

RADIO DIVISION

RADIO SERVICE BULLETIN

ISSUED MONTHLY

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ABBREVIATIONS AND SYMBOLS

The necessary corrections to the list of Commercial and Government Radio Stations of the United States and to the International List of Radiotelegraph Stations, appearing in this bulletin under the heading "Alterations, and corrections," are published after the stations affected in the following order:

Name	= Name of station.
Loc.	= Geographical location. W=west longitude. N=north latitude. S=south latitude. E=east longitude.
Call.	= Call signal (letters) assigned.
Type	= Type of wave classified as follows: A1=continuous wave (tube), A, arc=continuous wave, A2=interrupted continuous wave, A3=phone, B=spark.
Fy.	= Frequency in kilocycles; normal frequency in italics; wave length in meters in parenthesis.
Service	= Nature of service maintained: PG=general public (ship to shore), PR=limited public (limited to public correspondence between fixed stations), P=private, O=Government business exclusively.
Class	= FX=fixed station (point-to-point service), RG=radio-compass station, FA=aeronautical station, AB=aviation station, RF=directional radiobeacon, B=ship station, FC=coast station.
Hours	= Hours of operation: N=continuous service, X=no regular hour, Y=sunrise to sunset.
Accounts	= Message accounts settled by.
F. T. Co.	= Federal Telegraph Co.
I. R. T. Co.	= Intercity Radio Telegraph Co.
I. W. T. Co.	= Independent Wireless Telegraph Co.
M. R. T. Co.	= Mackay Radio & Telegraph Co.
R. C. A.	= Radio Corporation of America.
R. M. C. A.	= Radiomarine Corporation of America.
T. R. T. Co.	= Tropical Radio Telegraph Co.
C. w.	= Continuous wave.
I. c. w.	= Interrupted continuous wave.
A. c.	= Alternating current.
V. t.	= Vacuum tube.
M. a.	= Meters-amperes.
U. S. L.	= Applies only to the list of Commercial and Government Radio Stations of the United States.
Δ	= Equipped with a radio compass (direction finder).

NEW STATIONS

Commercial land stations, alphabetically, by names of stations

[Additions to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1923, and to the International List of Radiotelegraph Stations, published by the Berne bureau]

Station	Call signal	Frequency in kilocycles, meters in parentheses	Service and class	Hours	Owner ¹
Fresno, Calif. ¹	KGJI	3,250 (92.3), 4,244 (70.7), 5,365 (55.92), 8,810 (34.05), 10,010 (29.97)	FX-P	X	Federal-State Marketing Service.
Indio, Calif. ²	KGJB	do	FX-P	X	Do.
Lodi, Calif. ³	KGJC	do	FX-P	X	Do.
Marysville, Calif. ⁴	KGJH	do	FX-P	X	Do.
Modesto, Calif. ⁵	KGJG	do	FX-P	X	Do.
San Diego, Calif. ⁶	KGJA	do	FX-P	X	Do.
San Francisco, Calif. ⁷	KGJJ	2,446 (122.6)	FC-P	N	San Francisco Bar Pilots Association.
Santa Maria, Calif. ⁸	KGJE	3,250 (92.3), 4,244 (70.7), 5,365 (55.92), 8,810 (34.05), 10,010 (29.97)	FX-P	X	Federal-State Marketing Service.
Santa Rosa, Calif. ⁹	KGJD	do	FX-P	X	Do.
Manila, P. I. ¹⁰	KBO	5,145 (58.31), 15,010 (19.987)	FX-P		Philippine insular government.
Manila, P. I., radio ¹¹	KTY	464 (649), 5,585 (53.685), 11,170 (26.84), 16,755 (17.80), 17,900 (17.045)	FC-PG and FX-PR	N	Mackay Radio & Telegraph Co.
Do. ¹²	KUZ	432 (694), 5,555 (53.97), 11,110 (26.98), 16,665 (17.99)	FC-PG	N	Robert Dollar Co.

¹ Formerly carried under heading "station controlled by."

² Loc. (approximately) 119° 47' W., 36° 44' N.; type A1.

³ Loc. (approximately) 116° 11' W., 33° 43' N.; type A1.

⁴ Loc. (approximately) 121° 18' W., 38° 07' N.; type A1.

⁵ Loc. (approximately) 121° 35' W., 39° 09' N.; type A1.

⁶ Loc. (approximately) 119° 59' W., 37° 58' N.; type A1.

⁷ Loc. (approximately) 117° 09' W., 32° 43' N.; type A1.

⁸ Type A3.

⁹ Loc. (approximately) 120° 24' W., 34° 57' N.; type A1.

¹⁰ Loc. (approximately) 122° 45' W., 38° 27' N.; type A1.

¹¹ Loc. (approximately) 121° 03' 15" E., 14° 37' 15" N.; type A1.

¹² Loc. (approximately) 121° 03' 15" E., 14° 37' 15" N.; types A1 and A2.

Commercial ship stations, alphabetically, by names of vessels

[Additions to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1923, and to the International List of Radiotelegraph Stations, published by the Berne bureau]

Name of vessel	Call signal	Rates (cents)	Service	Hours	Owner	Message accounts settled by—
Alice Cooke	WJDO				Northern Products Corporation.	
Ballantrae	WJDS				Trenton Mercer Area Council, Boy Scouts of America.	Owner.
Compania de Filipinas ¹	KZEP	4	PG		Compania General de Tabacos de Filipinas.	Do.
Constance Chandler	WFEI	8	PG		Los Angeles S. S. Co.	M. R. T. Co.
Contoy	KSOI	8	PG	X	Gulf Mail S. S. Co.	R. M. C. A.
Eastern Leader	KDHY	8	PG	X	C. D. Mallory & Co.	Do.
Eleu	WJDH				Inter-Island Steam Navigation Co.	
Fireboat (unnamed) ²	WJDP		P	X	City of Detroit	Owner.
Fred W. Green ³	WNAI		PG	X	Northwestern Sand and Gravel Co.	Mackinac Radio Service.
Hualalai	WJDT	8	PG	X		
Islas Visayas ⁴	KZEV	4	PG		Cebu Navigation Co.	Owner.
Jean	WWEK	8	PG	X	A. H. Bull S. S. Co.	Do.
Jeanette E. ⁵	KGJK		P	X	Alaska Pacific Salmon Corporation.	Do.
Lanikai ⁶	WJDQ		P	X	Hawaiian Sea Products Co.	Do.
Negros ⁷	KZEN	4	PG		Compania Maritima	R. M. C. A.
Satartia III ⁸	WJDM		P	X	Benjamin Clayton	Do.
Sirius ⁹	KZAH	4	PG		Madrigal & Co.	Do.
Sobra Los Oias	WJDR				Sunset Exploration Co.	
Tidewater	WJDN	8	PG	X	Tidewater Oil Co.	Do.

¹ Type, A1 and A2; fy., 500 (600); hours, 8 to 12 a. m., 3 to 5 and 10 to 12 p. m.

² Type, A3.

³ Type, A1 and A2; rates, Great Lakes service, 4 cents per word.

⁴ Type, B; fy., 425 (705), 500 (600); hours, 8 to 12 a. m., 1 to 5 and 7 to 11 p. m.

⁵ Type, A3; fy., 2320 (129.3).

⁶ Type, A2.

⁷ Type, B; fy., 400 (750), 500 (600); hours, 7 to 12 a. m., 1 to 6 and 7 to 10 p. m.

⁸ Type, A1; fy., 5525 (54.3), 5555 (54), 8290 (36.19), 11050 (27.15), 11110 (27).

⁹ Type, A1 and A2; fy., 500 (600); hours, 8 to 12 a. m., 3 to 5 and 9 to 12 p. m.

Commercial land and ship stations, alphabetically, by call signals

Call signal	Name of station	Call signal	Name of station
KBO	Manila, P. I. fx	KZAH	Sirius b
KGJA	San Diego, Calif. fx	KZEN	Negros b
KGJB	Indio, Calif. fx	KZEP	Compania de Filipinas b
KGJC	Lodi, Calif. fx	KZEV	Islas Visayas b
KGJD	Santa Rosa, Calif. fx	WFEI	Constance Chandler b
KGJE	Santa Barbara, Calif. fx	WJDM	Satartia III b
KGJG	Modesto, Calif. fx	WJDN	Tidewater b
KGJH	Marysville, Calif. fx	WJDO	Alice Cooke b
KGJI	Fresno, Calif. fx	WJDP	Fireboat (unnamed) b
KGJJ	San Francisco, Calif. fc	WJDQ	Lanikai b
KDHY	Eastern Leader b	WJDR	Sobre Los Olas b
KGJK	Jeannette E b	WJDS	Ballantrae b
KSOI	Contoy b	WJDT	Hualalai b
KTY	Manila, P. I. fc and fx	WKCK	Jean b
KUZ	do fc	WNAI	Fred W. Green b

Commercial aircraft stations, alphabetically, by names of craft

[Additions to the List of Radio Stations of the United States, edition of June 30, 1928, and to the International List of Radiotelegraph Stations published by the Berne bureau]

Station	Call signal	Frequency in kilocycles, meters in parentheses	Service	Hours	Owner
NC9779 ¹	KHRC	333 (900), 375 (800), 425 (705), 500 (600), 2,506 (119.7)	P		R. M. C. A.
NC7770 ²	KHAY	333 (900), 375 (800), 500 (600)	P		Richard Hoyt (station operated by R. M. C. A.)

¹ Type, A1 and A3.

² Type, A1 and A2.

Commercial aircraft stations, alphabetically, by call signals

Call signal	Name of station	Call signal	Name of station
KHAY	NC7770	KHRC	NC9779

Broadcasting stations, alphabetically, by names of States and cities

[Additions to the List of Radio Stations of the United States, edition of June 30, 1928]

State and city	Call signal	Frequency in kilocycles, meters in parentheses	Power (watts)
Georgia: Savannah	WGSP	1,410 (212.8)	1,500
Mississippi: Jackson (Hinds)	WJDX	1,270 (236.2)	1,500
Virginia: Emory	WJDW	1,370 (219)	1,000

¹ Night.

² Day.

Broadcasting stations, alphabetically, by call signals

Call signal	Location of station (address)	Owner	Frequency in kilocycles, meters in parentheses	Power (watts)
WGSP	Savannah, Ga.	Chamber of Commerce of Savannah.	1,410 (212.8)	1,500
WJDX	Jackson (Hinds), Miss.	Lamar Life Insurance Co.	1,270 (236.2)	1,500
WJDW	Emory, Va.	Emory and Henry College.	1,370 (219)	1,000

¹ Night.² Day.

Government ship stations, alphabetically, by names of stations

[Additions to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1928, and to the International List of Radiotelegraph Stations published by the Berne bureau]

Station	Call signal	Frequency in kilocycles, meters in parentheses	Service	Hours	Owner
Tillamook	NOCB				U. S. Navy.

Government land and ship stations, alphabetically, by call signals

Call signal	Name of station
NOCB	Tillamook

Special stations, alphabetically, by names of stations

[Additions to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1928]

Station	Call signal	Frequency in kilocycles, meters in parentheses	Power (watts)	Owner
Connecticut: Hartford.	W1XF	321 (935)	200	Colonial Air Transport, 270 Madison Ave., New York, N. Y.
Illinois: Downers Grove. ¹	W9XR	2,100 (142.9) to 2,200 (136.4), 2,850 (105.3) to 2,950 (101.7).	5,000	Great Lakes Broadcasting Co., 72 West Adams St., Chicago, Ill.
Massachusetts: Boston.	W1XE	321 (935)	200	Colonial Air Transport, 270 Madison Ave., New York, N. Y.
New Jersey: Allwood. ¹	W2XCP	2,000 (150) to 2,100 (142.9), 2,850 (105.3) to 2,950 (101.7).	2,000	Freed-Eisemann Radio Corp., Junius St. and Liberty Ave., New York, N. Y.
<i>Portable</i>				
California: Los Angeles.	W6XBR	1,604 (187.03), 2,398 (125.1), 3,256 (92.5), 4,795 (62.57), 6,425 (46.7).	100	Warner Bros. Pictures (Inc.)
Maine: Houlton...	W1XR	50 (6,000) to 70 (4,286)	1,000	American Telephone & Telegraph Co., 195 Broadway, New York, N. Y.
New York: Rooky Point.	W2XCQ	1,604 (187.03), 2,398 (125.1), 3,256 (92.5), 4,795 (62.57), 6,425 (46.7), 8,650 (34.68), 12,850 (23.35), 417,300 (17.341).	100	R. C. A. Communications (Inc.).
<i>Aircraft</i>				
NC9746	W10XI	3,076 (97.5), 6,155 (48.74)	20	Aircraft Radio Corp., Boonton, N. J.
NC9779	W10XL	1,808 (186.5), 2,302 (130.3), 3,076 (97.5), 4,108 (73.03), 5,510 (54.46), 6,155 (48.74).	300	R. M. C. A., 66 Broad St., New York, N. Y.
NX7918	W10XH	4,108 (73.03)	10	Daniel Guggenheim Fund (Inc.), 598 Madison Ave., New York, N. Y.
X855E	W10XF	315 (952) to 350 (857), 1,608 (186.57), 8,330 (36.01).	200	Chicago Daily News.

¹ Visual broadcasting (television).² Visual broadcasting (television) and experimental.

Special stations, grouped by districts

Call signal	District and station	Call signal	District and station
W1XE W1XF W1XR	First district: Boston, Mass. Hartford, Conn. Houlton, Me. (portable).	W9XR	Ninth district; Downers Grove, Ill. Portable, aircraft and vessels licensed to operate in all districts—Aircraft: X855E.
W2XCP W2XCQ W6XBR	Second district: Allwood, N. J. Rocky Point, N. Y. (portable). Sixth district: Los Angeles, Calif. (portable).	W10XF W10XH W10XI W10XL	NX7918. NC9746. NC9779.

RADIOBEACON STATIONS

[Additions to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1928, and to the International List of Radiotelegraph Stations published by the Berne bureau]

Ashtabula Light Station, Ohio.—Loc. (approximately) 80° 48' W., 41° 55' N.: Transmits groups of 2 dashes and 1 dot for 60 seconds, silent 120 seconds, thus:

- - - . etc.	Silent
60 seconds	120 seconds

Operates continuously during thick or foggy weather and daily in clear weather from 11.45 to 12 a. m., 3.30 to 4 a. m. and p. m., and from 9.30 to 10 a. m. and p. m., ninetieth meridian time on a frequency of 314 (955).

ALTERATIONS AND CORRECTIONS

COMMERCIAL LAND STATIONS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1928, and to the International List of Radiotelegraph Stations, published by the Berne bureau]

- BALTIMORE, MD., RADIO.—Loc. 76° 35' 32" W.; 39° 16' 51" N.; fy., 135 (2,222) 143 (2,098), 418 (720), 500 (600).
- BANDINI, CALIF.—Loc. change to Los Angeles, Calif.; fy. 2,482 (120.87), 3,460 (86.7), 5,690 (52.72), 6,410 (46.8).
- BOLINAS, CALIF. (KEE).—Call, add KQG; fy., add 18,000 (16.667); owner, R. C. A. Communications (Inc.).
- BOLINAS, CALIF. (KEM).—Call, add KEB; fy., add 6,852.5 (43.778); owner, R. C. A. Communications (Inc.).
- BOLINAS, CALIF. (KEN).—Call, add KKW; fy., add 15,445 (19.424); owner, R. C. A. Communications (Inc.).
- BOLINAS, CALIF. (KER).—Call, add KQR; fy., add 18,040 (16.630); owner, R. C. A. Communications (Inc.).
- BOLINAS, CALIF. (KET).—Owner, R. C. A. Communications (Inc.).
- BOLINAS, CALIF. (KKQ).—Call, add KKL; fy., add 15,475 (19.386); owner, R. C. A. Communications (Inc.).
- BOLINAS, CALIF. RADIO (KPH).—Fy., 126 (2,381), 136 (2,206), 143 (2,098), 436 (688), 500 (600).
- BOLINAS, CALIF. (KQZ).—Call, add KEZ; fy., add 10,400 (28.846); owner, R. C. A. Communications (Inc.).
- BOLINAS, CALIF. (KWE).—Call, add KEI; fy., add 10,620 (28.249); owner, R. C. A. Communications (Inc.).
- CAMIGUIN ISLAND, P. I.—Call changed to KTX; loc. (approximately) 121° 53' 00" E.; 18° 50' 00" N.; type, A1; service, FX; hours, X.
- CHATHAM, ALASKA (KGIN).—Loc. (approximately) 134° 57' 00" W.; 57° 30' 30" N.; service and class, FX & FC (PR).
- CHATHAM, MASS., RADIO (WIM).—Fy., 406 (740), 500 (600).
- EXCURSION INLET, ALASKA.—Service and class, FX & FC-PR; accounts, R. M. C. A.
- FALSE PASS, ALASKA.—Accounts, R. M. C. A.

- GALVESTON, TEX., RADIO.**—Type, A2; fy., 418 (720), 500 (600); service and class, FC-PG & FX-PR; hours, 8 a. m. to noon and 1 p. m. to 5 p. m. daily.
- GUAM, GUAM.**—System A arc & A1 and 2; fy., 6,815 (44.02), 6,875 (43.64), 7,655 (39.09), 7,662.5 (38.65), 7,670 (39.11), 7,730 (38.81), 7,737.5 (38.78), 7,745 (38.74), 7,752.5 (38.7), 7,760 (38.66), 8,075 (37.15), 8,710 (34.44), 8,850 (33.9), 8,970 (33.44), 8,980 (33.41), 8,990 (33.37), 9,070 (33.08), 9,290 (32.29), 10,170 (29.5), 10,490 (28.6), 10,810 (27.75), 10,820 (27.73), 10,830 (27.7), 10,890 (27.55), 13,000 (23.08), 13,015 (23.05), 13,030 (23.02), 13,750 (21.82), 13,960 (21.49), 14,680 (20.44), 14,695 (20.415), 14,710 (20.39), 14,725 (20.375), 14,740 (20.35), 14,755 (20.335), 14,770 (20.31), 17,140 (17.503), 17,420 (17.222), 17,660 (16.988), 17,680 (16.968), 17,700 (16.949), 18,260 (16.429), 18,780 (15.974), 19,540 (15.253), 19,560 (15.337), 19,580 (15.322), 19,600 (15.306), 19,620 (15.291), 19,740 (15.198), 20,300 (14.778), 20,980 (14.299), 21,380 (14.032).
- HAWK INLET, ALASKA.**—Accounts, R. M. C. A.
- HIDDEN INLET, ALASKA.**—Fy., add 2,320 (129.3); service and class, FC and FX-PR and P.
- HONOLULU, HAWAII (KOG).**—Fy., add 16,580 (18.094), 16,900 (17.751); service and class, add FC-PG.
- HONOLULU, HAWAII, RADIO (KYG).**—Fy., add 460 (652), 500 (600).
- IKATAN, ALASKA, RADIO.**—Accounts, R. M. C. A.
- ISABELA DE BASILAN, P. I. (ZAMBOANGA) RADIO.**—Call changed to KPN.
- KAHUKU, HAWAII (KKH).**—Call, add KKP; fy., strike out 7,415 (40.459), add 7,520 (39.89), 13,705 (21.890); owner, R. C. A. Communications (Inc.).
- KING COVE, ALASKA, RADIO.**—Accounts, R. M. C. A.
- LAS VEGAS, NEV.**—Type, A2; fy., 2,482 (120.87), 3,460 (86.7), 5,690 (52.72), 6,410 (46.8).
- LAZY BAY, ALASKA.**—Accounts, R. M. C. A.
- LINDEN, N. J.**—Loc. 74° 14' 13" W.; 40° 36' 40" N.
- LUMARSO, P. I.**—Call changed to KBM.
- MANILA, P. I. RADIO (KAA).**—Fy., 187.5 (1,600), 474 (632.5), 500 (600), 5,645 (56.11), 11,290 (26.55), 16,935 (17.704).
- MARION, MASS., RADIO (WCC).**—Type, A1; fy., 117 (2,564), 129 (2,326), 141 (2,128), 143 (2,098).
- MARION, MASS. (WSO).**—Fy., 25.8 (11,628); owner, R. C. A. Communications (Inc.).
- MOBILE, ALA. (WPP).**—Fy., 143 (2,098), 165 (1,818), 438 (6,849), 500 (600), 4,116 (72.9), 6,515 (46.05).
- NAGA, P. I.**—Correct name is Naga-Naga, P. I.; loc. (approximately) 122° 55' 30" E.; 7° 30' 54" N.; type, A1; service and class, FX-P; hours, X.
- NAKEEN, ALASKA (BRISTOL BAY).**—Fy., 2,320 (129.3).
- NEW BRUNSWICK, N. J. (WII).**—Fy., 21.8 (13,750); owner, R. C. A. Communications (Inc.).
- NEW BRUNSWICK, N. J. (BOUND BROOK) (WRT).**—Fy., 22.6 (13,265); owner, R. C. A. Communications (Inc.).
- NEW YORK, CONN.**—Fy., strike out 326 (920), add 476 (630).
- NEW YORK, N. Y., RADIO (BOROUGH OF BROOKLYN) (WNY).**—Type, A1 and A2; fy., 135 (2,222), 143 (2,098), 442 (680), 500 (600).
- NEW YORK, N. Y. (WPY).**—Type, A1 & A2; fy., 438 (685), 500 (600).
- PALM BEACH, FLA.**—Type, A2; fy., 119 (2,520), 143 (2,098), 394 (760), 500 (600), owner, R. M. C. A.
- PALO ALTO, CALIF. (near) (KFS).**—Fy., 109 (2,752), 123 (2,439), 143 (2,098), 418 (720), 500 (600), 5,525 (54.3), 8,690 (34.52), 11,050 (27.15), 13,060 (22.97), 16,580 (18.094), 16,980 (17.668), 21,580 (13.902), 22,100 (13.575).
- PASAY, P. I., RADIO.**—Fy., add 5,615 (53.395), 11,230 (26.69).
- PHILADELPHIA, PA., RADIO (WNW).**—Type, B; fy., 410 (730), 500 (600); hours, 6 a. m. to midnight daily.
- PORTLAND, OREG., RADIO (KPK).**—Accounts, R. M. C. A.
- PORT MOLLER, ALASKA.**—Accounts, R. M. C. A.
- ROCKY POINT, N. Y. (KIO).**—Call, add KEQ; fy., add 6,732.4 (44.560).
- ROCKY POINT, N. Y. (WAJ).**—Call, add WEV; fy., add 6,942.5 (43.212); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WBU).**—Call, add WEN; fy., add 7,407.5 (40.500); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WEA).**—Call, add WQE; fy., add 18,920 (18.856); owner, R. C. A. Communications (Inc.).

- ROCKY POINT, N. Y. (WEC).—Fy., 8,930 (33.594); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WED).—Call, add WQL; fy., add 14,815 (20.250); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WEG).—Call, add WKD; fy., strike out 7,520 (38.894), add 7,415 (40.459), 13,435 (22.330); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WEL).—Call, add WQU; fy., add 13,855 (21.653); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WER).—Call, add WQI; fy., add 17,880 (16.779); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WES).—Call, add WQT; fy., add 13,885 (21.606); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WET).—Call, add WQS; fy., add 13,915 (21.559); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WEX).—Call, add WQR; fy., add 16,015 (18.732); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WHR).—Call, add WKL; fy., add 8,940 (33.557); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WIK).—Call, add WQF; fy., add 17,920 (16.741); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WIY).—Call, add WKJ; fy., add 9,460 (31.712); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WKO).—Call, add WEZ; fy., add 6,927.5 (43.306); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WKU).—Owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WKW).—Call, add WEO; fy., add 6,957.5 (43.119); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WPE).—Call, add WQJ; fy., add 21,240 (14.124); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WQA).—Call, add WKC; fy., add 13,465 (22.280); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WQK).—Owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WQP).—Call, add WQD; fy., add 18,960 (15.823); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WQV).—Call, add WQH; fy., add 18,800 (15.890); owner, R. C. A. Communications (Inc.).
- ROCKY POINT, N. Y. (WQW).—Owner, R. C. A. Communications (Inc.).
- SALT LAKE CITY, UTAH (KGTH).—Fy., 2,482 (120.87), 3,460 (86.7), 5,690 (52.72), 6,410 (46.8).
- SAN FRANCISCO, CALIF., RADIO (KTK).—Location changed to Mussell Rock, Calif., Radio; loc. (approximately) 122° 29' 36" W.; 37° 39' 12" N.; fy., 460 (652), 500 (600), 8,445 (35.52), 11,370 (26.39), 16,890 (17.762).
- SAN JUAN, P. R. (WGT).—Call, add WGU; fy., add 6,717.5 (44.659); owner, R. C. A. Communications (Inc.).
- SAN JUAN, P. R. (WGX).—Call, add WQZ; fy., add 15,985 (18.768); owner, R. C. A. Communications (Inc.).
- SAN JUAN, P. R. (WJT).—Call, add WGZ; fy., add 9,480 (31.646); owner, R. C. A. Communications (Inc.).
- SEATTLE, WASH. (KSA).—Fy., add 460 (652), 500 (600).
- TENAKEE, ALASKA.—Loc. (approximately) 135° 6' 00" W.; 57° 47' 00" N.
- TORRANCE, CALIF. (LOS ANGELES) RADIO.—Fy., 133 (2,256), 143 (2,098), 408 (735), 500 (600).
- TUCKERTON, N. J. (WSC).—Fy., add 5,525 (54.3), 6,485 (46.26), 6,500 (46.15), 8,370 (35.84), 11,050 (27.15), 12,670 (23.68), 12,730 (23.57), 12,820 (23.40), 13,210 (22.71), 16,575 (18.190), 16,740 (17.921), 16,780 (17.873), 21,700 (13.825), 21,740 (13.799), 21,780 (13.774), 21,820 (13.749), 22,100 (13.575).
- UGANIK, ALASKA (KVF).—Accounts, R. M. C. A.
- UNION BAY, ALASKA RADIO.—Type, add A3; fy., add 2,320 (129.3); service and class FC-PG and FX-PR; rates, 6c per word.
- WATERFALL, ALASKA RADIO.—Type, add A3; fy., 2,320 (129.3); service and class FC-PG and FC-PR.

PORTABLE:

- Louisiana (WFG).—Read Third Radio Zone No. 1.
- Louisiana (WFH).—Read Third Radio Zone No. 2.
- Louisiana (WFJ).—Read Third Radio Zone No. 6.
- Louisiana (WFQ).—Read Third Radio Zone No. 13.
- Louisiana (WFR).—Read Third Radio Zone No. 14.

PORTABLE—Continued.

Louisiana (WFS).—Read Third Radio Zone No. 15.
 Mississippi (WFM).—Read Third Radio Zone No. 7.
 Mississippi (WFN).—Read Third Radio Zone No. 8.
 Mississippi (WFP).—Read Third Radio Zone No. 9.
 Oklahoma (KNL).—Read Third Radio Zone No. 21.
 Oklahoma (KNM).—Read Third Radio Zone No. 20.
 Oklahoma (KNQ).—Read Third Radio Zone No. 19.
 Oklahoma (KNY).—Read Third Radio Zone No. 12.
 Oklahoma (KNZ).—Read Third Radio Zone No. 11.
 Oklahoma (KOD).—Read Third Radio Zone No. 10.
 Texas (KNS).—Read Third Radio Zone No. 18.
 Texas (KNT).—Read Third Radio Zone No. 17.
 Texas (KNU).—Read Third Radio Zone No. 16.
 Texas (KOF).—Read Third Radio Zone No. 5.
 Texas (KOI).—Read Third Radio Zone No. 4.
 Texas (KOT).—Read Third Radio Zone No. 3.

Strike out all particulars of the following-named stations: Cape Charles, Va.; Houston, Tex.; Johnswobd, Mich.; Norfolk, Va. (WEI); Pampa, Tex.; Poinciana, Fla.; Vestal Substation, Calif.; Wilsonville, Pa.

COMMERCIAL SHIP STATIONS, ALPHABETICALLY, BY NAMES OF VESSELS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1928, and to the International List of Radiotelegraph Stations, published by the Berne bureau]

ADMIRAL FISKE.—Fy., 143 (2,098), 151 (1,987), 157 (1,911), 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600); hours, N (first class), X (third class).

AGWIHAVRE.—Name changed to Gulfpenn.

AGWIMEX.—Name changed to Gulfwax.

AGWISUN.—Name changed to Gulfgem.

ALLEGRO.—Name changed to Mizpah.

AMERICAN MERCHANT.—Owner, United States Lines.

AMERICAN SHIPPER.—Owner, United States Lines.

ANNA HELEN.—Type, A1 and A2; fy., 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600), 5,525 (54.3), 5,555 (54), 8,450 (35.5), 11,050 (27.15), 11,110 (27); service, P; hours, X.

BALDHILL.—Accounts, R. M. C. A. (U. S. L.).

BENSON FORD.—Type, A1 and A2; fy., 143 (2,098); 160 (1,875); service, P.

BERYLE E.—Fy., 2,320 (129.3); service, P.

BOHEMIA.—Owner, Pathe Studios (Inc.).

CAPE ROMAIN.—Name changed to Emilia; owner, A. H. Bull S. S. Co.

CARONIA.—Type, A1 and A2; fy., 143 (2,098), 151 (1,987), 153 (1,961), 157 (1,911), 159 (1,887), 160 (1,875), 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600).

CHICKAMAUGA (KULC).—Name changed to Malhace; owner, Malsah S. S. Co.

CHINCHA.—Owner, American South African Line.

CHIRIKOF.—Type, A1; fy., 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600); hours, N; accounts, owner.

CITY OF ALBANY.—Name changed to Commercial Orleanian; owner, Commercial Mariner S. S. Co.

CITY OF SYDNEY.—Owner, Northern Fisheries.

DEFIANCE.—Type, A arc and B; fy., 143 (2,098), 151 (1,987), 153 (1,961), 157 (1,911), 160 (1,875), 375 (800), 410 (730), 425 (705), 454 (660), 500 (600); hours, N (first class), X (third class).

DOROTHY ALEXANDER.—Fy., 143 (2,098), 151 (1,987), 157 (1,911), 375 (800), 410 (730), 425 (705), 454 (660), 500 (600).

EASTERNER.—Fy., add 410 (730), 454 (660); accounts, R. M. C. A.

EASTERN KNIGHT.—Owner, Pacific-Atlantic S. S. Co.

EDRIS.—Name changed to Wanderlust; owner, Harvey S. Bissell.

ENCHANTRESS (KGBT).—Owner, Morgan Adams.

ENCHANTRESS (WPBN).—Fy., add 410 (730), 454 (660).

ETHEL M. STERLING.—Owner, Santa Fe Mercantile Co.

F. A. DOUTY.—Owner, Matson Navigation Co.

FIRE BOAT No. 31.—Fy., 1,596 (187.9).

FIRE BOAT No. 44.—Fy., 1,596 (187.9).

- FIRE BOAT No. 47.—Fy., 1,596 (187.9).
- FOUR WINDS.—Fy., add 5,525 (54.3), 8,290 (36.19), 11,050 (27.15), 13,240 (22.66), 16,580 (18.094), 16,860 (17.794); service, P.
- FRANK D. STOUT.—Owner, Southern Redwood Corporation.
- FREDERICK C.—Type, A3; fy., 2,320 (129.3).
- GARFIELD.—Name changed to Nosa Chief; owner, New Orleans & South American S. S. Co.
- GATEWAY CITY.—Type, B; fy., 375 (800), 425 (705), 500 (600).
- GENERAL M. H. SHERMAN.—Accounts, M. R. T. Co.
- GEORGE WASHINGTON (KDCL).—Owner, United States Lines.
- GEORGE W. MEAD.—Type, A1 and A2; fy., 375 (800), 394 (760), 410 (730), 425 (705); rates, Great Lakes service 4 cents per word; accounts, R. C. A.
- GEORGIAN (KJUA).—Type, A2; fy., 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600).
- GEORGIAN (WACF).—Owner, Pacific-Atlantic S. S. Co.
- GLENDOYLE.—Owner, Leonard C. Hammond.
- HARVESTER.—Owner, Texas Co.
- HAWAIIAN.—Fy., 375 (800), 410 (730), 425 (705), 454 (660), 500 (600).
- HELEN WHITIER.—Type, B; fy., 375 (800), 410 (730), 425 (705), 454 (660), 500 (600).
- HILDA.—Accounts, M. R. T. Co.
- IDA MAE.—Type, A1; fy., 2,320 (129.3).
- INDIANA (WPCZ).—Type, B; fy., 375 (800), 410 (730), 425 (705); hours, X.
- INTREPID.—Owner, Transportation Products Co.
- J. A. BAILEY.—Correct name, F. A. Bailey.
- JOHN F. CUSHING.—Rates, Great Lakes service 4 cents per word.
- J. R. GORDON.—Fy., add 410 (730), 454 (660).
- KAIMILOA.—Owner, Elizabeth Lauder Kellum.
- KISKA.—Fy., 2,320 (129.3); service, P; hours, X; accounts, owner.
- LAKE ELLENDALE.—Owner, National Dredging Co.
- LAKE ORMOC.—Fy., 143 (2,098), 153 (1,961), 157 (1,911), 159 (1,887), 160 (1,875), 375 (800), 394 (760), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600), 11,050 (27.15).
- LEONINE.—Fy., 2,320 (129.3); service, P.
- LEVIATHAN.—Owner, United States Lines.
- MALA.—Accounts, owner.
- MALAMA.—Accounts, owner.
- MANA.—Accounts, owner.
- MARIAN OTIS CHANDLER.—Accounts, R. M. C. A.
- MARISKA.—Name changed to Heigh-Ho; owner, A. E. Walbridge.
- MARQUETTE & BESSEMER No. 2.—Fy., 375 (800), 394 (760), 410 (730), 425 (705).
- MARY COLLINS.—Name changed to Leopold Adler.
- MARY PINCHOT.—Fy., 143 (2,098), 151 (1,987), 153 (1,961), 157 (1,911), 159 (1,887), 160 (1,875), 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600).
- MAUNALEI.—Accounts, owner.
- MAUNAWILI.—Accounts, owner.
- MIKIMIKI.—Type, A3; fy., 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600), 2,320 (129.3); service, P; hours, X; accounts, owner.
- MITCHELL.—Type, B; fy., 375 (800), 410 (730), 425 (705), 454 (660), 500 (600).
- MURSA.—Name changed to General M. H. Sherman.
- MYRTLE.—Owner, Pacific-Atlantic S. S. Co.
- NAKEEN.—Type, A3; fy., 2,320 (129.3); accounts, owner.
- NEPONSET.—Accounts, Luckenbach S. S. Co.
- NIRVANA.—Owner, Frank Aranow.
- NOSA KING.—Type, A2; fy., 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600).
- ORLEANS.—Owner, Pacific-Atlantic S. S. Co.
- OSSINING.—Fy., 375 (800), 410 (730), 425 (705), 454 (660), 500 (600).
- PACIFIC OAK.—Type, A1 and A2; fy., 143 (2,098), 151 (1,987), 157 (1,911), 160 (1,875), 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600).
- PENNSYLVANIA (WKCV).—Owner, Texas Co.
- PETER KERR.—Owner, Pacific-Atlantic S. S. Co.
- PETREL (WRBS).—Type, A3; fy., 2,320 (129.3).
- POINT BONITA.—Accounts, M. R. T. Co.
- POINT LOBOS.—Name changed to Ernest H. Meyer.

- PRESIDENT HARDING.—Owner, United States Lines.
 PRESIDENT ROOSEVELT.—Owner, United States Lines.
 REAPER.—Owner, Texas Co.
 RELAY.—Type A1 and A2; fy., 143 (2,098), 151 (1,987), 153 (1,961), 157 (1,911), 159 (1,887), 160 (1,875), 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600); service, PG.
 RIPPLE (KFLF).—Type, B; fy., 375 (800), 410 (730), 425 (705), 454 (660), 500 (600).
 ROYONO.—Name changed to Hedelca; owner, Alcan Hirsch.
 SALLY S.—Fy., 2,320 (129.3); service, P.
 SAMSON.—Owner, Diamond "P" Transportation Co.
 SAN ANTONIO.—Owner, South Coast S. S. Co.
 SANTA INEZ (WIDA).—Type, A1 and A2; fy., 143 (2,098), 151 (1,987), 157 (1,911), 159 (1,887), 160 (1,875), 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600); hours, X.
 SCHOHARIE.—Type, A2; fy., 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600).
 SENATOR.—Owner, Nicholson-Universal S. S. Co.
 SHENANGO (WJDB).—Rates, Great Lakes service 4 cents per word.
 SIALIA (WBDI).—Accounts, R. M. C. A.
 SIERRA (WKCM).—Accounts, R. M. C. A.
 SOLITAIRE.—Owner, Texas Co.
 SONORA.—Accounts, R. C. A.
 SOUTHSEAS.—Name changed to Velma Lykes.
 SPRAY.—Name changed to Patrick J. O'Hara; owner, O'Hara Bros. Co.
 STOCKTON.—Owner, Walter Miller.
 SULTANA.—Fy., 375 (800), 410 (730), 425 (705); accounts, R. C. A.
 TAMPA (WLCM).—Owner, William H. Cochrane.
 TRANSFORD II.—Owner, New England S. S. Co.
 TRIUMPH.—Type A arc and B; fy., 143 (2,098), 151 (1,987), 153 (1,961), 157 (1,911), 160 (1,875), 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600); accounts, R. M. C. A.
 VIRGINIA (WKCY).—Owner, Texas Co.
 VIRGINIA E.—Fy., 2,320 (129.3); service P; hours, X.
 VOLCANO.—Owner, Warrior Transportation Co.
 WAEGWOLTIC.—Owner, Fred Thommessen.
 WALUCIA III.—Type A1 and A2; fy., 143 (2,098), 151 (1,987), 157 (1,911), 159 (1,887), 160 (1,875), 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600); service, PG; hours, X; rates 8 cents per word.
 WARRIOR (WHDO).—Type, A1 and A2; fy., 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600); service, P; hours, X; accounts, owner.
 WEKIKI.—Owner, Malsah S. S. Co.
 WESTERLY.—Owner, E. W. Murphy.
 WEST HAVEN.—Name changed to Marian Otis Chandler.
 WEST IRA.—Owner, Pacific-Argentine Brazil Line.
 WEST KATAN.—Owner, Pacific-Atlantic S. S. Co.
 WEST KEATS.—Owner, Pacific-Atlantic S. S. Co.
 WESTLAND.—Name changed to Sea Thrush; owner, Shepard S. S. Co.
 WEST MINGO.—Owner, Pacific-Atlantic S. S. Co.
 WEST MONTOP.—Owner, Pacific-Atlantic S. S. Co.
 WILLANGLO.—Owner, Pacific-Atlantic S. S. Co.
 WILLBABCO.—Owner, Pacific-Atlantic S. S. Co.
 WILLHILO.—Name changed to Arizonan; owner, Williams S. S. Corporation.
 WILLIAM J. O'BRIEN.—Type, A2; fy., 375 (800), 400 (750), 410 (730), 425 (705), 454 (660), 468 (640), 500 (600).
 WILLWELLO.—Owner, Pacific-Atlantic S. S. Co.
 WINIFRED O'DONNELL.—Name changed to Nevada; owner, Texas S. S. Co.
 YAKA.—Accounts, R. M. C. A.
- Strike out all particulars of the following-named vessels: Aledo, Barbara C., Bellemina, Bellerose, Belvidere, Boobyalla, Bremerton, Cabegon, Cascade (WPUO), Chappaqua, Chester Kiwanis, City of Berkeley, Cohasset, Cokesit, Conotton, Contoocook, Eagle (KDBF), Eastern Moon, Eastern Sea, Eastern Shore, Eastern Sword, Eastport, East Wind, Englewood, Euzkadi, Foam (KFSR), Glen Ridge, Hagan, Halcyon (WNCQ), Jacona, Kamesit, Kenowis,

Lackawanna, Lake Elmdale, Lake Elmsford, Lake Fablus, Lake Fithian, Lake Gilpen, Lavada, Meton, Montgomery, Morristown, Naiwa, Newport, Owego, Pachet, Panay (KEMJ), Phyllis, Puget Sound, Rescue, Rockaway Park, Shooters Island, Sinasta, Stanwood, Tecomate, Venture, Volcano, West Africa, West Apaum, Westchester, Western Knight, Western Light, Western Ocean, Western Plains, West Jaffrey, Westlake, West Munham, W. F. Burrows, Winifred II, Woonsocket, York.

COMMERCIAL LAND AND SHIP STATIONS, ALPHABETICALLY, BY CALL SIGNALS

KDAD, *read* Gulfgem; KDBG, *read* Wanderlust; KDFT, *read* General M. H. Sherman; KDRX, *read* Gulfpenn; KDWJ, *read* Patrick J. O'Hara; KDUQ, *read* Gulfwax; KFSK, *read* Leopold Adler; KFZT, *read* Mizpah; KGCD, *read* Hedalta; KGTI, *read* Los Angeles, Calif.; KJUI, *read* Ernest H. Meyer; KNL, *read* Third Radio Zone No. 21 (portable); KNM, *read* Third Radio Zone No. 20 (portable); KNQ, *read* Third Radio Zone No. 19 (portable); KNS, *read* Third Radio Zone No. 18 (portable); KNT, *read* Third Radio Zone No. 17 (portable); KNU, *read* Third Radio Zone No. 16 (portable); KNY, *read* Third Radio Zone No. 12 (portable); KNZ, *read* Third Radio Zone No. 11 (portable); KOD, *read* Third Radio Zone No. 10 (portable); KOF, *read* Third Radio Zone No. 5 (portable); KOI, *read* Third Radio Zone No. 4 (portable); KORT, *read* Munlisto; KOT, *read* Third Radio Zone No. 3 (portable); KPG, call changed to KPN; KREA, *read* Emilia; KTK, *read* Mussell Rock, Calif., Radio (San Francisco); KUFG, *read* Velma Lykes; KUGV, *read* Arizonan; KULC, *read* Malchace; KUQ, *read* Naga-Naga, P. I.; KUX, call changed to KTX; KUZ, call changed to KBM; WBCV, *read* Marian Otis Chandler; WBCW, *read* Sea Thrush; WFCR, *read* Commercial Orleanian; WFG, *read* Third Radio Zone No. 1 (portable); WFH, *read* Third Radio Zone No. 2 (portable); WFJ, *read* Third Radio Zone No. 6 (portable); WFM, *read* Third Radio Zone No. 7 (portable); WFN, *read* Third Radio Zone No. 8 (portable); WFP, *read* Third Radio Zone No. 9 (portable); Wfq, *read* Third Radio Zone No. 13 (portable); WFR, *read* Third Radio Zone No. 14 (portable); WFS, *read* Third Radio Zone No. 15 (portable); WPBX, *read* Heigh-Ho; WQOE, *read* Nosa Chief; WTBL, *read* F. A. Bailey; WTUO, *read* Nevada. The following calls are additions: KEB Bolinas, Calif.; KEI, Bolinas, Calif.; KEQ, Rocky Point, N. Y.; KEZ, Bolinas, Calif.; KKL, Bolinas, Calif.; KKP, Kahuku, Hawaii; KKW, Bolinas, Calif.; KQG, Bolinas, Calif.; KQR, Bolinas, Calif.; WEN, Rocky Point, N. Y.; WEO, Rocky Point, N. Y.; WEV, Rocky Point, N. Y.; WEZ, Rocky Point, N. Y.; WGU, San Juan, P. R.; WGZ, San Juan, P. R.; WKC, Rocky Point, N. Y.; WKD, Rocky Point, N. Y.; WKJ, Rocky Point, N. Y.; WKL, Rocky Point, N. Y.; WQD, Rocky Point, N. Y.; WQE, Rocky Point, N. Y.; WQF, Rocky Point, N. Y.; WQH, Rocky Point, N. Y.; WQI, Rocky Point, N. Y.; WQJ, Rocky Point, N. Y.; WQL, Rocky Point, N. Y.; WQR, Rocky Point, N. Y.; WQS, Rocky Point, N. Y.; WQT, Rocky Point, N. Y.; WQU, Rocky Point, N. Y.; WQZ, San Juan, P. R.; strike out all particulars following the call signals, KDAC, KDBF, KDBM, KDBP, KDCH, KDFV, KDKB, KDST, KEDG, KEFQ, KEJQ, KEKB, KEMJ, KEPL, KEQK, KERG, KEXF, KEZK, KFFU, KFFW, KFGR, KFMH, KFSR, KFTG, KFWT, KGDH, KIPQ, KIRZ, KIZZ, KJEA, KJUJ, KOCX, KODS, KOKD, KOKZ, KOLR, KOQ, KOQC, KOS, KOSV, KOVG, KOZQ, KQOI, KQY, KTEA, KUDX, KUGC, KURF, KZAZ, KZOI, WBDD, WCDP, WCIE, WCIU, WEDY, WEI, WEP, WFDB, WFDD, WFV, WGAA, WGAI, WJUI, WKIO, WLF, WMF, WNBW, WNCQ, WPUO, WQCK, WQCX, WQUA, WQUU, WRBG, WSBG, WVAO, WVAU, WZIU, WZOA.

COMMERCIAL AIRCRAFT STATIONS, ALPHABETICALLY, BY NAMES OF CRAFT

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1928, and to the International List of Radiotelegraph Stations, published by the Berne bureau]

The service is P and the hours X for all of the following named stations: NC9606, NC9607, NC9643, NC9644, NC9645, NC9646, NC9647, NC9648, NC9649, NC9650, NC9651, NC9652, NC9653, NC9654, NC9655, NC9656, NC9657, MC9658, NC9659, NC9660.

BROADCASTING STATIONS, BY CALL SIGNALS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1928]

- KFH (Wichita, Kans.).—Owner, Radio Station KFH Co.
 KFLV (Rockford, Ill.).—Power, 500.
 KGEZ (Kalispell, Mont.).—Owner, Kalispell Chamber of Commerce.
 KGFF (Alva, Okla.).—Owner, KGFF Broadcasting Co.
 KGFI (San Angelo, Tex.).—Power, 100; fy., 1,500 (200).
 KMBS (Independence, Mo.).—Power, notice in Radio Service Bulletin for last month should have read 1,000 night, 1,500 additional day (total day 2,500).
 KMIC (Inglewood, Calif.).—Owner, Daltons (Inc.).
 KPLA (Los Angeles, Calif.).—Power, 1,000; fy., 1,000 (300).
 KTHS (Hot Springs, Ark.).—Power, 1,000; fy., 1,040 (288.5).
 KTSL (Shreveport, La.).—Owner, Houseman Sheet Metal Works.
 WAPI (Birmingham, Ala.).—Owner, Alabama Polytechnic Institute, University of Alabama and Alabama College.
 WBAW (Fort Worth, Tex.).—Power, 25,000 normally, 50,000 experimentally.
 WBAW (Nashville, Tenn.).—Owner, Tennessee Publishing Co.
 WBRC (Birmingham, Ala.).—Location changed to Birmingham, Ala. (near); power, 500 night, 1,000 day.
 WCAU (Byberry, Pa.).—Power, 10,000.
 WCKY (Harrison, Ohio).—Location changed to Villa Madonna, Ky.; owner, L. B. Wilson, Inc., power, 5,000.
 WDOD (Chattanooga, Tenn.).—Location changed to Chattanooga, Tenn. (near).
 WFAA (Dallas, Tex.).—Power, 500; fy., 800 (375).
 WHBD (Bellefontaine, Ohio).—Owner, F. P. Moler.
 WIL (St. Louis, Mo.).—Power, 100 night, 250 day; fy., 1,200 (250).
 WJAR (Providence, R. I.).—Power, 250 night, 400 day.
 WJBY (Gadsden, Ala.).—Owner, Charles J. Black.
 WJR (Pontiac, Mich.).—Owner, WJR, The Goodwill Station (Inc.).
 WLBY (Mansfield, Ohio).—Call changed to WJW.
 WMAL (Washington, D. C.).—Power, 250 night, 500 day.
 WMAY (St. Louis, Mo.).—Power, 100 night, 250 day.
 WMCA (Hoboken, N. J.).—Owner, Knickerbocker Broadcasting Co. (Inc.).
 WNBO (Washington, Pa.).—Power, 100.
 WNBZ (Saranac Lake, N. Y.).—Power, 50.
 WOWO (Fort Wayne, Ind.).—Location changed to Fort Wayne, Ind. (near); power, 1,000.
 WPRC (Harrisburg, Pa.).—Call changed to WCOD.
 Strike out all particulars of the following-named stations: KFEY (Kellogg, Idaho); KGFH (Glendale, Calif.); KGIF (Nebraska portable); WABF (Kingston, Pa.—Pringleboro); WLBO (Galesburg, Ill.); WNBQ (Rochester, N. Y.); WTHS (Atlanta, Ga.).

GOVERNMENT LAND STATIONS, ALPHABETICALLY, BY NAMES OF STATIONS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1928, and to the International List of Radiotelegraph Stations, published by the Berne bureau]

UNIONVILLE, Mo.—Strike out all particulars.

GOVERNMENT SHIP STATIONS, ALPHABETICALLY, BY NAMES OF STATIONS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1928, and to the International List of Radiotelegraph Stations, published by the Berne bureau]

- APO.—Type, A2 and B; fy., 6,593.4 (45.5); service, O; hours, 6 to 8 and 8.30 to 11.30 a. m., 1 to 3 and 6.30 to 11.30 p. m.
 BASILAN.—Hours, 6 to 8 and 8.30 to 11.30 a. m., 1 to 3 and 6.30 to 11.30 p. m.
 BRANT (WTDB).—Type, B; fy., 500 (600); hours, N.
 BUSTAMANTE.—Type, B; fy., 500 (600); hours 6 to 8 and 8.30 to 11.30 a. m., 1 to 3 and 6.30 to 11.30 p. m.
 CORREGIDOR.—Service, O; hours, 6 to 8 and 8.30 to 11.30 a. m., 1 to 3 and 6.30 to 11.30 p. m.
 CRANE (WTDC).—Type, B; fy., 375 (800), 425 (705), 500 (600); hours, N.
 EIDER (WTDD).—Type, B; fy., 315 (952), 375 (800), 500 (600).

KITTIWAKE.—Fy., 3,000 (100), 4,480 (67), 5,560 (54).

PATHFINDER.—Type, A2 and B; fy., 500 (600), 1,000 (300), 6,630 (45.25), 7,900 (37.97).

SCOTER.—Fy., 375 (800), 425 (705), 500 (600).

TEAL (WTDE).—Type, B; fy., 375 (800), 425 (705), 500 (600); hours, N.
Strike out all particulars of the following-named vessels: Bear, Sylph.

GOVERNMENT LAND AND SHIP STATIONS, ALPHABETICALLY, BY CALL SIGNALS

Strike out all particulars following the call signals KMH, NEXK, NIGX.

SPECIAL STATIONS, BY NAMES OF STATIONS

[Alterations and corrections to be made to the List of Radio Stations of the United States, edition of June 30, 1928]

CALIFORNIA:

Eureka (W6XAK).—Strike out all particulars.

Los Angeles (W6XA).—Strike out all particulars.

San Gabriel (W6XS).—Strike out all particulars.

Venice (W6XB).—Strike out all particulars.

CONNECTICUT: Hartford (W1XF).—Fy., 321 (935); power, 200.

DISTRICT OF COLUMBIA: Washington (W3XK).—Change to Silver Springs, Md.

MASSACHUSETTS:

Boston (W1XE).—Fy., 321 (935); power, 200.

Lexington (W1XAY).—Fy., 4,800 (62.5) to 4,900 (61.22), 2,000 (150) to 2,100 (142.9); power, 5,000; owner, Lexington Air Stations (visual broadcasting).

MINNESOTA: Robbinsdale (W9XAE).—Fy., 1,604 (187.03), 2,398 (125.1), 3,256 (92.5), 4,795 (62.57), 6,425 (46.69), 8,650 (34.68), 12,850 (23.35), 17,300 (17.341).

NEW HAMPSHIRE: Hanover (W1XP).—Strike out all particulars.

NEW JERSEY: Coytesville (W2XAL).—Fy., 6,040 (49.67), 11,800 (25.42), 15,250 (19.672), 21,460 (13.979).

NEW YORK: New York (W2XR).—Owner, Radio Pictures (Inc.).

RHODE ISLAND: Providence (W1XAC).—Fy., 1,604 (187.03), 2,398 (125.1), 3,256 (92.5), 4,795 (62.57), 6,425 (46.7), 8,650 (34.68), 12,850 (23.35), 17,300 (17.341); power, variable to 250; owner, Ceco Mfg. Co.

WASHINGTON: Seattle (W7XO).—Strike out all particulars.

Portable

CALIFORNIA:

Orange (W6XE).—Fy., 1,604 (187.03), 2,398 (125.1), 3,256 (92.5), 4,795 (62.57), 6,425 (46.69), 8,650 (34.68), 12,850 (23.35), 17,300 (17.341).

San Francisco (W6XAR).—Strike out all particulars.

MAINE: Houlton (W1XR).—Fy., 50 (6,000) to 70 (4,286); power, 1,000.

NEW YORK: Rocky Point (W2XCQ).—Fy., 1,604 (187.03), 2,398 (125.1), 3,256 (92.5), 4,795 (62.57), 6,425 (46.7), 8,650 (34.68), 12,850 (23.35), 17,300 (17.341).

Sixth radio district (W6XR).—Fy., 283 (1,060), 360 (833).

RADIOBEACON STATIONS

[Alterations and corrections to be made to the List of Commercial and Government Radio Stations of the United States, edition of June 30, 1928, and to the International List of Radiotelegraph Stations published by the Berne bureau]

Cape Henry Light Station, Va.—Characteristic of air oscillator fog signal changed and synchronized with the radiobeacon to sound a group of 2 blasts followed by 2 single blasts every 60 seconds; thus, blast 3 seconds, silent 3 seconds; blast 3 seconds, silent 15 seconds; blast 3 seconds, silent 15 seconds; blast 3 seconds, silent 15 seconds. The first dash of the radiobeacon and the blast of the oscillator following the 3 seconds silent interval are to be sounded simultaneously; navigators may determine their distance in nautical miles from the lighthouse by dividing the number of seconds intervening between the reception of the radio dash and the blast of the oscillator by 5.5. In the event that the air oscillator is out of commission, the air siren will sound a characteristic of blast 3 seconds, silent 17 seconds; thus, blast 3 seconds, silent 17 seconds.

Cape Lookout Shoals Lightship, N. C.—Fry., 290 (1,034).

Los Angeles Harbor Light Station, Calif.—Characteristic changed to groups of 1 dot and 2 dashes, thus:

. — . — . — etc.	Silent
60 seconds	120 seconds

Fy., 305 (984).

Point Arguello Light Station, Calif.—Fy., 290 (1,034). Clear-weather operating period changed; will transmit regular characteristic both the first and fourth 15-minute periods of each hour from 5 p. m. to 8 a. m. No change in daylight clear-weather operating periods.

Point Sur Light Station, Calif.—Clear-weather operating period changed; will transmit regular characteristic both the first and fourth 15-minute periods of each even hour from 6 p. m. to 7 a. m. No change in daylight clear-weather periods.

San Francisco Lightship, Calif.—Fy., 310 (968).

Point Arena Light Station, Calif.—Fy., 295 (1,017).

Blunts Reef Lightship, Calif.—Characteristic changed to groups of 1 dot, 1 dash, 1 dot and 1 dash, thus:

. — . — . — . — etc.	Silent
60 seconds	120 seconds

Fy., 305 (984).

Cape Blanco Light Station, Oreg.—Characteristic changed to groups of 3 dashes and 1 dot, thus:

— — — . — — — . etc.	Silent
60 seconds	120 seconds

Transmits daily in clear weather from 10.30 to 11 a. m. and from 4.30 to 5 p. m. and during the third 15 minutes of each even hour from 10.30 p. m. to 6.45 a. m. and continuously during thick or foggy weather. Fy., 290 (1,034).

Columbia River Lightship, Oreg.—Fy., 310 (968).

Grays Harbor Light Station, Wash.—Fy., 295 (1,017).

Umatilla Reef Lightship, Wash.—Characteristic changed to groups of 1 dot, 1 dash and 1 dot, thus:

. — . — . — etc.	Silent
60 seconds	120 seconds

Fy., 305 (984). Loc. (approximately) 124° 50' W., 48° 10' N. Operated only upon request.

Swiftsure Bank Lightship, Wash.—Fy., 290 (1,034).

Sentinel Island Light Station, Alaska.—Fy., 295 (1,017).

Cape Spencer Light Station, Alaska.—Fy., 310 (968).

Cape St. Elias Light Station, Alaska.—Fy., 290 (1,034).

Great Lakes.—Changes in operating periods, frequency, and codes to be made on July 1, 1929. At 12 midnight central standard time, on June 30, 1929, the daily operating periods, frequencies, codes and intervals, of all beacons on the Great Lakes, will be changed as necessary to conform with the schedule which follows. This schedule will continue in effect after July 1, until further notice. The changes in operating periods provide for an additional daily period which is to be made effective at all stations. The changes in frequency provide for a synchronized group system of operation which will be made effective on and after July 1, 1929, to eliminate interference. (A new radiobeacon chart embodying the information contained in this notice, also information as to the details of operation of radiobeacons proposed for establishment this season, will be distributed on June 1, 1929, by mail to all vessels equipped with the radiocompass. Masters failing to receive this chart by July 1, 1929, should make application to the Superintendent of Lighthouses, Detroit, Michigan, for a copy.)

Station	Daily operating periods ¹	Interval (seconds)		Wave length (meters)	Frequency (kilocycles)	Code	Class
		On	Off				
<i>Central standard time, a. m. and p. m.</i>							
Buffalo.....	1.30 to 2, and 7.30 to 8.....	60	120	1,020	294	— — — —	B
Ashtabula.....	3.30 to 4, and 9.30 to 10.....	60	120	955	314	— — — —	B
Detroit River.....	4 to 4.30, and 10 to 10.30.....	60	120	960	306	— — — —	C
Lake Huron.....	2 to 2.30, and 8 to 8.30.....	60	120	980	306	— — — —	B
Thunder Bay Island.....	4 to 4.30, and 10 to 10.30.....	60	120	1,049	286	— — — —	B
Detour.....	2.30 to 3, and 8.30 to 9.....	60	120	1,049	286	— — — —	B
Whitefish Point.....	3.30 to 4, and 9.30 to 10.....	60	120	1,049	286	— — — —	B
Marquette.....	1 to 1.30, and 7 to 7.30.....	60	120	993	302	— — — —	B
Manitou Island.....	2.30 to 3, and 8.30 to 9.....	60	120	993	302	— — — —	B
Passage Island.....	4 to 4.30, and 10 to 10.30.....	60	120	993	302	— — — —	B
Devils Island.....	3 to 3.30, and 9 to 9.30.....	60	120	1,049	286	— — — —	B
La Pointe.....	3.30 to 4, and 9.30 to 10.....	60	120	955	314	— — — —	B
Duluth.....	1.30 to 2, and 7.30 to 8.....	60	120	955	314	— — — —	C
Lansing Shoal.....	2 to 2.30, and 8 to 8.30.....	60	120	955	314	— — — —	B
Point Betsie.....	4 to 4.30, and 10 to 10.30.....	60	120	955	314	— — — —	B
Manitowoc.....	1 to 1.30, and 7 to 7.30.....	60	120	993	302	— — — —	C
Ludington.....	3 to 3.30, and 9 to 9.30.....	60	120	993	302	— — — —	C
Grand Haven.....	3.30 to 4, and 9.30 to 10.....	60	120	993	302	— — — —	C
Milwaukee.....	1.30 to 2, and 7.30 to 8.....	60	120	1,049	286	— — — —	B
Chicago Harbor.....	2.30 to 3, and 8.30 to 9.....	60	120	1,049	286	— — — —	B
Calumet Harbor.....	Last 15 minutes each hour.....	60	120	1,049	286	— — — —	B

¹ All stations operate simultaneously from 11.45 a. m. to noon, and continuously during fog.
 NOTE.—B class, 100 to 200 watts; C class, 5 to 50 watts.

MISCELLANEOUS

GENERAL ORDER OF THE FEDERAL RADIO COMMISSION

Postponement of General Order No. 43, limiting chain programs (General Order No. 63, May 15, 1929).—The Federal Radio Commission hereby postpones the effective date of General Order No. 43, limiting duplicated operation on cleared channels to stations more than 300 miles apart, 122 days to October 1, 1929.

AUSTRALIA RATIFIES INTERNATIONAL RADIO CONVENTION

In addition to the lists promulgated in the February and April, 1929, editions of this publication, Australia deposited with the Department of State, Washington, on April 3, its ratification of the International Radiotelegraph Convention and the regulations annexed thereto, Washington, 1927.

WEATHER REPORTS TRANSMITTED FOR BENEFIT OF AVIATION AND COMMERCIAL INTERESTS ON PACIFIC COAST

The United States Weather Bureau, through the naval radio station NPG at San Francisco, Calif., broadcasts early reports of weather observations taken at about 130 stations in the United States, Canada, and Alaska; also ship reports from vessels in the eastern Pacific Ocean and pilot balloon upper-air aerological reports from selected stations. The observations taken at land, vessel, and aerological stations are in the Weather Bureau word codes applying to these types of stations and are easily decoded.

Transmitting schedules

At 6.18 a. m. (one hundred and twentieth meridian time).—Daily, including Sundays and holidays; average time, about 1 hour.

At 6.18 p. m. (one hundred and twentieth meridian time).—Daily, including Sundays and holidays; average time, between 40 and 45 minutes.

Both a. m. and p. m. broadcasts are made on simultaneous frequencies of 8,590, 108, and 42.8 kilocycles (34.9, 2,776, and 7,000 meters, respectively).

1. All observations in the foregoing broadcasts are of current date, taken at 5 a. m. and 5 p. m. (one hundred and twentieth meridian time), and they contain coded weather information in a group of words arranged for each station, as

follows: (a) Sea-level barometric pressure; current temperature. (b) Wind direction; state of weather; temperature (minimum in the a. m. broadcast and maximum in the p. m. broadcast). (c)¹ Sea-level barometric pressure of the previous 5 p. m. observation; maximum temperature of preceding 24 hours ending at 5 a. m. (d) Wind velocity; amount of precipitation. (e) Clouds (kind, direction, and rate of movement).

Reports from Alaska, except those from Juneau, Kodiak, Dutch Harbor, and St. Paul, are observations taken 12 hours previously.

2. A selected list of vessel weather observations taken on the current date in the eastern Pacific Ocean will follow the land-station observations. These reports are in the vessel weather code and consist of the position of the vessels (latitude and longitude), sea-level barometric pressure, current temperature, wind direction, state of weather, and wind velocity.

3. Next will follow aerological, or pilot balloon upper-air, observations of current date made at a selected list of far-western Weather Bureau stations. These reports are based on readings which give the wind velocity and direction at the surface and the following levels aloft: 250, 500, 1,000, 1,500, 2,000, 3,000, and 4,000 meters, and for the maximum altitude observed. Data for visibility and clouds are also included in this broadcast. The observations are coded in the Weather Bureau Aerological Code.

Notes

Code books for translating the three foregoing broadcasts (1, 2, and 3) are necessary. Information regarding the procuring of these three separate codes may be obtained by addressing the Weather Bureau offices at either San Francisco, Calif., or Washington, D. C.

No forecasts of any kind are included in the broadcasts, as such forecasts, for the benefit of aviation, marine, and commercial interests, are broadcast from the same radio station (NPG) immediately following the daily major marine bulletin, which is described in the Weather Bureau Radio Circular No. 10 (4th ed., revised). The forecasts are for aviation zones 12, 13, and 14 (see chart on back), and also for the States of Washington, Oregon, Idaho, Nevada, and California. The forecasts are in plain language. In the a. m. broadcast the period covered by the State forecasts is 24 hours, beginning 5 p. m. of the same day; in the p. m. broadcasts for 36 hours, beginning at 5 a. m. the next day. The aviation forecasts broadcast in the a. m. are for 12 hours, beginning at noon of the same day and continuing until midnight; those in the p. m. broadcast are for 12 hours, from midnight until noon of the next day. The major marine bulletin begins at 7.30 a. m. and 7.30 p. m. (one hundred and twentieth meridian time) and usually occupies between 35 and 40 minutes in the morning and between 30 and 35 minutes at night. Listeners desiring the forecasts, and who do not wish to copy the entire major bulletin, may easily adjust their schedules to the reception of the forecasts only.

Forecasts of weather conditions and of wind at surface and aloft are issued twice daily for the benefit of aviators. They are made at approximately 9.30 a. m. and 9.30 p. m. (seventy-fifth meridian time), and cover a period of 12 hours, beginning at noon and midnight, respectively.

Circular No. 17—Radio (2d ed. revised), which may be obtained from the United States Department of Agriculture, Weather Bureau, at either San Francisco, Calif., or Washington, D. C., contains a chart showing the aviation forecast zones.

DISTRIBUTION OF WEATHER INFORMATION, FORECASTS, AND WARNINGS BY NAVAL RADIO FOR BENEFIT OF MARINE INTERESTS ON PACIFIC OCEAN AND COAST

[In cooperation with Office of Communications, Navy Department]

The Weather Bureau issues daily (Sundays and holidays included) bulletins containing weather reports, forecasts, and warnings for the benefit of marine interests in the eastern waters of the Pacific and in the States bordering on that ocean. These bulletins are broadcast from naval radio stations and will conform to the provisions of this circular.

All time referred to herein is one hundred and twentieth meridian (Pacific standard time) and is equivalent in GCT, unless otherwise specifically indicated.

¹ The third word of the group indicated at (c) is included only in the 5 a. m. observations broadcast at 6.18 a. m. Therefore in the 6.18 p. m. broadcast (d) becomes the third word and (e) the fourth word.

Major marine bulletin

This bulletin is broadcast from the San Francisco naval radio station (call letters NPG) twice daily, as follows:

Morning bulletin at 7.30 a. m. (1530 GCT) on wave lengths of 7,000 meters (42.8 kc.), 2,776 meters (108 kc.), and 34.9 meters (8,590 kc.) simultaneously.

Evening bulletin at 7.30 p. m. (0330 GCT) on wave lengths of 7,000 meters (42.8 kc.), 2,776 meters (108 kc.), and 34.9 meters (8,590 kc.), simultaneously.

The bulletin is divided into two parts and invariably begins with the letters USWB (U. S. Weather Bureau).

The first part consists of surface weather conditions at a selected list of places, being based upon observations taken at 5 a. m. and 5 p. m., except as indicated.

The foregoing list is followed by reports from ships in the north Pacific Ocean. Ship observations taken at 4 a. m. are included in the a. m. bulletin, and 4 p. m. observations in the p. m. bulletin. Belated a. m. reports will be added to the following p. m. bulletin, and belated p. m. reports will be added to the next a. m. bulletin. Such belated reports will always be preceded by the words "Previous reports."

The second part of the bulletin consists of a summary of general atmospheric pressure distribution over land and sea, including the locations of "high" and "low" areas, and the barometer readings at their centers, wind and weather forecasts for Pacific offshore areas, and storm warnings for these areas.

The following is a list of places for which weather observations are included in the regular broadcasts. Only the key letters, and not the names of the places, are transmitted.

Key letters, stations, and locations

Key letters	Name of station	Latitude north	Longitude west	Key letters	Name of station	Latitude north	Longitude west
		° ' "	° ' "			° ' "	° ' "
NM	Nome, Alaska	64 30	185 24	HL	Helena, Mont	46 34	112 04
SPI	St. Paul, Alaska	57 15	170 10	LD	Lander, Wyo	42 50	108 45
DH	Dutch Harbor, Alaska	53 55	166 30	WM	Winnemucca, Nev	40 58	117 43
TN	Tanana, Alaska	65 10	152 06	R	Reno, Nev	39 32	119 49
EA	Eagle, Alaska	64 46	141 12	SLC	Salt Lake City, Utah	40 46	111 54
KD	Kodiak, Alaska	57 47	152 22	MD	Modena, Utah	37 48	113 54
OV	Cordova, Alaska	60 32	145 42	DV	Denver, Colo	39 45	105 00
JU	Juneau, Alaska	58 18	134 24	GJ	Grand Junction, Colo	39 04	108 34
PR	Prince Rupert, British Columbia	54 18	130 18	SA	Santa Fe, N. Mex	35 41	105 57
KA	Kamloops, British Columbia	50 41	120 29	PH	Phoenix, Ariz	33 28	112 00
TAT	Tatoosh Island, Wash	48 28	124 44	YU	Yuma, Ariz	32 45	114 36
SE	Seattle, Wash	47 38	122 20	HO	Honolulu, Hawaii	21 19	157 52
NH	North Head, Wash	46 16	124 04	MDI	Midway Island	28 12	177 22
PD	Portland, Oreg	45 32	122 41	ED	Edmonton, Alberta	53 53	113 30
RO	Roseburg, Oreg	43 13	123 20	CY	Calgary, Alberta	51 02	114 02
EUR	Eureka, Calif	40 48	124 11	SC	Swift Current, Saskatchewan	50 19	108 02
RB	Red Bluff, Calif	40 10	122 15				East
SM	Sacramento, Calif	38 35	121 30	FMA	Manila, P. I	14 35	120 59
SF	San Francisco, Calif	37 48	122 26	FGM	Guam	13 27	144 45
FN	Fresno, Calif	36 43	119 49	FHO	Hong Kong, China	22 18	114 10
PAR	Point Arguello, Calif	34 35	120 39	FSH	Shanghai, China	31 15	121 29
LA	Los Angeles, Calif	34 03	118 15	FBI	Bonin Island	27 05	142 11
SPE	San Pedro, Calif	33 44	118 16	FKO	Koshun, Formosa	40 40	129 11
DI	San Diego, Calif	32 43	117 10	FNA	Naha, Japan	26 13	127 41
SPO	Spokane, Wash	47 40	117 25	FKA	Kagoshima, Japan	31 34	130 33
WW	Walla Walla, Wash	46 02	118 20	FTO	Tokio, Japan	35 41	139 45
BA	Baker, Oreg	44 46	117 50	FNE	Nemuro, Japan	43 20	145 35
BS	Boise, Idaho	43 37	116 13				

† Observations taken at 4 a. m. and 4 p. m., 120th meridian time.

‡ Observations taken at 8 a. m. and 8 p. m., 135th meridian time.

§ Observations taken at 8 a. m. and 8 p. m., Honolulu local time.

¶ Observations taken at 6.30 p. m., midway local time of preceding day.

* Observations taken at 6 a. m., 120th east meridian time of the same day.

EXPLANATION OF CODE USED IN THE FIRST PART OF MAJOR MARINE BULLETIN

Key to groups and examples

First group. Barometric pressure (first three figures of group): Pressure, (reduced to sea level) in inches and hundredths, except that the first figure of full reading is omitted. Thus, if the corrected pressure is 29.98 inches, the figures 998 are sent, or if the reading is 30.14 inches, the figures 014 are sent.

Direction of surface wind (fourth figure of group): 0=calm, or no movement; 1=northeast; 2=east; 3=southeast; 4=south; 5=southwest; 6=west; 7=northwest; 8=north.

Force of wind (fifth figure of group): Sent according to Beaufort scale, values 0 to 9, inclusive.

Beaufort scale

Scale No.	Explanatory titles	Statute miles per hour	Terms used in forecasts
0	Calm	Less than 1	Light.
1	Light air	1 to 3	
2	Slight breeze	4 to 7	
3	Gentle breeze	8 to 12	Gentle.
4	Moderate breeze	13 to 18	
5	Fresh breeze	19 to 24	Fresh.
6	Strong breeze	25 to 31	Strong.
7	High wind	32 to 38	
8	Gale	39 to 46	Gales.
9	Strong gale	47 to 54	
*10 (W)	Whole gale	55 to 63	Whole gale.
*11 (S)	Storm	64 to 75	
*12 (H)	Hurricane	Over 75	

* The numeral code does not admit of force in excess of 9 being sent. Therefore, the letters W, S, and H will be used for wind forces 10, 11, and 12, respectively.

NOTE.—The last column gives the terms applicable to the Beaufort scale which are used in the forecasts and warnings issued by the U. S. Weather Bureau.

Example of first group as sent: 99842.

Translation: Barometric pressure, 29.98 inches; wind from south; wind force, 2 (4 to 7 statute miles per hour).

Second group. Present weather (first figure of group): State of weather at surface at 5 a. m. and 5 p. m. 1=clear (3 tenths or less); 2=partly cloudy (4 to 7 tenths); 3=cloudy (8 to 10 tenths); 4=raining; 5=snowing; 6=thunderstorm; 7=sleeting or hailing; 8=dense fog.

Pressure change (second figure of group) in hundredths of inch during two hours preceding observation: 0=change of less than 0.04 inch; 1=increase of 0.04; 2=decrease of 0.04; 3=increase of 0.06; 4=decrease of 0.06; 5=increase of 0.08; 6=decrease of 0.08; 7=increase of 0.10; 8=decrease of 0.10; 9=increase or decrease of 0.12 or more. (Whether it is an increase or decrease can be obtained by barometric tendency at surrounding stations.)

Precipitation (third figure of group): The amount of precipitation during the previous 12 hours is indicated by the third figure of the group. The figure used is indicative of the amount of precipitation, as: 0=no precipitation; 1=0.01 inch to 0.10 inch; 2=0.12 inch to 0.20 inch; 3=0.22 inch to 0.30 inch; 4=0.32 inch to 0.40 inch; 5=0.42 inch to 0.50 inch; 6=0.52 inch to 0.60 inch; 7=0.62 inch to 0.70 inch; 8=0.72 inch to 0.80 inch; 9=0.82 inch or more.

Current temperature (fourth and fifth figures of group): Temperatures are reported in even degrees, Fahrenheit. When the temperature is zero or 100°, the fourth and fifth figures will be 00; when between 2° and 8°, inclusive, the fourth figure will be 0, and the fifth figure the temperature; when below zero, complementary figures will be used (subtract coded temperature sent from 100° to obtain correct temperature). The significant figure 1 is omitted for temperatures of 100° or more. No confusion should arise in determining below zero and above 100° temperatures when the season of the year and the location of the reporting stations are considered.

Examples of temperature coded for stations which may be 100° or more in summer and below zero in winter: (Eagle) EA 62=62° in summer or -38° in winter; (Calgary) CY 00=100° in summer or zero in winter; (Boise) BS 08=108° in summer or 8° in winter.

Examples of groups as sent and as translated: 52798—Snowing; pressure change, decrease of 0.04 inch during preceding two hours; precipitation 0.62 to 0.70 inch; current temperature, -2° . (If in winter.) 21374—Partly cloudy weather; pressure change, increase of 0.04 inch during preceding two hours; 0.22 to 0.30 inch precipitation; current temperature, 74° .

Ship reports

Ship reports are included in the first part of the bulletin immediately following the land stations. They are included in two groups, preceded by the call letters identifying the ship. The first group consists of five numerals, signifying the ship's position, and the second group of five numerals expressing the barometric pressure, wind direction, and force. The key to second group in ship reports is that used for first group in land reports. In the first group giving the ship's position (to the nearest degree), the first two numerals express the latitude (north) and the last three the longitude (west).

Example: WMCH 31140, 00646.

Translation: S. S. *Mau*; latitude 31° north, longitude 140° west. Barometric pressure 30.06 inches; wind from the south; wind force of 5 (19 to 24 miles per hour).

Contents of the second part of major marine bulletin

(a) Summary of general atmospheric pressure distribution over land and sea, including the locations of "high" and "low" areas, and the barometer readings at their centers.

(b) Wind and weather forecasts for Pacific offshore areas: North of Cape Blanco; between Cape Blanco and Point Conception; south of Point Conception. (Periods covered by the forecasts: In a. m., major bulletins, 24 hours, beginning at noon. In p. m., major bulletin, 24 hours, beginning at midnight.)

NOTE.—Forecasts for the States of Washington, Oregon, Idaho, Nevada, and California, and flying weather forecasts for aviation zones 12, 13, and 14, immediately follow the major bulletins using the same frequencies. Details regarding these forecasts will be found in the Weather Bureau Circular No. 17 (2d ed., revised).

Local transmitting schedules

The table below shows additional naval radio stations from which local distributions are made daily (including Sundays and holidays), their call letters, transmitting frequencies and wave lengths, the information broadcast therefrom, the hours of distribution, and the Weather Bureau stations from which the forecasts and information are supplied.

Whenever storm warnings are issued in the forenoon (based on 5 a. m. observations), they are broadcast at the same time as the wind and weather forecasts. When issued in the afternoon (based on special observations) or at night (based on 5 p. m. observations), they are broadcast at the evening hours indicated.

Ships may request any station listed herein to furnish the latest weather forecasts and warnings and weather reports.

Offshore wind and weather forecasts broadcast at or before noon and in the p. m. are for the 24 hours beginning at noon and midnight, respectively; storm warnings are for 24 hours beginning at the hour indicated in the warning messages.

Storm warnings are displayed at 44 points on the Pacific coast of the United States. Flags are used by day and lanterns by night.

A card descriptive of storm signals and a copy of this circular will be furnished free on application to any United States Weather Bureau Office on the Pacific coast.

In accordance with article 17, paragraph 2, of the General Regulations of the International Radiotelegraphic Convention of 1927, the 3-minute silent intervals are observed in connection with all broadcasts described herein.

Station		Call	Wave length	Kilo-cycles	Weather information broadcast	Time (GCT)	Stations issuing information
Location							
Dutch Harbor, Alaska.	NPR	1,621	185	Current barometric pressure, wind direction and velocity, and state of weather at Dutch Harbor, followed by re-broadcast of major weather bulletin as received from San Francisco.	0530, 2030.	Dutch Harbor, Alaska (naval radio station).	
Puget Sound, Wash.....	NPC	2,941	102	Barometric pressure, wind direction and velocity, and state of weather in Puget Sound and Straits of Juan de Fuca.	0100, 0400, 1700, 2100.	Seattle, Wash. (Weather Bureau station).	
Tatoosh Island, Wash...	NPD	2,941 2,941 800	102 375	Current barometric pressure, wind direction and velocity, and state of weather at Puget Sound. Storm warnings. Local weather conditions, current barometric pressure, wind direction and velocity, and state of sea; storm warnings on Washington coast and Puget Sound.	0100, 0300, 0400, 1300, 1700, 2100-2100. 0100, 0400, 1300, 1700, 2100-1300, 1700, 2100, 0100, 0400.	Seattle, Wash. (Weather Bureau station). Tatoosh Island, Wash. (Weather Bureau station).	
Astoria, Wash.....	NPE	800	375	Wind and weather forecasts for Washington coast, Straits of Juan de Fuca, and Puget Sound.	1700, 2100, 0100, 0400.		
Eureka, Calif.....	NPW	2,941	102	Wind and weather forecasts, Washington and Oregon coasts, Puget Sound, and Straits of Juan de Fuca.	0130, 0430, 1730, 2130.	North Head, Wash. (Weather Bureau station).	
		2,941	102	Current barometric pressure, wind direction and velocity, condition of bar, and storm warnings.	0130, 0430, 1330, 1730, 2130.		
		2,776	108	Wind and weather forecasts and storm warnings for California coast north of San Francisco; advices concerning storm warnings for North Pacific coast.	2018.	Eureka, Calif. (Weather Bureau station).	
		2,776	108	Current barometric pressure, wind direction and velocity, and state of weather at Eureka.	0018, 0418, 0818, 1218, 1618, 2018.		
San Francisco, Calif....	NPG	2,776 7,000	108 42.8	Storm warnings issued in afternoon. Major bulletin. (See description, pp. 1 and 2).	0018, 0418, 0818, 1218, 1618, 2018. 0330, 1530.	San Francisco, Calif. (Weather Bureau station).	
		2,776	108	Major bulletin.			
		8,560	108	do.			
		34.9	8,590	Current barometric pressure, wind direction and velocity, and state of weather in Bonita Channel; storm warnings for northern California coast.	0000, 0400, 0800, 1200, 1600, 2000.	Point Bonita (Coast Guard lookout). (Weather Bureau station.)	
		2,776	108	Aviation Bulletin. (See Circular No. 17)	0218, 1418		
		7,000	42.8	do.			
		2,941	102	Southern California forecast and local weather conditions (barometric pressure, temperature, weather, force and direction of wind).	1630.	San Diego, Calif. (Weather Bureau station).	
San Diego, Calif.....	NPL	2,941	102	Local weather conditions.			
		2,941	102	Storm warnings and advisory warnings.	2200		
					On receipt and at 0300.		

Honolulu, Hawaii	NPM	5, 552	54	Forecasts of wind and weather for Hawaiian Islands and neighboring ocean areas.	2230	Honolulu, Hawaii (Weather Bureau station).
		5, 552	54	Current barometric pressure, wind direction and velocity, and state of weather at Honolulu. (No broadcasts from Honolulu on Sundays and holidays.)	0630, 1830, 2230	
Cavite, P. I.	NPO	5, 854	56	Weather information.	0430, 1400	Philippine weather service (Manila).
		2, 776	108	do.	0430, 1400	
		37, 34	8, 634	do.	1400	
		18, 67	16, 068	do.	0430	
Tutulla, Samoa Islands.	NPU	2, 828	105	do.	2900	Samoa weather service (Tutulla).

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A base chart (size $8\frac{3}{4}$ by $11\frac{1}{2}$ inches) showing how weather reports transmitted in major bulletins may be entered and used in the preparation of weather maps at sea will be supplied free to masters who regularly take and forward weather observations to the United States Weather Bureau or to the United States Navy, Hydrographic Office.

DAYLIGHT SAVING TIME IN EFFECT IN SPAIN AND IRELAND

The legal time (daylight saving) was advanced 1 hour on April 20 at 11 p. m. in Spain and on April 21 at 2 a. m. in the Irish Free State.

TYPE B EMISSIONS PROHIBITED IN VICINITY OF ALGERIA

The Governor General of Algeria has placed in effect article 16, paragraph 3, subparagraph 3, of the general regulations annexed to the International Radiotelegraph Convention, Washington, 1927, which provides that "the use of type B wave of 665 kilocycles (450 meters) shall be forbidden henceforth in regions where this wave may interfere with broadcasting.

Pursuant thereto the use of type B on the above-cited frequency is henceforth prohibited at a distance of 200 nautical miles from the coasts of Algeria between 1200 and 1400 hours and between 1800 and 2400 hours (12 a. m. to 2 p. m. and 6 to 12 p. m.) local time.

MEDICAL SERVICE BY OSTEND (BELGIUM) STATION

In future radio medical consultation service for ships will be assured by the coast station "Ostend Radio" (call signal OST). Requests for the consultation should bear as the address, "Radiomedical Ostend Radio," and be transmitted to this station.

METEOROLOGICAL OBSERVATIONS TRANSMITTED BY SANTIAGO (CHILE) STATION

The Meteorological Office of Chile will transmit twice daily at 0130 and 1600 on a frequency of 100 kilocycles (3,000 meters), type A1, meteorological observations and a general forecast. Each transmission will commence with the words "Meteo Chile," and will contain the following information: (a) An estimate of the meteorological situation (en clair); (b) Meteorological observations in code taken at 1200 and 1800, respectively, at the meteorological stations (see list); (c) general weather forecast for the ensuing 24 hours (en clair).

Meteorological observations referred to in (b) will be given in the following code: IIVS BBDFW.

Meaning of code

II=Letter symbols of meteorological observation stations: AR=Arica. AN=Antofagasta. AS=Aysen. BO=Pto. Bories. CA=Caldera. CS=Constitution. CQ=Coquimbo. CO=Corral. GA=Galera. GF=Guafo. IQ=Iquique. JF=Juan Fernández. ME=East Mocha. PM=Pto. Montt. PA=Pta Arenas. TL=Taltal. TU=Tumbes. VD=Valdivia. SA=Santiago.

V=Visibility: 0=Objects not visible at 50 meters. 1=Objects visible at 50 meters, but not visible at 200 meters. 2=Objects visible at 200 meters, but not visible at 500 meters. 3=Objects visible at 500 meters, but not visible at 1,000 meters. 4=Objects visible at 1 kilometer, but not visible at 2 kilometers. 5=Objects visible at 2 kilometers, but not visible at 4 kilometers. 6=Objects visible at 4 kilometers, but not visible at 10 kilometers. 7=Objects visible at 10 kilometers, but not visible at 20 kilometers. 8=Objects visible at 20 kilometers, but not visible at 50 kilometers. 9=Objects visible at 50 kilometers or more.

S=State of the sea: 0=Calm. 1=Very smooth. 2=Smooth. 3=Slight. 4=Moderate. 5=Moderate swell. 6=Swell. 7=High. 8=Very high. 9=Phenomenal.

BB=Barometer reading (corrected) in millimeters, with initial figure 7 omitted.

D=Wind direction: 1=N. 2=NE. 3=E. 4=SE. 5=S. 6=SW. 7=W. 8=NW.

F=Wind force (Beaufort scale: 0-9).

W=Weather at time of observation: 0=Fine, clear weather. 1=Very few clouds. 2=Cloudy. 3=Overcast. 4=Fog. 5=Drizzle. 6=Rain. 7=Snow, or sleet. 8=Squally. 9=Gale.

NOTE.—The weather forecast is based on a general analysis of the meteorological situation, deduced from information supplied by the meteorological observation stations and ships at sea.

RADIOBEACON ESTABLISHED AT CROMER, ENGLAND

During thick weather, whenever the atmosphere in the vicinity of the lighthouse is obscured so as to impede navigation, this radiobeacon located at the lighthouse in approximately latitude $52^{\circ} 55' N.$, longitude $1^{\circ} 19' E.$, will transmit on a frequency of 300 kilocycles (1,000 meters) continuously for 1 minute, every 4 minutes, the following:

(a) The signal MMC (— — — — . —) will be emitted continuously, at the rate of 15 words per minute, for 48 seconds, approximately.

(b) A continuous dash (————) for 10 seconds, approximately.

(c) The signal MMC made once, of 2 seconds' duration, approximately. (The whole transmission of (a), (b), and (c) will occupy 1 minute.)

(d) A silent interval of 3 minutes.

During clear weather, in order to afford facilities for obtaining bearings, three emissions of the whole character of the signal described above will be made consecutively, at half-hour intervals approximately, commencing at 2 minutes past the hour.

Although this signal is to be permanent, it may be found necessary to make some adjustment after establishment, and the station should be considered as under test for a period of three months, during which time the signals may be subject to temporary interruptions.

POSITION REPORTS REQUESTED BY GERMAN STATIONS

For the purpose of avoiding delays in the transmission of radiotelegrams destined to ships at sea, German coast stations, open to public service will demand, in general, from each ship which enters in its radius, conforming to the dispositions of article 24, paragraph 4, subparagraph 2 of the General Regulations annexed to the International Radiotelegraph Convention of Washington, information concerning its position, route, its next port, etc. This information will be demanded by press service, for which there is no charge. German ships should furnish this information to coast stations without being previously invited.

In order to permit a rapid and certain dispersement of radiotelegrams destined to ships at sea it is desirable that foreign ships likewise give the information above without special invitation from the time they enter within the radius of action of a German coast station.

The German Government would be grateful to foreign governments if they would compel their ship stations to conform to the preceding dispositions as closely as possible. Radio operators of United States ships are hereby advised accordingly.

RADIO OPERATORS NOT TO TRANSMIT TRAFFIC DURING BROADCAST PERIODS NOR TEST WITHOUT GIVING CALL SIGNAL WHILE IN PORT

Reception of British broadcasting programs is seriously interfered with by operation of radio installations on ships anchored at docks and ports of Great Britain. Inasmuch as no call signals are transmitted during these operations and a great many ships are often only a short distance from one another it is very difficult to identify the ships responsible for the interference.

An arrangement has been concluded on this subject with radio and British navigation companies. It stipulates that the operation of radio installations on board ships must be made outside of the hours of emission provided for radiobroadcasting. The attention of British operators has been called to article 11, paragraph 3, of the International Radiotelegraph Regulations of Washington, which prescribes that any station whatever sending out emissions for tests, adjustments, or experiments must transmit its call signal at frequent intervals during the course of these transmissions.

The British administration believes it should be sufficient to bring this procedure to the knowledge of radio operators aboard foreign ships in order to reduce in a large measure this interference. It is necessary to observe that these tests in question are prohibited at the docks and ports of Great Britain during the hours provided for radiobroadcasting.

Radio operators on board vessels of the United States are hereby cautioned to comply with the requirements of this regulation, not only in British ports but throughout the world, otherwise they may be penalized.

APPLICATION FOR SHIP STATION LICENSE SHOULD GIVE CORRECT OWNERSHIP

Attention of all concerned is invited to the fact that applications for this class of license should agree with the outstanding marine document (register enrollment or license) issued by a customs officer. Where a vessel is undocumented but is recorded by a customs officer consequently bearing a number on its bow, the owner given in the application should agree with the record in the customhouse.

Recently the division received a number of applications giving as the owner the name of the parent company in lieu of the subsidiary company under which name the vessel had been incorporated and documented. In other cases the popular name of the company or steamship line has been given.

The checking of these applications with the marine document record on file with the Bureau of Navigation of this department requires considerable time, and where the ownership does not agree the applications have to be returned to the applicant for correction.

Applications should be submitted for action by the Federal Radio Commission through the supervisor of radio or radio inspector at the different ports, list of which are as follows:

(These districts should not be confused with the 5 radio zones established by the act of February 23, 1927, section 2, creating the Federal Radio Commission.)

1. Headquarters, customhouse, Boston, Mass.: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.

2. Headquarters, Subtreasury Building, New York, N. Y.: New York (county of New York, Staten Island, Long Island, and counties on the Hudson River to and including Schenectady, Albany, and Rensselaer) and New Jersey (counties of Bergen, Passaic, Essex, Union, Middlesex, Monmouth, Hudson, and Ocean).

3. Headquarters, Detention Building, Immigration Station, Fort McHenry, Baltimore, Md.: New Jersey (all counties not included in second district), Pennsylvania (counties of Philadelphia, Delaware, all counties south of the Blue Ridge Mountains, and Franklin County), Delaware, Maryland, Virginia, District of Columbia.

4. Headquarters, post-office building, Atlanta, Ga.: North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Porto Rico, Virgin Islands.

5. Headquarters, customhouse, New Orleans, La., branch office in Burt Building, Dallas, Tex.: Mississippi, Louisiana, Texas, Arkansas, Oklahoma, New Mexico.

6. Headquarters, customhouse, San Francisco, branch office in City Hall Building, Los Angeles, Calif.: California, Hawaii, Nevada, Utah, Arizona.

7. Headquarters, L. C. Smith Building, Seattle, Wash.: Oregon, Washington, Alaska, Idaho, Montana, Wyoming.

8. Headquarters, Commerce Building, Detroit, Mich., branch office in Post Office Building, Buffalo, N. Y.: New York (all counties not included in the second district), Pennsylvania (all counties not included in the third district), West Virginia, Ohio, Michigan (Lower Peninsula).

9. Headquarters, Engineering Building, Chicago, Ill., branch offices in Federal Building, Kansas City, Mo. and in Federal Building, Duluth, Minn., open during lake navigation season, also branch office in St. Paul, Minn., open during period when lake navigation season is closed: Indiana, Illinois, Wisconsin, Michigan (Upper Peninsula), Minnesota, Kentucky, Missouri, Kansas, Colorado, Iowa, Nebraska, South Dakota, North Dakota.

AN ACT TO REQUIRE APPARATUS AND OPERATORS FOR RADIO COMMUNICATION ON CERTAIN OCEAN STEAMERS, APPROVED JUNE 24, 1910, AS AMENDED JULY 23, 1912¹

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. That from and after October first, nineteen hundred and twelve, it shall be unlawful for any steamer of the United States or of any foreign country navigating the ocean or the Great Lakes and licensed to carry, or carrying, fifty or more persons, including passengers or crew or both, to leave or attempt to leave any port of the United States unless such steamer shall be equipped with an efficient apparatus for

¹ The amended act applies to vessels licensed to carry as well as those actually carrying 50 or more persons, etc. This act of 1910 as amended in 1912 was not repealed by the radio act of 1927, approved Feb. 23.

radio communication, in good working order, capable of transmitting and receiving messages over a distance of at least one hundred miles, day or night. An auxiliary power supply, independent of the vessel's main electric power plant, must be provided which will enable the sending set for at least four hours to send messages over a distance of at least one hundred miles, day or night, and efficient communication between the operator in the radio room and the bridge shall be maintained at all times.

The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches, and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States; and every willful failure on the part of the master to enforce at sea the provisions of this paragraph as to equipment, operators, and watches shall subject him to a penalty of one hundred dollars.

That the provisions of this section shall not apply to steamers plying between ports, or places, less than two hundred miles apart.

SEC. 2. That this act, so far as it relates to the Great Lakes, shall take effect on and after April first, nineteen hundred and thirteen, and so far as it relates to ocean cargo steamers shall take effect on and after July first, nineteen hundred and thirteen: *Provided*, That on cargo steamers, in lieu of the second operator provided for in this act, there may be substituted a member of the crew or other person who shall be duly certified and entered in the ship's log as competent to receive and understand distress calls or other usual calls indicating danger, and to aid in maintaining a constant wireless watch so far as required for the safety of life.

The remaining sections of the act of June 24, 1910, which are unchanged, read as follows:

SEC. 2. That for the purpose of this act apparatus for radio communication shall not be deemed to be efficient unless the company installing it shall contract in writing to exchange, and shall, in fact, exchange, as far as may be physically practicable, to be determined by the master of the vessel, messages with shore or ship stations using other systems of radio communication.

SEC. 3. That the master or other person being in charge of any such vessel which leaves or attempts to leave any port of the United States in violation of any of the provisions of this act shall, upon conviction, be fined in a sum not more than five thousand dollars, and any such fine shall be a lien upon such vessel, and such vessel may be libeled therefor in any district court of the United States within the jurisdiction of which such vessel shall arrive or depart, and the leaving or attempting to leave each and every port of the United States shall constitute a separate offense.

SEC. 4. That the Secretary of Commerce shall make such regulations as may be necessary to secure the proper execution of this act by collectors of customs and other officers of the Government.

THE PRAGUE BROADCASTING FREQUENCY PLAN

The first frequency plan to receive the collective assent of the European governments was formulated at the Prague conference which terminated on Saturday, April 13. Known as the Prague Plan, the new measure follows upon the decisions at the Washington Radio Convention, 1927, which provided that broadcasting frequencies should be dealt with by government action. The plan, which is notable for the inclusion of Russian stations, is due to come into operation on June 30 next.

Frequencies in kilocycles, approximate meters in parentheses	Country	Frequencies in kilocycles, approximate meters in parentheses	Country
<i>Low frequencies</i>		<i>Medium frequencies—Con.</i>	
160 (1,875)	Holland.	545 (550)	Hungary.
167 (1,800)	Finland.	554 (542)	Sweden.
174 (1,725)	France.	563 (533)	Germany.
183.5 (1,635)	Germany.	572 (525)	Latvia.
193 (1,553)	Great Britain.	581 (517)	Austria.
202.5 (1,481)	Russia.	585.5 (511)	Russia.
207.5 (1,444)	Aviation.	590 (507)	Belgium.
212.5 (1,411)	Poland.	599 (501)	Italy.
217.5 (1,380)	Aviation.	603.5 (497)	Russia.
222.5 (1,348)	Sweden.	617 (487)	Czechoslovakia.
230 (1,304)	Russia.	621.5 (483)	Russia.
250 (1,200)	(Turkey.	626 (479)	Great Britain.
260 (1,153)	Iceland.	630.5 (476)	Russia.
280 (1,072)	Denmark.	635 (473)	Germany.
297 (1,010)	Norway.	644 (466)	France.
	Switzerland.	653 (459)	Switzerland.
		666.5 (450)	Russia.
		666 (453)	Common wave.
		671 (447)	France.
<i>Medium frequencies</i>		680 (441)	Italy.
320 (930)	Russia.	689 (436)	Sweden.
364 (825)	Do.	698 (429)	Yugoslavia.
375 (800)	Do.	702.5 (427)	Russia.
385 (778)	Do.	707 (424)	Spain.
395 (760)	Switzerland.	716 (418)	Germany.
442 (680)	Do.	725 (413)	Ireland.
527 (572)	(Germany.	729.5 (411)	Russia.
531.5 (565)	Yugoslavia.	734 (408)	Poland.
536 (560)	Russia.	743 (403)	Switzerland.
	Germany.		

Frequencies in kilocycles, approximate meters in parentheses	Country	Frequencies in kilocycles, approximate meters in parentheses	Country
<i>Medium frequencies—Con.</i>		<i>Medium frequencies—Con.</i>	
747.5 (401)	Russia.	1,094 (274)	Italy.
763 (399)	Great Britain.	1,103 (273)	France.
761 (394)	Rumania.	1,112 (270)	Greece.
770 (390)	Germany.	1,121 (268)	Spain.
779 (385)	Poland and Italy.	1,130 (265)	France.
783.5 (383)	Russia.	1,139 (263)	Czechoslovakia.
788 (381)	France.	1,148 (261)	Great Britain.
792.5 (379)	Russia.	1,157 (259)	Germany.
797 (377)	Great Britain.	1,166 (257)	Sweden.
806 (372)	Germany.	1,175 (255)	France.
810.5 (375)	Russia.	1,184 (253)	Germany.
815 (368)	Spain.	1,193 (251)	Spain.
819.5 (366)	Russia.	1,202 (250)	Czechoslovakia.
824 (364)	Norway.	1,211 (248)	Italy.
833 (360)	Germany.	1,220 (246)	Common wave.
842 (356)	Great Britain.	1,229 (244)	Albania (provisionally Poland).
851 (352)	Austria.		Great Britain.
855.5 (351)	Russia.	1,238 (242)	Norway.
860 (349)	Spain.	1,274 (240)	Germany.
869 (345)	France.	1,256 (239)	Divided between Monaco, Nice, and Corsica.
878 (342)	Czechoslovakia.	1,265 (237)	
887 (339)	Belgium.		Norway.
891.5 (337)	Russia.	1,274 (235)	Sweden.
896 (335)	Poland.	1,301 (231)	Spain.
905 (332)	Italy.	1,310 (229)	Germany.
914 (329)	France.	1,319 (227)	Rumania.
923 (325)	Germany.	1,328 (226)	Ireland.
932 (322)	Sweden.	1,337 (225)	Luxembourg.
941 (318)	Bulgaria.	1,346 (223)	Finland.
950 (316)	France.	1,355 (221)	France.
959 (313)	Poland.	1,364 (220)	Common wave.
968 (310)	Great Britain.	1,373 (218)	Do.
977 (307)	Yugoslavia.	1,382 (217)	Do.
986 (304)	France.	1,391 (216)	Poland.
995 (301)	Great Britain.	1,400 (214)	Italy.
1,004 (298)	Holland.	1,410 (213)	Rumania.
1,013 (295)	Esthonia.	1,420 (211)	Hungary.
1,022 (293)	France.	1,430 (210)	Belgium.
1,031 (291)	Czechoslovakia.	1,440 (208)	Common wave.
1,040 (289)	Finland.	1,450 (207)	Do.
1,049 (286)	Great Britain.	1,460 (206)	Do.
1,058 (283)	France.	1,470 (204)	Do.
1,067 (281)	Portugal.	1,480 (203)	Do.
1,076 (279)	Denmark.	1,490 (202)	Do.
1,085 (276)	Czechoslovakia.	1,500 (200)	Free.
	Germany.		

RADIO SIGNAL TRANSMISSIONS OF STANDARD FREQUENCY, JULY TO DECEMBER

The Bureau of Standards announces a new schedule of radio signals of standard frequencies for use by the public in calibrating frequency standards and transmitting and receiving apparatus. The signals are transmitted from the bureau's station WWV, Washington, D. C. They can be heard and utilized by stations equipped for continuous-wave reception at distances up to about 1,000 miles from the transmitting station.

The transmissions are by continuous-wave radiotelegraphy. A complete frequency transmission includes a "general call" and "standard frequency" signal and "announcements." The general call is given at the beginning of the 5-minute period and continues for about 2 minutes. This includes a statement of the frequency. The standard frequency signal is a series of very long dashes with the call letter (WWV) intervening. This signal continues for about 4 minutes. The announcements are on the same frequency as the standard frequency signal just transmitted and contain a statement of the frequency. An announcement of the next frequency to be transmitted is then given. There is then a 4-minute interval while the transmitting set is adjusted for the next frequency.

Information on how to receive and utilize the signals is given in Bureau of Standards Letter Circular No. 171, which may be obtained by applying to the Bureau of Standards, Washington, D. C. Even though only a few frequency points are received, persons can obtain as complete a frequency meter calibration as desired by the method of generator harmonics, information on which is given in the letter circular. The schedule of standard frequency signals is as follows:

Eastern standard time (p. m.)	July 22	Aug. 20	Sept. 20	Oct. 21	Nov. 20	Dec. 20
10.....	1,500	4,000	550	1,600	4,000	550
10.12.....	1,700	4,400	600	1,800	4,400	600
10.24.....	2,000	4,800	700	2,000	4,800	700
10.36.....	2,300	5,200	800	2,400	5,200	800
10.48.....	2,700	5,800	1,000	2,800	5,800	1,000
11.....	3,100	6,400	1,200	3,200	6,400	1,200
11.12.....	3,500	7,000	1,400	3,600	7,000	1,400
11.24.....	4,000	7,600	1,500	4,000	7,600	1,500

REFERENCES TO CURRENT RADIO LITERATURE

This is a monthly list of references prepared by the Bureau of Standards and is intended to cover the more important papers of interest to professional radio engineers which have recently appeared in periodicals, books, etc. The number at the left of each reference classifies the reference by subject, in accordance with the scheme presented in A Decimal Classification of Radio Subjects—An Extension of the Dewey System, Bureau of Standards Circular No. 138, a copy of which may be obtained for 10 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C. The various articles listed below are not obtainable from the Government. The various periodicals can be secured from their publishers and can be consulted at large public libraries.

R100.—Radio principles

- R113 Kruger, K., and Plendl, H. Ueber die Ausbreitung der kurzen Wellen bei kleiner Leistung im 1,000 Kilometer-Bereich. (On the propagation of short waves with low power in the 1,000 km. range.) Zeits. für Hochfrequenztechnik, 33, pp. 85-92; March, 1929.
 Continuous communication on a frequency of 6,000 kilocycles between ground and plane over distances up to 600 kilometers, using a 2-watt piezocontrolled transmitter with battery power was shown to be practical. Detailed description of experiments and explanation of results are given.
- R113.4 Kenrick, G. W., and Jen, C. K. Measurements of the height of the Kennelly-Heaviside layer. Proc. Inst. Radio Engrs., 17, pp. 711-733; April, 1929.
 Further contribution to the Kennelly-Heaviside layer problem is offered in the form of experimental data showing evidence of the diurnal cycles in layer height and a mathematical discussion of methods for the interpretation of group time and phase retardation experiments with the view of determining the relationship between "virtual" and "true" heights.
- R113.5 Dearlove, F. Radio-frequency phenomena associated with the Aurora Borealis. Experimental Wireless and Wireless Engineer (London), 6, pp. 193-195; April, 1929.
 Observations made in Labrador and Newfoundland on the effect of aurora borealis on reception at high frequencies. Two types of aurora appear—type A, a faint glow generally seen in northern sky extending faint streaks of greenish light in all directions and appearing at a great altitude, generally moving slowly but sometimes stationary; type B appears suddenly and consists of undulating patches of vivid greenish light. Type A, and to a less extent type B, produces very abnormal types of reception for frequencies of 7,500, 3,750, and 1,875 kilocycles, even during daylight.
- R113.6 Lange, E. H. Note on earth reflection of ultra short radio waves. Proc. Inst. Radio Engrs., 17, pp. 745-751; April, 1929.
 Computations and curves are given for the reflection coefficients and phase angles for various surface conditions in conjunction with a horizontal ultra short antenna. Theoretical polar diagrams were computed for various heights of horizontal antenna above the surface.
- R130 Kingdon, K. H., and Mott-Smith, H. M. The operation of radio receiving-tube filaments on alternating current—Part II. General Electric Review, 32, pp. 228-232; April, 1929.
 Discussion of causes of distortion resulting from use of grid-leak with a detector tube which employs alternating current on the filament. When grid becomes sufficiently positive, grid current flows, causing grid voltage fluctuations which in turn give rise to a double-frequency ripple in plate current. Serious disturbances are caused if filament drop is greater than 0.1 volt.
- R131 Barclay, W. A. The algebraic representation of triode valve characteristics. Experimental Wireless and Wireless Engineer (London), 6, pp. 178-183; April, 1929.
 Analytical treatment of the "lumped" triode characteristic holding over the entire characteristic curve.
- R131 Decaux, B. Un abaque de classification pour les triodes de reception, application a leur choix rationnel. (A chart classifying receiving tubes.) L'Onde Electrique, 8, pp. 37-40; January, 1929.
 A chart is presented in which each tube is recorded as a point, its abscissa being the logarithm of the amplification factor and its ordinate being the logarithm of the internal resistance. The position of the point with respect to indicated zones shows for what purpose the tube is suitable.

- R133 Latour, M. A propos de la communication de M. F. Bedeau sur "Les differentes methodes de determination de la condition d'entretien des oscillations dans les emetteurs a lampes." (Re a communication from M. F. Bedeau on "The different methods of determining the condition for continuous oscillations in electron transmitting tubes.") *L'Onde Electrique*, 8, pp. 77-79; February, 1929.
A brief summary of the author's earlier analysis of the conditions for continuous operation of a self-exciting 3-electrode tube generator.
- R133 Mercier, J. Le mecanisme de la stabilisation des oscillations dans un oscillateur a lampes. (The mechanism for stabilizing oscillations in electron tube oscillators.) *L'Onde Electrique*, 8, pp. 29-36; January; pp. 60-67, February, 1929.
A mathematical graphical study of the building up and maintenance of radio-frequency in an electron tube generator. The consideration extends to various orders of magnitude of the damping constant and to the effect of a grid current.
- R133 Okabe, K. On the short-wave limit of magnetron oscillations. *Proc. Inst. Radio Engrs.*, 17, pp. 652-59; April, 1929.
The short-wave limit for radio-frequency current generator by a magnetron is theoretically considered. Experimental results in support of the theory are given. Successful production of a wave length of 5.6 centimeters is reported.
- R137 Hartshorn, L. The measurement of the anode circuit impedances and mutual conductances of thermionic valves. *Proc. Royal Soc. (London)*, 41, pp. 113-125; February 15, 1929.
Application of Wheatstone bridge to measurement of plate circuit admittance or impedance and mutual conductance of an electron tube under actual conditions. Current of audio-frequency was used.
- R146 Guillemin, E. A., and Rumsey, P. T. Frequency multiplication by shock excitation. *Proc. Inst. Radio Engrs.*, 17, pp. 629-651; April, 1929.
Fundamental principles involved in theory of frequency multiplication by means of iron-core coupled circuits are briefly reviewed from standpoint of Fourier's analysis as well as that of recurring transients.
- R146 Marique, J. Note sur le calcul des etages multiplicateurs de frequence a triodes. (Note on the design of frequency multiplying stages of triodes.) *L'Onde Electrique*, 8, pp. 1-19; January, 1929.
Calculations are given based on the static characteristics of a tube for determining the power that can be drawn from a tube at twice or three times the frequency of the input. A simple theory is presented for choosing the best tube inductance, capacity, and grid and plate voltages for a frequency multiplying stage.
- R200.—Radio measurements and standardization
- R201.2 Lloyd, H. Note on an application of the Whiddington ultra-micrometer. *Journal Scientific Instruments (London)*, 6, pp. 81-84; March, 1929.
Methods are given which have been employed for overcoming some difficulties met with in using a heterodyne micrometer, and improved arrangements are described for the indication of the zero beat condition audibly or visibly.
- R210 Pession, G., and Gorio, T. Measurement of the frequencies of distant radio-transmitting stations. *Proc. Inst. Radio Engrs.*, 17, pp. 734-744; April, 1929.
Equipment installed in the Italian Royal Experimental Institute of Communications for radio-frequency measurements is described.
- R220 Cagniard, L. Deux exemples de montages qui font intervenir la variation des caracteristiques d'un appareil recepteur ou de mesure. (Two examples of networks making use of the variation in characteristics of a receiving or a measuring apparatus.) *L'Onde Electrique*, 8, pp. 68-76; February, 1929.
A circuit with its analysis is presented for the accurate measurement of capacities, self-inductances, etc., at higher frequencies. The circuit is a Wheatstone bridge employing in its resonant measuring diagonal a quadrant electrometer. The capacity of the latter, being a function of its deflection, increases the sensitivity of the circuit enormously.
- R230 Hartshorn, L. The measurement of the inductance and effective resistance of iron cored coils carrying both direct and alternating current. *Journal Scientific Instruments (London)*, 6, pp. 113-115; April, 1929.
Method is described for measurement of effective inductance and resistance of coils of large self inductance which are required to carry a comparatively large direct current with a superposed alternating-current ripple. Hay's inductance bridge is used with special arrangements for independent control and measurement of the alternating-current and direct-current components, the avoidance of earth capacity effects without grounding the alternating-current supply, and elimination of the direct current from the vibration galvanometer used as detector without losing sensitivity. Typical results are given.
- R240 Sutton, G. W. A method for the determination of the equivalent resistance of air condensers at high frequencies. *Proc. Royal Soc. (London)*, 41, pp. 126-134; February 15, 1929.
Losses in air condensers are due to leakage through the solid dielectric and to terminal and plate resistance. A method is developed for measuring each under conditions such that the other is negligibly small. Limits of the errors to which the methods are liable are discussed, and some results of practical measurements are quoted.
- R275 Jolliffe, C. B. The use of the electron tube peak voltmeter for the measurement of modulation. *Proc. Inst. Radio Engrs.*, 17, pp. 660-663; April, 1929.
Method described whereby the peak value of the radio-frequency current is measured without modulation. The modulation is then applied and the peak value again measured.

R300.—Radio apparatus and equipment

- R329 Eckersley, P. P. and T. L., and Kirke, H. L. The design of transmitting aerials for broadcasting stations. *Journal Institution of Electrical Engineers* (London), **67**, pp. 507-526; April, 1929.
Presents theory of the antenna as a radiator with special reference to its ability to radiate rays parallel to the surface of the earth. Account of experiments with different types of antennas designed to achieve this result is given. Theory of attenuation of waves having frequencies between 500 and 1,500 kilocycles is given, and a complete set of curves taken from a transmitting antenna near London is shown. Data is given for aiding in the determination of extent of service area for a broadcasting station.
- R330 Sutherlin, L., and Upp, C. B. Characteristics of radio receiving tubes. *Electric Journal*, **26**, pp. 146-152; April, 1929.
Gives description of several power tubes and their characteristics.
- R333 Hull, A. W. Hot cathode Thyratrons—Part I. *General Electric Review*, **32**, pp. 213-223; April, 1929.
Three-electrode tube similar to pliotron into which a small amount of inert gas has been introduced. This gas changes the pure electron discharge into an arc so that the Thyratron is an electrostatically controlled arc rectifier. Characteristics of tube are given.
- R342.5 Lamb, J. J. A general purpose audio-frequency power amplifier. *QST*, **13**, pp. 23-23; April, 1929.
Design and construction data.
- R343 Jarvis, K. W. Radio receiver testing equipment. *Proc. Inst. Radio Engrs.*, **17**, pp. 664-710; April, 1929.
Detailed description of testing equipment capable of measuring performance characteristics of modern radio receivers with design conforming to the restrictions of the standardization committee. A novel modulation meter is described.
- R343 Hendricks, P. S. Another 1929 receiver. *QST*, **13**, pp. 15-18; May, 1929.
Description of 3-tube receiver suitable for frequencies of 2,800 to 15,150 kilocycles and also for the 28 megacycle band.
- R357 Greibach, E. H. A new type of precision frequency changer for instrument calibration. *Electric Journal*, **26**, pp. 125-126; March, 1929.
A photo-electric means of producing wide and accurately known variations in the frequency obtained through a standard tuning fork.
- R370 David, P. La qualite de la reproduction radiophonique. (The quality of radiophone reproduction). *L'Onde Electrique*, **8**, pp. 41-59; February, 1929.
A summary is presented of the factors affecting the quality of radiophone reception discussing (1) distortion due to unfaithful reproduction of frequency and amplitude, (2) distortion due to parasitic frequencies, and (3) necessary precautions in detection and in the amplification of audio-frequencies. It is concluded that improvement in quality is to be secured at a sacrifice of sensitivity and selectivity in the receiving apparatus.
- R386 Tubbs, E. A. Practical design of audio-frequency filters. *Radio* (San Francisco), **11**, pp. 17-18; May, 1929.
Design data.
- R388 Rangachari, T. S. The superposition of circular motions. *Experimental Wireless and Wireless Engineer* (London), **6**, pp. 184-193; April, 1929.
Derivation of expressions for the superposition of circular motions such as produced in a cathode-ray tube.

R500.—Applications of radio

- R526.1 Aicardi. Reperage de directions fixes au moyen d'ondes Hertiennes—Radio alignements. (Fixed direction marking by radio waves). *L'Onde Electrique*, **8**, pp. 20-28; January, 1929.
A beacon system is described employing the transmission on the same wave length from two separate antennas. One transmission is slightly modulated. The number and the disposition of the nodal lines in the resultant field are indicated. A practical scheme for periodically displacing these lines to enable the observer to know his position with respect to them is also presented.
- R526.2 Gloeckner, M. H. Der Bordpeilungempfangen im Flugzeug. (The radio direction finder applied to aircraft). *Zeits. fur Hochfrequenztechnik*, **33**, pp. 92-101; March, 1929.
Complete description of a special radio direction finder developed by DVL and the Telefunken Co., with an explanation of its application to air navigation.

R800.—Nonradio subjects

- 534 On the sound waves radiated from loud-speakers diaphragms. *Experimental Wireless and Wireless Engineer* (London), **6**, pp. 175-177; April, 1929.
A review of the radiation of sound waves from commercial types of loud-speakers with special reference to beam effects.
- 621.314.6 Hermanspann, P. Untersuchungen an Drosseln mit geschlossenen Hypernik-Kern. (Experiments with Hypernik (iron-nickel-alloy) closed core chokes). *Zeits. für Hochfrequenztechnik*, **33**, pp. 81-84; March, 1929.
Report of experiments with Hypernik-cored chokes by the Physical Institute of the Technical University at Munich. Measurements of inductance and losses at varying field strengths were taken and compared with those of ordinary dynamo sheet iron. Hypernik is a special alloy of iron and nickel manufactured by the Westinghouse Co.

OBITUARY

The division deeply regrets to announce the death of R. Y. Cadmus, supervisor of radio, in charge of the third radio district, with headquarters at Baltimore, Md. Mr. Cadmus was one of the two radio inspectors first appointed under the original radio act, the other inspector being W. D. Terrell, the present head of the radio division of this department.

Mr. Cadmus entered on duty July 1, 1911, and served continuously with the exception of the period of the World War, during which time he saw service as an officer in the United States Navy. He also was an officer in this branch of the military forces during the Spanish-American War.

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