose offices are located within 10 miles of the respective carriers' operating offices in Washington, and to other customers of the respective carriers within the "corporate limits" of the three cities mentioned. Accordingly, Western Union requested that its complaints be dismissed, and the proceeding was terminated May 17, 1955.

Tariff Schedules, Contracts and Division of Tolls Statements

Carriers furnishing international and marine communications services submitted the following filings: 689 tariff schedules, 43 contracts, 330 amendments to contracts, 117 reports of negotiations with foreign administrations and carriers, 244 division of tolls statements, and 23 applications for permission to file tariff schedules on less than 30 days' notice.

Rate Level and Structure

In December 1954, a petition was filed for a review and revision of the international rate level and structure. While the matter was being studied, an increase in the level of revenues and earnings took place. Accordingly, a further request was made that the petition be held in abeyance or dismissed without prejudice. On June 1, 1955, the latter action was taken.

Other Regulatory Matters

Depreciation.—Further progress was made, through cooperation with the carriers, in conducting studies and developing information necessary for the Commission to prescribe annual depreciation rates for the international telegraph carriers. As a result, the Commission,

for the first time, prescribed annual depreciation rates, effective January 1, 1954, for the ocean-cable plant of Western Union. It is expected that depreciation rates for some other carriers will follow in fiscal 1956. Continued consideration was also given to the reasonableness of the book depreciation reserve, the depreciation accounting practices, and the depreciation rates and charges of these carriers.

Continuing property records.—All but one international telegraph carrier had completed its property record at the end of fiscal 1955. This carrier expects to do so next year. Studies designed to verify the form and content, as well as to evaluate the regulatory effectiveness, of the property records of the radiotelegraph and ocean-cable carriers were continued. They disclosed certain deficiencies in the records of some carriers and the latter have taken corrective measures. The Commission revised its system of accounts for the international telegraph carriers to provide relief from filing certain material applicable to property records.

Relief and pensions.—Studies were pursued to ascertain the effect of pension costs upon allowable operating expenses for rate-making purposes. One large carrier proposed to adopt a partial funding program, and this plan was analyzed to determine the reasonableness of the additional cost.

Reclassification of plant.—Except for certain adjustments applicable to the plant of several carriers, which are now under study, the plant and equipment of the international telegraph carriers has been reclassified on the basis of original cost. This reclassification is required by the systems of accounts applicable to them.

Miscellaneous accounting matters.—The Commission continued to study the reasonableness of the international telegraph carriers' accounting practices and procedures. These studies are designed to assure rule compliance as a means toward attaining proper rate regulation. Among the matters given consideration were (a) traffic-damage claims, (b) plant retirements and installations, and (c) removal from the carriers' rate bases of all plant and equipment not used or useful in rendering public communication service.

STATISTICS

General

Reports were filed on an annual basis by 366 common carriers and 6 controlling companies for the calendar year 1954. Considerable financial and operating data taken principally from these reports are published annually in a volume entitled "Statistics of the Communications Industry in the United States" (see appendix list of Commission

publications sold by the Superintendent of Documents). The larger telephone and telegraph carriers also file monthly reports of revenues and expenses, and summaries of these data are published monthly by the Commission.

Telephone Carriers

The annual reports received from common carriers include those from 60 telephone carriers and 296 carriers engaged in rendering mobile radiotelephone service. Selected financial and operating data concerning telephone carriers for the year 1954 as compared to 1953 are shown in the following table:

Telephone carriers [1]

Item	1953	1954	Percent of increase or (decrease)
Number of carriers	54	52	
Investment in plant and equipment (as of Dec. 31)	$13,749,883,288	$14,898,749,385	8.36
Depreciation and amortization reserves	$3,618,085,781	$3,836,431,835	6.03
Net investment in plant and equipment	$10,131,797,507	$11,062,317,550	9.18
Local service revenues	$2,777,053,634	$2,983,316,809	7.43
Toll service revenues	$1,641,990,139	$1,796,011,175	9.38
Total operating revenues	$4,628,117,965	$5,013,180,966	8.32
Operating expenses	$3,222,873,105	$3,436,376,578	6.62
Taxes	$838,052,515	$929,143,694	10.87
Net operating income after all taxes	$567,191,745	$647,660,094	14.19
Net income	$496,507,445	$569,599,735	14.72
Dividends declared	$398,972,071	$449,585,317	12.69
Company telephones:			
Business	13,394,632	13,889,031	3.69
Residence	30,448,066	32,063,238	5.30
Number of calls originating during the year:			
Local [2]	69,978,334,496	72,932,452,573	[3]
Toll [2]	2,268,968,227	2,374,742,694	[3]
Number of employees at end of October	625,832	614,369	(1.83)
Male	215,080	219,533	2.07
Female	410,752	394,836	(3.88
Total compensation for the year	$2,378,679,557	$2,496,657,341	4.96

[1] Data shown relate to telephone carriers whose annual operating revenues exceed $250,000. Intercompany duplications, except in minor instances, have been eliminated.
[2] Partly estimated by reporting carriers.
[3] The number of calls shown are not comparable, as many calls were reclassified from "Toll" to "Local" during 1954, due to enlargement of numerous local calling areas.

Telephones by States

More than 52,800,000 telephones were in use domestically at the start of the calendar year 1955. According to the American Telephone and Telegraph Co., more than 43,300,000 were owned by the Bell System and nearly 9,500,000 by independent companies.

A tabulation follows:

State	Total number of telephones	Distribution of telephones			
		By ownership		By type of service	
		Bell system	All other	Business	Residence
Alabama	546,400	480,100	66,300	151,300	395,100
Arizona	235,600	228,300	7,300	84,900	150,700
Arkansas	298,000	230,200	67,800	93,700	204,300
California	4,979,800	4,127,400	852,400	1,608,900	3,370,900
Colorado	536,800	519,700	17,100	170,300	366,500
Connecticut	966,200	19,500	946,700	267,300	698,900
Delaware	153,000	153,000	----------	46,900	106,100
District of Columbia	537,500	535,600	1,900	253,500	284,000
Florida	1,029,700	699,100	330,600	377,200	652,500
Georgia	767,000	667,800	99,200	235,400	531,600
Idaho	164,000	128,900	35,100	46,000	118,000
Illinois	3,485,500	2,920,600	564,900	1,091,400	2,394,100
Indiana	1,362,700	809,400	553,300	348,200	1,014,500
Iowa	917,500	561,400	356,100	189,300	728,200
Kansas	701,900	542,600	159,300	170,000	531,900
Kentucky	576,000	388,100	187,900	152,100	423,900
Louisiana	682,900	654,700	28,200	193,000	489,900
Maine	251,100	226,500	24,600	65,200	185,900
Maryland	867,600	852,700	14,900	242,500	625,100
Massachusetts	1,827,000	1,823,200	3,800	528,100	1,298,900
Michigan	2,487,900	2,247,800	240,100	650,400	1,837,500
Minnesota	1,042,400	802,900	239,500	259,500	782,900
Mississippi	287,900	277,300	10,600	83,500	204,400
Missouri	1,335,100	1,105,200	228,900	362,500	972,600
Montana	181,400	158,600	22,800	52,600	128,800
Nebraska	450,900	227,400	223,500	108,600	342,300
Nevada	68,400	35,200	33,200	28,600	39,800
New Hampshire	166,900	158,200	8,700	43,300	123,600
New Jersey	2,111,100	2,071,800	39,300	589,600	1,521,500
New Mexico	172,000	143,500	28,500	69,700	102,300
New York	6,764,400	6,283,300	481,100	2,259,900	4,504,500
North Carolina	758,000	422,600	335,400	215,900	542,100
North Dakota	144,100	94,600	49,500	36,200	107,900
Ohio	3,138,800	2,075,400	1,063,400	802,500	2,336,300
Oklahoma	672,600	581,200	91,400	200,800	471,800
Oregon	536,600	429,600	107,000	155,000	381,600
Pennsylvania	3,799,700	3,208,500	591,200	997,600	2,802,100
Rhode Island	273,400	264,900	8,500	78,600	194,800
South Carolina	356,500	271,700	84,800	108,700	247,800
South Dakota	170,500	128,000	42,500	40,900	129,600
Tennessee	787,600	691,000	96,600	215,400	572,200
Texas	2,415,700	2,024,300	391,400	766,500	1,649,200
Utah	248,700	234,500	14,200	71,200	177,500
Vermont	103,700	90,600	13,100	27,500	76,200
Virginia	899,800	722,400	177,400	268,400	631,400
Washington	893,500	714,900	178,600	259,200	634,300
West Virginia	413,600	364,600	49,000	106,400	307,200
Wisconsin	1,150,800	835,200	315,600	306,100	844,700
Wyoming	95,600	86,800	8,800	30,900	64,700
Grand total	52,813,800	43,321,800	9,492,000	15,511,200	37,302,600

Land Line Telegraph

The following table sets forth financial and operating data relating to the domestic land line operations of the Western Union Telegraph Company for the calendar year 1954 as compared to 1953. The data

pertaining to its cable operations are included in a later table relating to ocean-cable carriers.

The Western Union Telegraph Company [1]

Item	1953	1954	Percent of increase or (decrease)
Investment in plant and equipment (as of Dec. 31)	$289,448,249	$300,125,917	3.69
Depreciation and amortization reserves	$128,776,085	$130,182,872	1.09
Net investment in plant and equipment	$160,672,164	$169,943,045	5.77
Message revenues	$174,649,515	$173,819,586	(0.48)
Total operating revenues	$208,578,008	$209,634,899	0.51
Operating expenses, depreciation and other operating revenue deductions	$193,863,321	$194,657,236	0.41
Net operating revenues	$14,714,687	$14,977,663	1.79
Provision for Federal income taxes	$5,743,000	$6,207,167	8.08
Net income (or deficit)	[2] $13,242,117	[3] $4,479,468	(66.17)
Net income (landline and cable systems)	[2] $14,468,603	[3] $6,470,898	(55.28)
Dividend (landline and cable systems)	$3,690,143	$3,730,406	1.09
Number of revenue messages handled [4]	162,187,632	152,581,589	(5.92)
Number of employees at end of October	38,957	37,009	(5.00)
Total compensation for the year	$139,488,909	$137,520,793	(1.41)

[1] Represents data for land-line operations. Figures covering cable operations are included in the table below relating to ocean-cable carriers.
[2] Net income reflects net gains from sale of investments of $6,363,993 (net sales $8,580,993 less tax $2,217,000).
[3] After allowance for a charge of $3,319,000 ($6,498,000 less $3,379,000 tax saving) due to establishment of an estimated liability for vacation pay and other employee benefits.
[4] Includes domestic transmission of transoceanic and marine messages (about 8,438,000 in 1953 and about 8,502,000 in 1954).

Radiotelegraph and Ocean-Cable Carriers

There are shown in the accompanying tables financial and operating statistics selected from the annual reports filed by the United States radiotelegraph and cable carriers furnishing international communications services. These tables compare the figures for the calendar year 1954 to those for the previous year.

Radiotelegraph carriers

Item	1953	1954	Percent of increase or (decrease)
Number of carriers	7	7	
Investment in plant and equipment (as of Dec. 31)	$39,129,876	$40,265,004	2.90
Depreciation and amortization reserves	$17,705,958	$17,774,111	0.38
Net investment in plant and equipment	$21,423,918	$22,490,893	4.98
Message revenues:			
Domestic [1]	$1,857,041	$1,868,433	0.61
Transoceanic	$21,235,725	$21,810,481	2.71
Marine	$1,528,362	$1,449,877	(5.14)
Total operating revenues	$30,237,680	$31,204,268	3.20
Operating expenses, depreciation and other operating revenue deductions	$27,309,420	$28,117,065	2.96
Net operating revenues	$2,928,260	$3,087,203	5.43
Provision for Federal income taxes	$2,780,734	$2,236,552	(19.57)
Net income	$2,477,000	$2,262,287	28.67
Dividends declared	$400,000	$400,000	
Number of revenue messages handled:			
Domestic [2]	49,421	54,735	10.75
Transoceanic	10,712,257	10,838,042	1.17
Marine	964,824	940,715	(2.50)
Number of employees at end of October	6,008	5,940	(1.13)
Total compensation for the year	$23,468,678	$24,014,980	2.33

[1] Includes revenues from the domestic transmission of transoceanic and marine messages, and revenues from domestic classification messages (primarily Canadian and Mexican).
[2] Represents domestic classification messages (primarily Canadian and Mexican).

Ocean cable carriers (including cable operations of Western Union)

Item	1953	1954	Percent of increase or (decrease)
Number of carriers	3	3	
Investment in plant and equipment (as of Dec. 31)	$92,038,045	$93,401,673	1.48
Depreciation and amortization reserves	$57,641,617	$58,213,461	0.99
Net investment in plant and equipment	$34,396,428	$35,188,212	2.30
Message revenues:			
Domestic [1]	$160,853	$190,320	18.32
Trasoceanic	$21,312,199	$23,240,617	9.05
Total operating revenues	$29,488,941	$32,606,848	10.57
Operating expenses, depreciation and other operating revenue deductions	$25,907,756	$26,536,854	2.43
Net operating revenues	$3,581,185	$6,069,994	69.50
Provision for Federal income taxes	$1,527,000	$2,617,833	71.44
Net income	$912,930	$3,070,941	236.38
Dividends declared [2]		$883,670	
Number of revenue messages handled:			
Domestic [3]	90,145	98,729	9.52
Transoceanic	9,926,457	10,446,064	5.23
Number of employees at end of October	5,678	5,874	3.45
Total compensation for the year	$14,038,363	$15,226,644	8.46

[1] Includes revenues from the domestic transmission of transoceanic messages, and revenues from domestic classification messages (primarily Canadian).
[2] All dividends declared by Western Union Telegraph Co. have been reported in the table above relating to the domestic land-line operations of that company and excluded from this table.
[3] Represents domestic classification messages (primarily Canadian).

International Telegraph Traffic

The volume of United States international telegraph traffic handled by the cable and radiotelegraph carriers during calendar 1954 totaled 521,827,659 paid words. Of this volume, a total of 265,293,369 paid words were transmitted to foreign and overseas points, while a total of 256,534,290 paid words were received in the United States. The six radiotelgraph carriers accounted for 271,087,424 paid words or about 51.9 percent of the industry volume, and the remaining 48.1 percent, or 250,740,235 paid words, was handled by the four cable carriers. The following table sets forth the traffic volume, in words, exchanged between the United States and each of the principal countries of the world during calendar 1954.

United States—international telegraph (radio and cable) traffic in words, 1954 (includes traffic transiting the United States)

Country	Number of words	
	Outbound from U. S.	Inbound to U. S.
EUROPE, AFRICA, AND THE NEAR EAST		
Algeria	173,785	113,632
Arabia	853,099	889,396
Austria	1,231,263	1,078,360
Belgian Congo	285,723	267,217
Belgium	4,656,232	3,920,353
British East Africa	304,019	292,031
British West Africa	226,212	236,866
Czechloslovakia	430,459	462,740
Denmark	1,666,305	1,135,795
Egypt	1,587,136	1,527,205
Ethiopia	243,044	166,597
Finland	533,812	524,943
France	14,793,157	13,119,398
French West Africa	120,137	101,761
Germany	13,350,806	13,001,104
Greece	1,778,481	1,130,687
Hungary	226,434	305,898
Iceland	267,751	287,614
Iran	670,501	1,341,792
Iraq	285,753	278,498
Ireland	771,320	876,560
Israel	2,456,418	2,029,724
Italy	9,746,223	7,737,303
Lebanon	854,064	893,333
Liberia	485,197	576,942
Luxembourg	113,314	104,250
Morocco—French	560,445	526,594
Morocco—Tangier	487,008	351,412
Netherlands	7,513,305	6,213,043
Norway	2,632,923	1,876,560
Persian Gulf	404,108	476,802
Poland	980,606	710,813
Portugal	1,070,837	900,501
Rhodesia	110,040	125,450
Roumania	160,795	64,918
Spain	3,460,818	2,066,215
Sweden	3,198,605	2,765,429
Switzerland	7,237,075	5,826,856
Syria	240,519	202,657
Transjordania	289,057	257,824
Trieste, Free Territory of	143,908	113,165
Turkey	1,221,416	1,093,629
Union of South Africa	2,508,534	2,616,413
U. S. S. R	5,306,977	2,277,862
United Kingdom	45,915,943	46,779,796
Yugoslavia	940,288	792,804
All other places	1,158,166	1,702,665
Total	143,652,020	130,241,407
WEST INDIES, CENTRAL, NORTH, AND SOUTH AMERICA		
Argentina	5,925,181	6,880,324
Bahamas	868,515	1,034,695
Barbados	228,046	175,266
Bermuda	877,476	829,133
Bolivia	682,525	730,325
Brazil	10,342,032	11,479,133
British Guiana	192,854	196,587
British Honduras	125,189	161,822
Canada	9,287,493	11,478,824
Canal Zone	678,695	484,914
Chile	2,281,040	2,160,676
Colombia	5,644,037	4,862,116
Costa Rica	1,066,974	796,983
Cuba	5,997,036	8,534,666
Dominican Republic	1,317,390	1,192,380
Ecuador	1,398,038	974,839
Guatemala	1,750,092	1,809,518
Haiti	974,077	822,104
Honduras Republic	840,047	1,091,353
Jamaica	1,011,631	773,341
Mexico	2,065,246	1,192,622
Netherlands West Indies	961,702	1,128,641
Nicaragua	887,617	710,492
Other British West Indies[1]	179,203	116,418
Panama	1,214,213	1,113,201
Paraguay	270,192	326,264
Peru	2,186,650	1,985,062
Puerto Rico	4,178,785	3,811,303
Salvador	1,019,319	786,933
Surinam	133,997	123,404
Trinidad	781,902	549,965
Uruguay	2,154,046	2,116,619
Venezuela	7,847,689	9,359,281
Virgin Islands	247,117	234,918
All other places	194,958	113,222
Total	75,811,004	80,137,344
ASIA AND OCEANIA		
Afghanistan	191,840	74,676
Australia	3,483,575	3,073,619
Burma	623,430	139,287
Ceylon	415,300	353,822
Formosa	1,240,285	1,362,607
Guam	421,311	585,213
Hawaii	4,759,428	4,159,926
Hongkong	1,825,093	1,683,922
India	4,209,184	3,698,600
Indochina	384,184	640,826
Indonesia	1,865,608	2,031,613
Japan	14,790,338	14,476,802
Korea	807,322	1,111,533
Malaya, Federation of	1,357,805	1,148,535
New Zealand	1,193,675	948,311
Okinawa	479,783	690,656
Pakistan	1,459,014	1,483,337
Philippines	4,935,384	6,150,576
Thailand (Siam)	961,066	1,067,547
All other places	333,902	303,881
Total	45,739,527	45,185,283
Unknown destination or origin	90,818	970,256
Grand total	265,293,369	256,534,290

[1]Points not listed separately.