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Groups Fight State Licensing

by Charles Taylor

Waco TX ... A number of states are progressing with legislation making it illegal for radio and television engineers to practice their trade without passing a standardized licensing test.

But the test, according to the National Association of Radio and Television Engineers (NARTE), based here, is unfair to broadcast engineers because it contains no questions directly relating to the industry.

The organization also argued that stricter licensing will limit competition by forcing the market to include only state-qualified engineers in bidding.

In addition, many long-time engineers with on-the-job experience instead of formal academic training will be shut out. "We feel like this has closed the door

on tens of thousands of people who got their knowledge 30 years ago," said Ray Thrower, president of NARTE.

Officials at the National Society for Professional Engineers (SPE) maintain, however, that the testing not only will place broadcast engineers under the same scrutiny as their counterparts in other engineering disciplines, but also will set a necessary and overdue standard for minimum competence within the broadcast engineering industry.

How to be an engineer

The new laws generally call for broadcast engineers to have graduated from a four-year engineering program accredited by the Accreditation Board for Engineering and Technology (ABET), and to pass a standard written exam that addresses the spectrum of engineering

as a profession. Four years of experience in the industry also are required to become a Professional Engineer.

"From a philosophical point of view, we think that someone who has been through that kind of training has demonstrated that they are qualified and competent. There are a lot of people who have substantially less than that and they're calling themselves engineers. We have some concerns over that," said Arthur Schwartz, general counsel for SPE, and secretary of the National Conference

on Engineering Specialty Certification in April, where the issue was first nudged into action.

So far, laws have been enacted or are near passage in Washington state, New Jersey, New Mexico and Michigan. Fines for operating without a license reach as high as \$5000 with a one-year jail sentence.

"This isn't something being bounced around just as an academic exercise. I've seen too many letters from people whose

(continued on page 29)

Support for NRSC-1

by Alan Carter

Washington DC ... Broadcasters are fine tuning comments on the FCC's proposal on mandatory NRSC audio and transmission standards for AM radio due 22 November.

The NAB is preparing evidence which it hopes will show that if AM stations use the NRSC audio standard, called NRSC-1, they are already in compliance with the NRSC transmission standard, known as NRSC-2, according to NAB staff engineer Stan Salek.

Developed by the National Radio Systems Committee (NRSC) and currently in voluntary use, NRSC-1 established a 75µsec preemphasis and a 10 kHz stop-band. NRSC-2, the RF emission standard or "RF mask," addresses the signal from the transmitter out.

Several broadcasters on the NRSC have voiced concern about the Commission's focus on the RF mask in the proposed rule making, rather than the audio standard.

Not in total support

Some NRSC members are looking for a way to delay mandatory introduction of NRSC-2 because its monitoring is more complicated at this point.

However, the FCC, in its rule making, stated that a mandatory transmission standard appears to be the way to insure compliance with the standard as a whole. "It is therefore our tentative view that greater attention should be given to the radiated emissions that directly cause interference to other stations than to the characteristics of the audio signals fed to a transmitter," the NPRM noted.

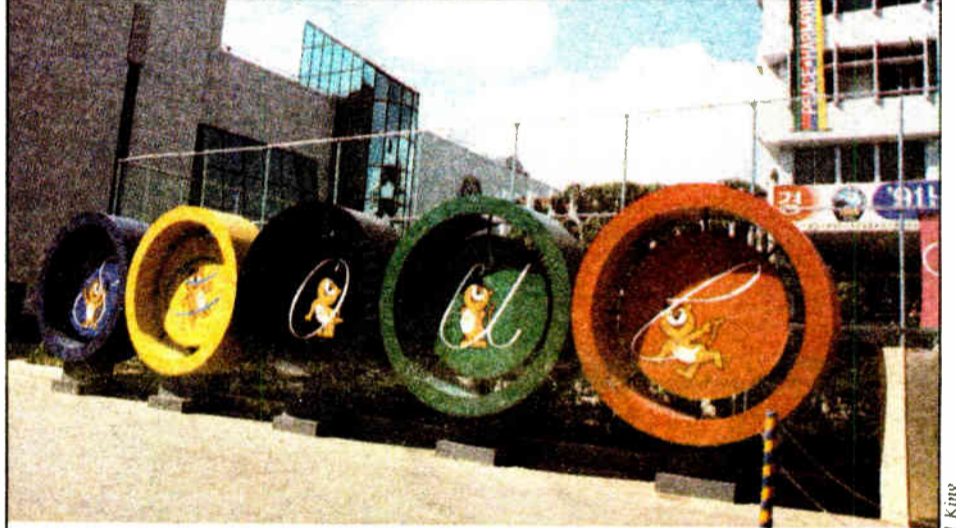
The Commission added that "Audio processing pursuant to the NRSC standard alone cannot ensure the absence of

interference."

The notice specifically mentioned problems arising from overmodulation, and clipping or limiting in transmitters as a way that stations using NRSC processing filters might yet be out of compliance with the transmission standard.

The notice also addressed concerns about extra implementation and compli-

(continued on page 3)



Wrapping Up the Games

Hodori (the cartoon tiger mascot of the 24th Olympiad in Seoul, South Korea) greeted visitors entering the International Broadcast Center, where NBC and Westwood One were headquartered during their coverage of the Games. For a wrap-up of the broadcasts, see p. 3.

Photo by Carmel King

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Pirate Station Plans Return To Airwaves

Long Beach NY ... A "pirate" radio station aboard the 170' freighter Sarah, which broadcast for four days off the coast here last summer, is seeking court approval to return to the air.

The station's lawyer cited the Constitution's first amendment, guaranteeing freedom of speech, as the primary justification, adding that the FCC has no right to control unoccupied frequencies.

"I view unoccupied spots on the radio spectrum as unoccupied street corners. If I want to make a speech there, I can do it," said Jeremiah Gutman, who is representing the station's proponents through the New York Civil Liberties Union.

"The FCC is acting like a dog in a manger saying nobody can use (unoccupied places on the AM bandwave above 1605) until they decide we can. I don't think they have a right to do that," he said.

The FCC, meanwhile, said that the ship's flag will never be raised because

(continued on page 15)

Forest Service Site Fees Criticized

Charles Taylor

Washington DC ... Six notices filed by the US Forest Service intended to increase site fees for broadcast antennas located on public land have drawn criticism on several fronts.

The NAB charges that while the forest service by law is required to set fees for the use of public land by fair market value, instead, it is enacting site fees based upon the "perceived ability to pay of various broadcast station operations." Such an approach, the association said, is unlawful.

The forest service also should reconsider its reluctance to grant fee waivers to stations in view of the public service they provide, the NAB declared.

The organization is not alone in its opposition to the fee schedule changes. Several members of the Senate and House have raised concerns, asking for a delay in the hike in order to hold Congressional hearings, or for legislation to ban the increases for communications uses.

Awakened to concerns

In response, the Forest Service has "awakened to our concerns," said Barry Umansky, deputy general counsel at NAB. A comment deadline has been extended from late September to 2 December. And because of that, implementation of fee hikes will be pushed from 1 January 1989 to at least March or April, he said.

In some regions, Umansky said, possible implementation will be delayed until calendar year 1990.

Rose Narlock, a public affairs specialist at the US Forest Service, said there has been "quite an outcry" about raising the fees. Each of nine national regions will be studying its proposed hike on an individual basis, she said, though Congressional action could block or limit any increases. Each region has a different fee schedule.

In its filing with the forest service, the NAB centered its comments on what it views as a number of violations, both legal and ethical.

In addition to the fair market value argument, NAB said that fee increases were unjustified in light of improve-

ments often made by broadcasters to the federal land, including access roads, electric power delivery and fencing. These improvements increase the value of the land, the agency said.

Unfair monopoly

The NAB also said that since the public land often offers broadcasters "the most attractive and possibly the only alternative for the broadcast tower," such as a mountain top, the forest service maintains an unfair monopoly.

"Antitrust agencies spend considerable resources preventing private companies from exercising that type of power. Federal agencies should be cautioned against adopting behavior unlawful in the private sector," the NAB wrote.

A 1976 case was cited in which the NAB challenged the FCC regarding collecting fees from stations based on the value to the recipient instead of the cost of regulation value of the application processing services performed by the FCC staff.

NAB challenged the fees and won, requiring the FCC to refund more than \$31 million to stations. "NAB is prepared to pursue broadcaster interests in this forest service matter to the same degree that they were pursued concerning the FCC's illegal collection of fees from broadcasters," the group warned.

Total or partial waivers

One section of the Federal Land Policy and Management Act of 1976 states that the forest service may grant total or partial waivers of rental fees when a land user provides free or reduced-charge public benefits.

In a February letter, the NAB argued that broadcasters do provide services to the public, all free of charge. "News, public affairs programming, warning under the Emergency Broadcast System, weather advisories and bulletins etc. are provided throughout each year and only by broadcasters," NAB said.

Others with facilities on federal land, such as cable TV operators and telephone companies impose direct charges on users, the NAB pointed out.

The forest service responded to the letter in March, saying that the primary service of a broadcast station remains commercial and that the provision of required public services would not qualify a broadcast station for a waiver.

In the most recent filing, NAB said that such a viewpoint "is completely at odds with your own enabling statute, the Communications Act of 1934 and all notions of federal coordination and cooperation." Higher fees, the NAB added, reduce a station's economic ability to provide the public benefits the Forest Service cites as motivation for the fee waivers, leaving broadcasters in a "Catch 22."

For more information, contact Barry Umansky at the NAB, 202-429-5456; or the US Forest Service, 202-447-3957.

NEWS BRIEFS

Mark IV Buys Cetec

Buchanan MI ... Mark IV Industries, parent company of Electro-Voice Inc., has acquired Cetec Corp., including its communications equipment holdings.

Included in the purchase that was effective 14 July was Vega, maker of wireless mics; Ivie, maker of sound electronics including audio instrumentation; Gauss, which includes tape duplicator and low-frequency loud speaker divisions, and Cetec Raymer, maker of commercial sound equipment.

Vega sales and marketing will be handled by Electro-Voice, according to Ivan Schwartz, broadcast/production marketing specialist for Electro-Voice.

The distribution network for Vega and Ivie is currently being evaluated to assure maximum effectiveness in the marketing and future growth of both companies, Schwartz said.

Radio Reading Services

Washington DC ... The FCC has adopted a policy statement clarifying the costs noncommercial radio stations may charge to operators of reading

services to lease a station's subcarrier capacity under Section 73.593 of the rules.

Although a noncommercial FM is not required to charge for the use of its subcarrier, the station's licensee may recover from the radio reading services costs that are caused directly by the reading service's use of the subcarrier.

Other costs, such as salaries, rent and maintenance, also may be recoverable by the station from the service, but only to the extent those costs are identifiable and directly related to the provision of the reading service—and can be justified.

Costs such as "opportunity costs" that result from the station's non-use of the subcarrier for more profitable purposes may not be charged, the FCC ruled.

NTIA Looks at Future

Washington DC ... An NTIA report recently released found that most of the nation's public policy goals on economic and technological advancement have largely been accomplished.

The report also stressed that, assuming sound future policy, the outlook for communications and information tech-

nologies, markets and services is bright.

NTIA Administrator Alfred Sikes outlined five areas that should be stressed by future government policymakers: building on universal service, capitalizing on technology to meet human needs, better resource management, privacy safeguards and international competition, and competition and government policy.

SBE Tower Video

Denver CO ... The Denver SBE Chapter 48 has produced a video tape intended to be shown to community groups about radio tower construction.

The chapter noted that building a new tower has become difficult given the concerns over free-fall clearance, lightning danger, radiation, interference potential and aesthetics.

The 18-minute, VHS tape costs \$24.95 and is available from Chapter 48: c/o International Map Service, 85 S. Union Blvd., Suite D2, Lakewood, CO, 80228, 303-987-2747.

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Broadcasters Emphasize NRSC-1

(continued from page 1)

ance costs associated with NRSC-2 but not NRSC-1. The Commission said it could find little evidence to support such contentions.

"Inasmuch as licensees are already responsible for assuring compliance with the emission standards, it is unclear how alteration of these standards would affect compliance cost," the notice stated, concluding that compliance costs under either the audio or the transmission standard "appear to be roughly equivalent."

NAB staff engineer Stan Salek said, however, that the NAB disagreed with the FCC's conclusion about compli-

FCC Plans AM Rule Changes

by Alan Carter

Washington DC ... The FCC has taken additional measures towards improving AM with four separate proposed rule makings that address technical criteria.

The Commission at a 13 October meeting unanimously proposed changes to its rules to facilitate enhancement of nighttime operations, to improve methods for calculating skywave and groundwave field strength, and to review methods of calculating nighttime protection.

FCC Chairman Dennis Patrick said the proposals, several of which stem from the Commission's AM technical review,

(continued on page 21)

ance costs.

Salek said the audio portion would not be as expensive to implement because some NRSC-1 equipment has the test portion built in with LED meters to set it up properly.

Presumptive compliance

The FCC did, however, appear to address the concerns of NRSC members by including a section in the notice asking for comment on "presumptive compliance" with NRSC-2 if a station has implemented NRSC-1.

Salek is seeking out radio stations that have voluntarily implemented NRSC-1 and that have access to test equipment to determine presumptive compliance with NRSC-2.

He said he expected to find most in compliance. "Just implementing NRSC-1 takes you a vast majority of the way through NRSC-2 for most stations, and that's what I'm trying to prove here," Salek said.

Under presumptive compliance, Salek said a two-tiered approach could be taken with NRSC-1 introduction first and two years later the adoption of NRSC-2. "Having the NRSC audio standard in place, stations would be able to have the time to analyze and make the equipment acquisitions and corrections necessary to fully comply with the RF emission standard," Salek said.

Salek maintained that if there were compliance problems with the transmission standard, it would be "at the far reaching edges" of the mask rather than at "the sharp edges of

the cutoff."

The scenario means, he explained, that technically a station could be out of compliance but "in the real world" there would be little effect on interference.

Other problems

NRSC chairman Charlie Morgan, of Susquehanna Broadcasting, said he would encourage the Commission to allow broadcasters to comply with NRSC-1 before requiring NRSC-2 because the standard has not been fully tested. It also would be "too expensive and cumbersome" for some AM stations to measure the transmission standard at this time.

Morgan also noted the FCC should address the audio standard more directly, in particular the preemphasis curve.

NRSC member John Marino, of New-City Communications, also noted his concern that broadcasters encourage the Commission to better define the preemphasis curve. "But of course, broadcasters should support the full NRSC package," he added.

Another issue on which Marino said broadcasters should comment is to discourage the FCC from using the NRSC standards to "shoehorn in" more AM stations.

For information from the FCC, contact the public affairs office at 202-632-5050. Contact Stan Salek at the NAB by calling 202-429-5391.

Airing the Olympics

Seoul South Korea ... It was a smooth ride for the 200 Westwood One affiliates that received more than 85 hours of live feeds from the 1988 Summer Olympics.

"Technically, things went superbly, much better than I had anticipated," said Raphael Weiss, manager of technical operations for the NBC Radio Network. "Our affiliates listening to our programming coming all the way from Seoul thought we were in the next room."

The network's programming included hourly 2½-minute feeds—almost around the clock—and a four-hour broadcast each day.

Part of the four-hour show included a question and answer segment where listeners from around the US could call toll-free to the Westwood commentators in Seoul.

"We had an 800 number that terminated in Arlington, VA, went to Seoul where the questions were answered and then mixed, and then returned to the US," Weiss said. "My biggest fear was the double satellite hop delay, but it worked. My fears were just wiped out."

The network's equipment package included much of the same elements used in covering the 1988 Democratic and Republican conventions. Equipment for the events was valued at \$450,000, Weiss said.

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Circle Reader Service 46 on Page 27



New Phase Lok V Head Block

Afterthoughts, After the Shows

by Judith Gross

Falls Church VA ... Is it over yet? The fall convention schedule, I mean. Not that it isn't fun to get together with colleagues from the industry and see the latest gizmos and all.

But eventually even a seasoned showgoer comes down with a case of booth-blur. You can recognize its symptoms: the glassy-eyed stare, the staggered pace on feet which look (and feel) like they're walking on a bed of hot coals.

Final assessment on the SBE show was A-plus on the quality of seminars, the exhibits and the types of attendees. But a mere E-for-effort on the numbers of attendees and quantity of traffic overall.

For starters, why didn't the convention organizers make that opening reception an open bar? If attendees have to pay for drinks, they are just as likely to spend happy hour in the lounge at the Holiday Inn (where there were bowls of popcorn and the Olympic games on the tube).

There was a lot of griping in the aisles about the sparse traffic. Even one of the SBE chapter newsletters called it "disappointing." One exhibitor was fly-fishing in the aisles.

But let's put those rumors about exhibitors pitching pennies at one booth to rest. They were dimes.

Changes are already in the works. Next year's show in Kansas City will drop the Sunday half-day exhibit hours, for one.

Interesting to note that vendors at the SBE show in Denver and vendors and NAB staff at Radio '88 in Washington, DC reported small snafus with convention

center workers.

In Denver it seems that the workers hanging those neon signs some companies sport didn't use cherry pickers to



speed up the process, opting for pulleys and rope which dragged the whole thing out.

A little sleuthing by a crafty exhibitor uncovered the reason. Yep, you guessed it, they are paid by the hour.

In DC there were some horror stories about convention staff rudeness, scarfing down the free coffee, danish and sodas provided for staff, and the like.

But at least as far as the SBE show is concerned, the exhibitors were mostly happy with the results, it seems. More than half of them have already signed up for booths at next year's convention.

As far as the NAB's fall radio show, it seems there is now some talk about having an exhibitor's advisory committee for that show as well. There already are such committees for the spring NAB show and for SBE.

☆☆☆

As the deadline draws near on comments about a mandatory NRSC stan-

dard the controversy over whether it should be only an audio standard, only a transmission standard or both haven't died down at all.

The FCC worded its NPRM favoring the transmission standard. It's what they feel they're best at, monitoring emissions.

But NAB and some NRSC members ar-

or two recess appointments to the Commission now that Congress is done for the year? He didn't get action on his two nominees, so that's the scuttlebutt in DC. And one of the names being tossed about is very familiar to the industry. Stay tuned ...

My buddy Paul Kaminski, producer



Not pitching pennies ...

en't very happy with that outlook. They've been hoping for the audio standard, first, with maybe a transmission standard much later.

Now comes the notion of "presumptive compliance." The FCC left sort of a loophole in one item in the notice, asking if it could be presumed that when a station puts in the 75 μ sec preemphasis and 10 kHz stopband processing filter the station it automatically complies with the "RF mask"—or transmission standard.

Well, seems it could, but it might be stretching things a bit. Reports from the field indicate that it is entirely possible to put in the NRSC filter and still be out of compliance with the RF mask, because of transmitter clipping or other problems.

In fact there are rumors of at least one station doing just that now. Then, with an audio standard only, it would be awfully difficult for the FCC to enforce. They aren't likely to go and check a station's processing card to see if the preemphasis exceeds the limit.

While with a transmission standard, it's a fairly straightforward thing to determine compliance, by applying the RF mask. Yeah, a spectrum analyzer would do it. But so would Delta's splatter monitor.

The NRSC marks the first time in a long time the FCC has been willing to enact a technical regulation and it's their first effort on behalf of AM improvement. Sounds like the "presumptive compliance" loophole stands to undermine all that. Plus it doesn't seem like sound engineering.

☆☆☆

Whatever they decide, you can bet the Commission is on a very fast track with its AM improvement dockets and the outstanding notices on FM as well.

With the elections close at hand, it's anybody's guess how the FCC will end up after the start of the new year, so expect some quick action on many of these things.

And it's just a feeble rumor, but could it be that President Reagan will make one

of Motor Sports Radio in Johnson City NY (an apple's throw from beautiful, downtown Binghamton) was so inspired by Ron Frizzell's article comparing AM radio to the Titanic after the iceberg hit (1 October RW) that he's decided to do his part.

Paul said his company, Sportcom/MSR will offer a 15% discount off its cash with order price for the 1989 season to any AM station which broadcasts in stereo and for those on the NRSC standard.

"It's about time that people in the programming industry stopped wringing their hands about the demise of AM and started to offer incentives to improve programming on AM," Paul said. Couldn't agree more. Action in the pocketbook, that's the way to go.

Allied Broadcast has a nifty little giveaway in the works. The company will hold a drawing on 8 January to give away two NAB Engineering Handbooks. The handbooks are invaluable tools and worth a bit of moola (\$124.50 for members, \$149.50 for non-members).

How to enter the drawing? It's simple. Put your name and title on your company or station's letterhead and mail to: Allied Broadcast, Dept db, PO Box 1487, Richmond IN 47375. And may the luckiest engineer win.

Footnote on the Olympics. Seems the NBC folks got themselves declared personae-non-grata with Korean natives for broadcasting their attack on the referee who ruled against their countryman in that boxing match.

NBC staff were told not to wear any of their clothing with logos (that's right, no peacocks) lest they be attacked as well.

No, I don't believe it. Did the Crystal Award given by the NAB at Radio '88 to WAGE of Leesburg really fall apart before the recipient left the hall? Gee they don't make them like they used to, do they?

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NAB, SBE: A View From One Exhibitor's Booth

by Jack Williams

Carlsbad CA . . . First I must point out that the observations and opinions expressed below are mine alone and do not necessarily reflect the views of the NAB, SBE or their Exhibitors' Advisory Committees.

With both the NAB Radio and SBE National Conventions very fresh in mind, I would like to offer some observations of each followed by a constructive suggestion for the future of both events.

Guest Editorial

NAB Radio is first and foremost a radio business convention. The business needs of the convention require it to be held in venues with plenty of first class hotel, ballroom, meeting room and suite facilities—in other words, expensive places.

For example, the NAB's welcoming event was held in the ballrooms (that's right, plural) of Washington DC's Marriott Hotel, and was replete with huge serving tables lavishly spread with food, several bars and even a marching band.

The closing night's entertainment was provided by Natalie Cole, certainly a class act. During the show, the radio networks, program syndicators, consultants and so forth used their "hospitality" suites to sell and/or reassure affiliates, clients, etc.

Bottom line: this is our industry's business convention and a good one. Tes-

timony to its quality is the fact that over 3000 station owners, general managers and program directors attended the most recent edition.

The growing success of the NAB Radio convention will probably cause many of the suite participants (such as the various networks) to consider reducing their participation at the spring NAB and focusing more on the NAB Radio meeting, thereby drawing even more management and programming attendees to the fall meeting.

Of course, it is this group of attendees which draws the interest of most exhibitors, as evidenced by the variety of products and services displayed (even including a fireworks company).

Nuts and bolts show

SBE National is a radio and television broadcast technology convention with

. . . the attendees at this year's SBE show were knowledgeable and perceptive people

an emphasis on educational seminars and workshops.

Beyond securing good meeting room and exhibition facilities, the organization goes out of its way to provide very affordable venues for its attendees and exhibitors. The SBE is a basic "nuts and bolts" show without the call for either a marching band or a headline closing act.

Always held near the center of the country to minimize travel time and cost, the convention even spans a Saturday night to further reduce airfares. Since it is important for engineers to keep abreast of developments in hardware and applications, we applaud the efforts of the SBE to make it more affordable to attend.

Bottom line: the attendees at this year's SBE show were knowledgeable and perceptive people who came into our booth asking informed questions. They were treated to more hardware displays and to more and better technical seminars than ever before.

It seems certain that, returning to their home stations, they will be even better equipped to make decisions on hardware choices, configurations, applications, and their stations' preparedness for the future.

Both of these shows have come a long way. The NAB Radio Convention, now in its 10th year, enjoys credibility among the top executives in the radio industry.

The SBE gathering, in only its third national show, attracted a very high quality attendance, probably due in part to the well known success of the regional SBE's over the years.

Looking to the future

As an exhibitor, we are gratified by the consistent improvement of the shows and of the sophistication of the registrants. Show management itself has also steadily improved and the overall look and feel of both conventions is now top-notch.

Suggestions for the future have in-

(continued on page 19)

OPINION

With its third annual national convention over, the SBE has many reasons to bask in the glow of success.

By what it offers to attendees in exhibits and seminars, the SBE national has become significant industry event.

Professional show management this year and hopefully a publicist to be hired next year prove that the SBE is committed to building on what it's got.

But some big hurdles remain if the convention is to thrive.

The SBE has to make sure the convention is a true national draw by finding ways to encourage stronger attendance from its 5300 members.

While exhibitors praised the quality of attendees in terms of buying power, the consensus was that there weren't enough of them.

Build On Success

If seminars can't lure more members from all over the country, SBE should look towards other ways of getting members to attend.

Rather than taking money earned from the show and putting it into its educational foun-

dation, the SBE could help defray transportation costs for its membership.

Since SBE is a grass roots organization, offering more social functions would be a different approach from the traditional seminar-exhibits convention fare and might better serve its membership.

A conclave of engineers in a more social setting, with shorter exhibit hours, might be a greater draw than technical sessions which often repeat those held at other conventions.

The SBE convention is competing with many other shows, especially on the radio side. There has been talk of somehow working with NAB to combine all or portions of SBE national and the NAB's fall radio show.

SBE needs to do what it does best—offer a forum for engineers to exchange ideas and be supportive of each other. With the right additions SBE can build on its past success and have a stronger convention next year.

—RW

READERS FORUM

If you have comments for *Radio World*, call us at 800-336-3045 or send a letter to Readers' Forum (Radio World, Box 1214, Falls Church VA 22041 or MCI Mailbox #302-7776). All letters received become the property of Radio World, to be used at our discretion and as space permits.

Women wanted

Dear RW:

I guess women engineers have finally come into their own! I'm speaking of John Shepler's column of 1 October where the heroes of the story are women engineers.

This industry sorely needs to get new men and women interested in a career in broadcast engineering. These are very difficult times for engineering and it is more and more difficult to attract people to a broadcast engineering career.

For whatever reason, there aren't a whole lot of women in the business. Perhaps our perception of women in the job is finally changing.

Whatever the reason, I think it would be interesting to find out how many women engineers are out there. Are there many other women who have made it to Chief or Assistant?

Margaret Bryant, Engineering Manager
WMAQ
Chicago, IL

Forget AM

Dear RW:

It must be a sentimental attachment to AM radio that keeps us looking for ways to revive it. The truth is no amount of technical enhancement will make AM sound like FM. While there are still some successful AMs, it's time to accept that AM broadcasting is obsolete.

AM's technical inferiority is obvious. The economic problems, however, reach beyond AM's inability to compete

directly with FM. When it's more profitable to shut off an AM station so as to build a shopping center or a housing development on the tower land, something is very wrong. Land is expensive and AMs need too much of it. Some communities face losing stations for this reason.

Larry Tighe's "FM 2" proposal is the only logical solution. AMs will never be able to compete head-to-head with FMs until they are FMs too. "FM 2" simply and economically solves the problems of daytimers and stations with inferior coverages.

Where will the spectrum needed for "FM 2" come from? I don't know, but finding room for "FM 2" has got to be easier than trying to turn that old sow's ear into a silk purse.

The CD made LPs obsolete. FM has made AM obsolete. No one is trying to save the LP. Why should we save AM? Our old friend AM radio has served us well, but it's time to pay our last respects and bury it.

Harold Kozlowski
Chantilly, VA

Not technically possible

Dear RW:

In his letter to *Radio World* (1 September 1988 issue), William O. Barry proposed a plan for the FM band that, unfortunately, violates engineering principles and FCC policies in spectacular fashion. (Has RW no technical advisor to critique letters?) Sorry, Mr. Barry, it

(continued on page 19)

Radio World

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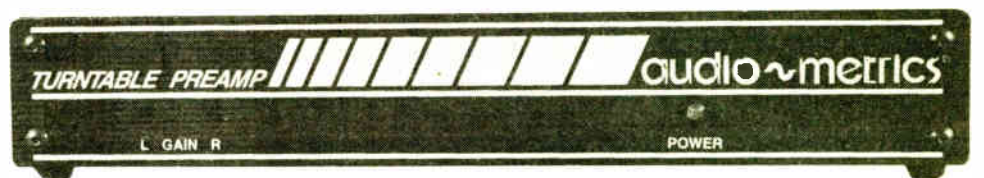
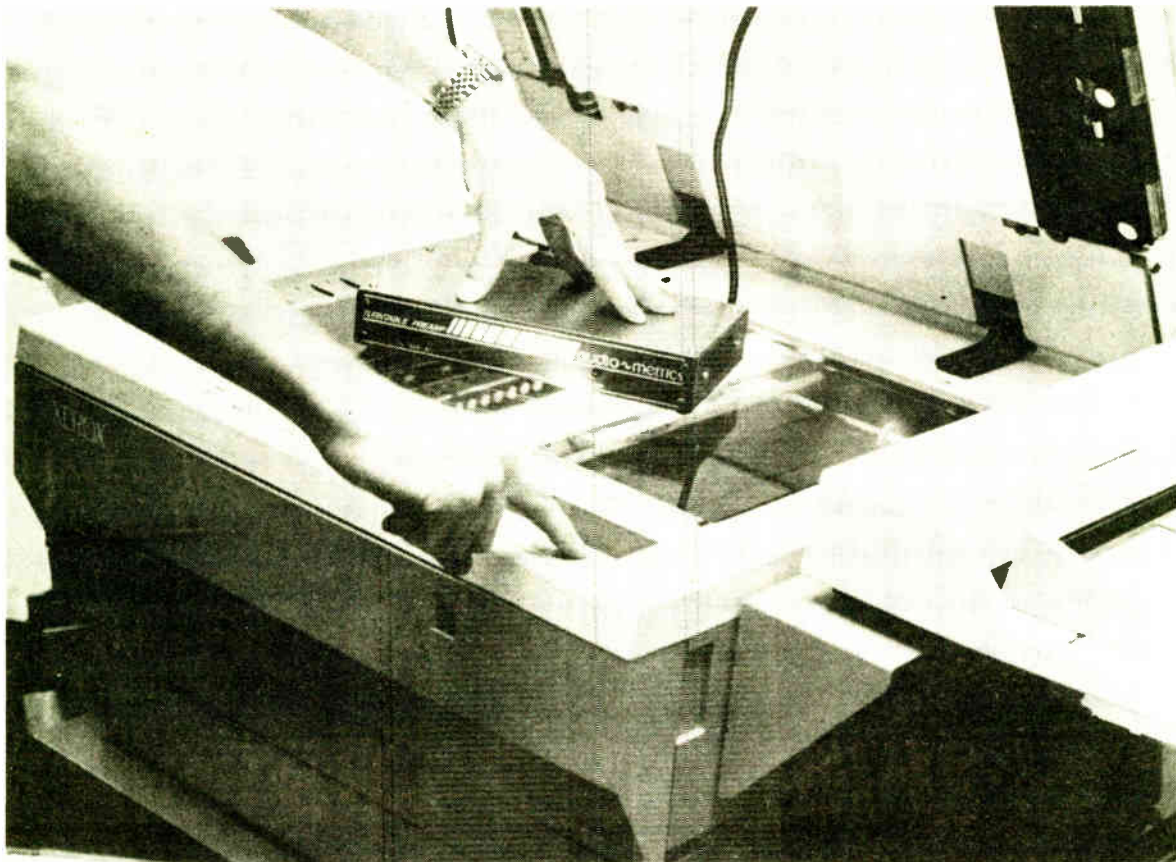
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SBE CONVENTION COVERAGE

Changes Ahead for 1989 Show

by Alan Carter

Denver CO ... The 1988 Society of Broadcast Engineers (SBE) convention held 22-25 September here is history, but plans are well underway for next year's fourth annual national show in Kansas City.

This year's exhibit covered approximately 35,000 square feet with 195 exhibitors. And show manager Eddie Barker said about half of the 1989 space, which he estimated will be 38,000 square feet, has been reserved. He will begin taking additional reservations this month.

The convention also included seminars, which were well received, accord-



Delta's stereo noise generator, preemphasis monitor and splatter monitor for the NRSC standard.

ing to SBE. The Society reported that 62% of those attendees responding to a survey rated the seminars as good.

Some changes are taking shape for 1989, when the convention will run 5-8 October.

Exhibit hours

In the biggest change, SBE will drop the final exhibit hours on the last morning of the show, Barker said. Barker said he would rather cut back and give "good hours" to exhibitors on the other days.

Rau Updates Radio Issues

Denver CO ... NAB Science and Technology VP Michael Rau updated engineers at the SBE national convention here on a variety of topics related to radio.

Rau noted issues before the FCC including a proposed rule making for the NRSC audio and transmission standards on which comments are due 22 November. Approximately 840 stations have voluntarily implemented the audio standard, he said.

He also commented on an inquiry on the expanded AM band and the inquiry on AM technical improvements, both under consideration at the Commission with comments on file.

Overall, he said he expected other notices and rule makings to be forthcoming from the FCC.

On NAB and industry projects, Rau expressed his disappointment in delays with the "ultimate radio" under design by Richard Sequerra. Although Sequerra is well known in consumer electronics for radio designs, Rau said, "For us, he hasn't really done that great of a job so far."

Among the features on the radio are continuous tuning, AM stereo,

SBE registered 1874 people excluding exhibitors, who numbered 503. The Rocky Mountain Film and Video Expo, held in coordination with the convention, reported registering 920 attendees.

Asked about exhibitors who said they found "quality" but not "quantity" in the attendance, Barker commented, "I'd be upset if somebody said we had a thousand tire kickers."

Barker, whose Dallas-based management firm ran the show for the first time this year, was pleased with the Denver show, noting it moved after two years in St. Louis. "I didn't have anybody come to me and say I (an exhibitor) have a lousy location," Barker added.

He said he expected Kansas City to be a better draw for attendance than Denver. "I just think a lot of people will drive in for the day."

Changes ahead

In an interview on the closing day of the show, SBE President Jack McKain indicated the society is considering hiring a publicist to promote the convention. Barker was in favor of the move. "With all the things that SBE has on its plate to do over the next few years, there's a story to be told."

Baker has two years left in a three-year contract with SBE to manage the exhibits.

McKain said SBE is implementing devices to improve attendance. Among the steps, he said, is building direct contact with local chapters to encourage attendance.

According to SBE, the society has approximately 5300 members in 109 chapters, of which 94 chapters are classified as active.



NAB's Rau addresses SBE attendees.

FMX and the expanded AM band. The radio was to be introduced at Radio '88 this fall but was not completed.

Sequerra is still working on the design, and Rau said he looks forward to the completion of the project. "Everybody I've talked to wants one," he said, "and I want one."

In general comments, Rau said engineers are in a unique situation in today's industry because "it is an incredibly smart asset to be technically trained."

He said he believes engineers have a growing management role. He recommended that engineers work to "be part of the management team" and strive toward further education and flexibility.

Asked if SBE would consider a combined technical exhibit with the NAB for the fall, McKain said any combined effort is premature. But, he added, that does not mean the action could not become a reality in the future.

"We are thinking of the many things

solve the problem at the NAB/SBE level first."

Rau said he was open to ideas on bringing the two shows closer together. Although he said it wasn't NAB's "number one priority," he stated "I am personally willing to discuss the possibili-



Next year the SBE will have shorter exhibit hours.

ties with SBE and take ideas to our membership to see if any further action is warranted."

McKain, however, said there will not be any immediate changes. "We have to

that are possibilities," McKain said. He confirmed there have been discussions with NAB Science and Technology VP Michael Rau.

SBE has made firm commitments for national shows through 1994. In addition
(continued on page 9)

SBE Hosts Frequency Coordination Forum

by Bill Bradford

Denver CO ... Broadcasters were updated on frequency coordination issues, including the formation of a standard forum and database work, during a panel discussion at the national SBE convention here 22-25 September.

Richard Rudman, who is past SBE president and national chairman of the SBE Frequency Coordinating Committee, was moderator. The panel was composed of Gerry Dalton of KDKA, Pittsburgh, PA, and Jeff Brothers of KRMA, Denver. Brothers is transmitter supervisor for KRMA and chairman of the Denver area frequency coordinating effort.

Dalton began the session with a report of SBE efforts and happenings at the national level. Work is in progress to form a standard forum for coordination efforts, which would be accepted by both the FCC and the NAB.

A 25-page Frequency Coordination Guide for new local area groups is being completed and will be available soon.

Industrywide council

Rudman reported that the FCC seems interested in the formation of an "all industry" council concerning frequency coordination, including the NAB and the National Cable Television Association (NCTA).

Dalton gave an update and review on the database currently used by SBE. He is the main creator and debugger of the database.

It is a compiled Clipper program, available to all who ask for it from Dalton or national SBE. He addressed several items, including new software

versions (without "undocumented features" aka bugs), changes in the fields and availability of the program.

The current version is 2.87. Dalton asked anyone interested who has an earlier version to contact him for an update.

One objective is to have all local coordination efforts using similar software so that all usage can be coordinated.

General issues

Questions from the floor focused on issues including database bugs. Dalton encouraged broadcasters to let him know of bugs.

Also during the session, SBE board member Jim Wulliman talked about a possible SBE Certification Program for satellite uplink operators. A poll of attendees showed at least 75% would support such a program.

Problems with increased usage of uplinks, with associated conflicts of use with UHF radios, wireless mics, etc., were noted. Recent space shuttle events have shown the need for such coordination.

Rudman said frequency coordination is a changing dynamic area, and communications between all parties is an important aspect. If conflicts arise, he encouraged those affected to contact the national SBE for assistance. SBE has established contacts with the FCC and has counsel to help in local problems.

For information on the frequency database, or to obtain the program, contact Gerry Dalton at 214-263-9911, or national SBE at 317-842-0836. Software is distributed by Lone Star Software.

Bill Bradford is CE for KUTV in Salt Lake City, UT.

Session Offers Advice On Surge Protection

by David C. Ostmo

Denver CO ... Seventy percent of power transients originate within a facility. Lightning and other outside sources cause only 30% of spikes. One hundred percent of all power transients can be especially harmful to digital electronics.

These were among some facts presented in a seminar on methods of surge protection at the SBE national convention here 22-25 September.

The discussion was led by Oral Evans of Control Concepts, who said power line disturbances "can cause erratic operation of equipment, degradation of components, (and) erratic operations."

The sources

A majority of transients do not enter a plant through the outside power lines, rather they are generated by equipment found at a radio station, Evans noted.

Electrical spikes can be created by fluorescent lighting, air conditioners and even photocopiers. With CDs and other digital devices becoming commonplace, he called it essential to reduce the anomalies to a minimum.

Proper grounding is the first step in controlling power line disturbances. Evans observed that it should be a good earth ground that is at the same potential as the equipment ground. Excess electrical energy will find the path of least resistance to ground. If an easy and safe route isn't provided, a new path may be created in an undesirable place.

"I have seen lightning strikes that basically have gone through concrete supports for towers trying to get to ground," Evans said. "So remember, number one, have a good ground and that will solve an awful lot of your problems."

Without proper grounding, many surge suppressors will not work effectively. "You can't clamp to something that isn't there," Evans explained.

Evans explained that there are currently several types of spike protecting devices, including MOVs, (metal oxide varistors), transformers and linear filters. No one device is totally effective against power line disturbances and each kind has strengths and weaknesses, he noted.

What's what

Evans said that MOVs are perhaps the most common type of line protection. Varistors are designed to clamp at a preset voltage. They are effective against surges. But he observed that MOVs degrade every time they conduct, saying the lifetime of an MOV will depend on the manufacturer and the amount of transients it experiences.

Isolation transformers do an excellent job of eliminating noise between the conductors and ground, according to Evans. Unfortunately, line to line surges or sags will go right through. To attenuate some of the transients, some transformers put a capacitor across the secondary.

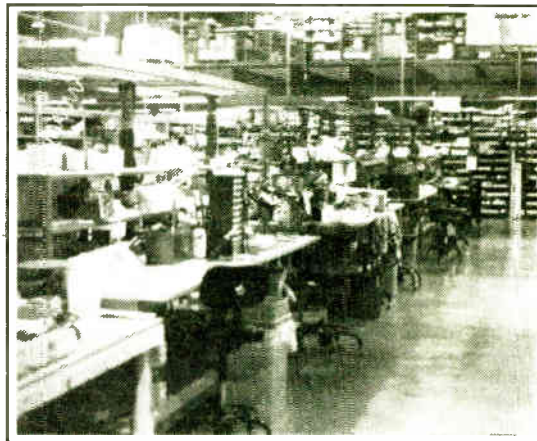
Evans said that linear filters are used *(continued on next page)*

Touring TTC Headquarters



Television Technology Corp. (TTC) opened its new headquarters, above, in the Denver suburb of Louisville, CO, to visitors during the SBE national convention. TTC moved into the 45,000 square foot facility located in an industrial park last April.

For the radio market, TTC manufactures 1 kW to 25 kW FM transmitters, a solid state 300 W transmitter, an FM translator, and AM transmitters of all power levels, to 25 kW.



An overall view of the assembly area at TTC is shown above. Work stations where circuit boards are assembled appear in right of photo.



Systems built prior to assembly of transmitters—an intermediate stage of assembly—are shown at left.

In the background is the free stock storage area, where bit parts and related supplies are kept.



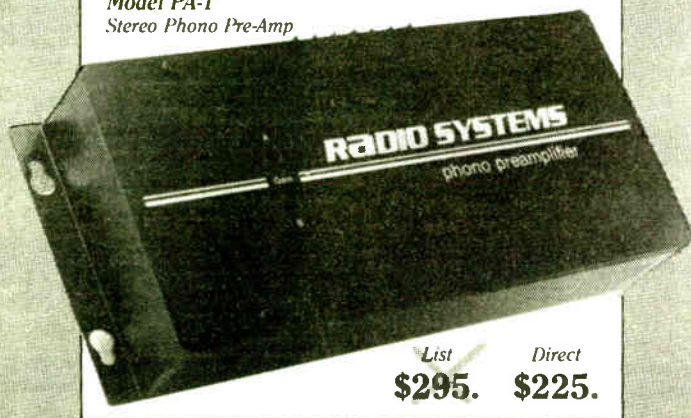
The bottom photograph shows the testing area for TTC's low power transmitter products.

On 22 August, the company announced an agreement in principle to purchase Jampro Antennas, Inc., of Sacramento, CA. The sale was expected to be finalized sometime this fall.

The recently relocated TTC employs a staff of approximately 120.

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Next Convention in the Works

(continued from page 7)

to 1989 in Kansas City, additional dates and locations are: 11-14 October 1990, Saint Louis; 30 September-7 October 1991, Houston; 28 September-5 October 1992, Minneapolis; 4-11 October 1993, Nashville, and 4-10 October 1994, Cincinnati.

In conversations with exhibitors on the floor, several indicated a concern about the number of shows and conferences in the fall and the drain on exhibitors and attendees. In addition to SBE, there is the NAB fall radio show and the IEEE conference.

"If we could put politics aside and look at what's best for the industry, I think something positive could be accomplished," said Fidelipac's Art Constantine. "I think most of us would like to see fewer shows. It makes no sense to have more shows that no one attends."

Modulation Sciences' Eric Small questioned if SBE could have a "national"

Surge Protection

(continued from previous page)

to sift out RFI and EMI that may be created by other equipment. They do not block high voltage spikes.

But he noted that the most effective protection is provided by a combination of several devices. Ideally, the protector will correct problems along the entire sine wave including overshoot and undershoot.

He said the device should have a fast reaction time since many damaging spikes are less than 200 μ sec wide with a very fast rise time.

Evans strongly suggested that a station only purchase transient suppressors that are UL listed. In some parts of the country, electricians and electrical inspectors may refuse to wire in or approve anything that is not UL approved. Should a problem develop with one that is not, some insurance companies may hesitate to pay off a claim.

A properly installed surge protector can amount to a cheap form of insurance all by itself, according to Evans. The device will prevent needless downtime by defending components against premature failure. In these days of high cost, high tech equipment, effective surge protection is no longer a luxury, it is a necessity.

David Ostmo, a former radio chief engineer, now is chief engineer at KXON-TV, an educational station owned by Rogers State College in Claremore, OK.

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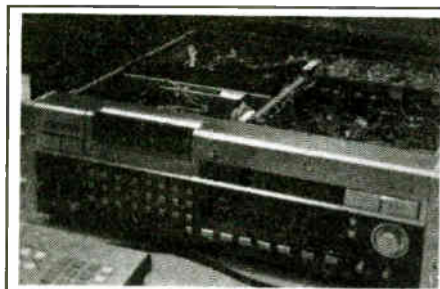


Radio Design Labs' Joel Bump, with the Stick-On series attenuator.

show unless it combines with the NAB fall radio show. "It (SBE) should remain a super regional show, and it will do very well."

Martin Burns of Harrison commented that he would like to see a combined industrywide radio show between SBE and NAB.

CRL's Bill Ammons agreed. "There



Tascam's professional DAT machine was featured at SBE.

does need to be a good grassroots, nuts-and-bolts event for engineers." He added that it needed to be "low cost" and "accessible."

Gary Crowder of Gentner Electronics called for a "good radio show" where managers and engineers could be together.

But Tim Schwieger of Broadcast Supply West (BSW) put a new twist on the subject. He suggested a joint radio show with separate exhibit floors for programmers and equipment manufacturers.

For information from Eddie Barker call 214-631-1278; Jack McKain, 505-889-0222, and SBE national headquarters, 317-842-0836.

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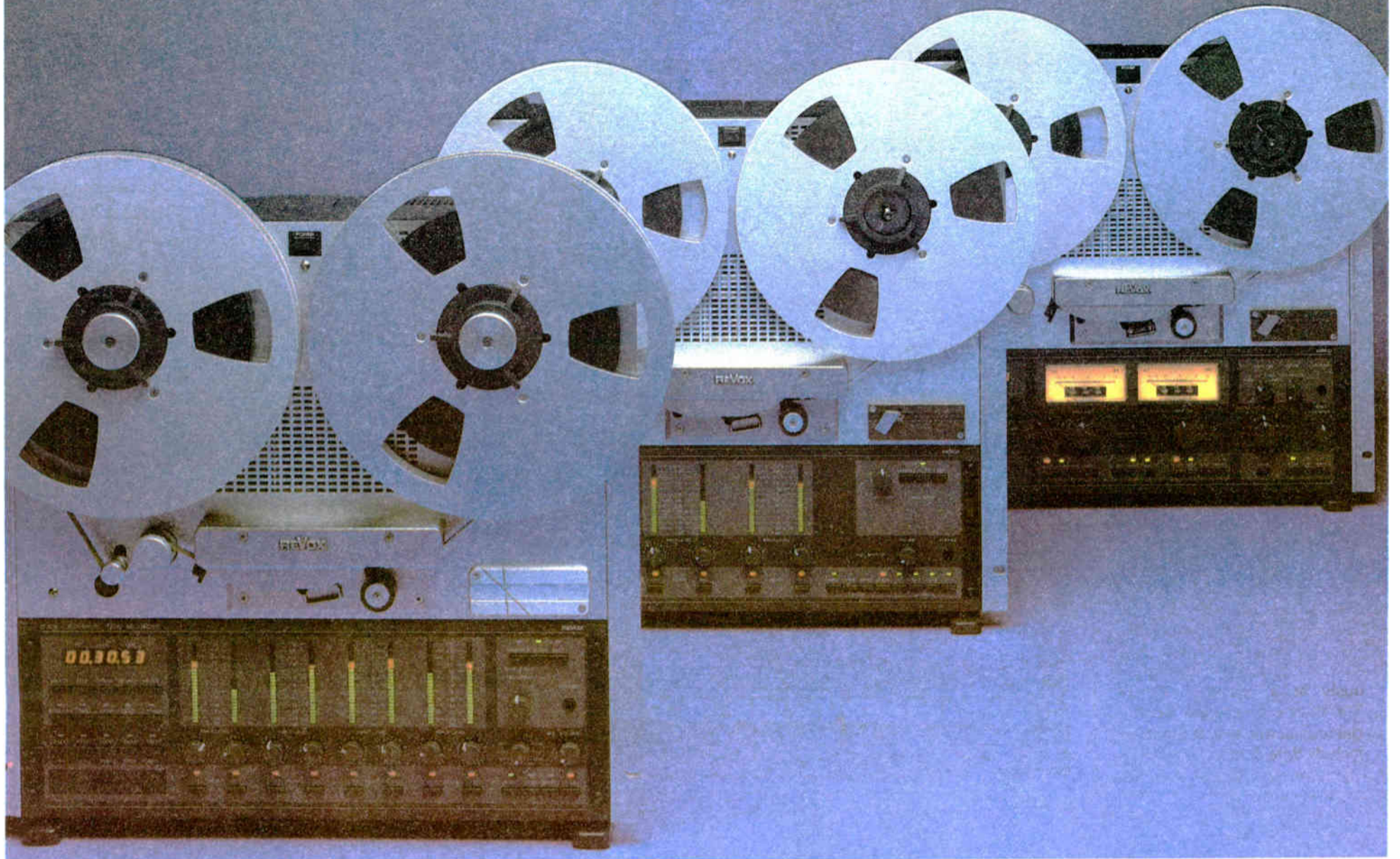
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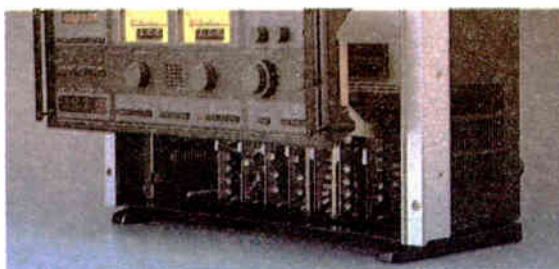
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STUDER REVOX

SBE Spans Engineering Gamut

by Tom Osenkowsky

Denver CO . . . The Third Annual Society of Broadcast Engineers national convention was held in Denver September 22 through 25.

With over 170 exhibitors, 25 hours of seminars and 22 floor hours SBE '88 can only be labeled as the biggest and best ever. The venture out west from St. Louis brought mixed but mostly favorable response from those questioned.

According to the SBE at the show close, 50% of this year's exhibitors had already signed up for next year's show.

Of great importance to today's broadcast engineer is the ability to keep pace with the ever-changing technology encountered on a day-to-day basis.

With a wide variety of topics, almost every facet of radio and television engineering was addressed in both day and evening sessions.

SCAs, boosters, etc.

For FM broadcasters transmitting SCA data, Harold Walker of Pegasus Data Systems revealed how data can now be sent at 192,000 bits per second using the new "slip-code" method.

As a matter of fact, a second channel can be used simultaneously at a reduced rate of 144,000 bits per second. Beneficial uses of this new technology include time division multiplexing of data, fax, digital SCA music, packet and E-Mail to name a few.

Omega International's Steve Broomel lectured on the applications of FM boosters. With new FCC regulations, boosters may be employed on the station's frequency to overcome natural obstructions, avoid multipath distortion and provide consistent reception.

However, boosters may not be employed, Broomel noted, to increase the coverage contours of a station. Power, antenna configuration, location and height all play an important role in the successful operation of a booster station.

Oral Evans of Control Concepts discussed the nature of power line disturbances in various forms and how new technology can deal with these factors. It was shown how both the positive and negative over/undershoot of a transient can be virtually eliminated using new suppression techniques.

Computers in broadcasting

What would a modern broadcast facility be without a computer? Russell Brown of KTSF-TV told of his applications of a Macintosh computer to daily operations at the station.

From CAD drawings for PC board layout, new studio design and video design drawings to layout of schematic diagrams, a

computer was shown to be a time and money saver.

Additional uses such as serial ES-bus troubleshooting and personnel scheduling were illustrated.

On additional applications of a computer, I presented examples of directional array design (both good and bad) and tuneup of an existing or new array using several different computer-aided methods.

In other sessions held during

the SBE convention, NAB Science & Technology VP Michael Rau discussed in detail the efforts of the NAB on several fronts. The long-awaited anti-skywave antenna project will soon be underway.

NAB also plans to make available a test CD tailored especially for the broadcaster. Such specialties as NRSC USASI weighted noise, test tones as well as a myriad of other test signals will certainly be a must for

every serious minded broadcaster.

Rau also discussed such pertinent topics as the proposed Class A power increase, NAB's new "ultimate" receiver, AM improvement and HDTV.

Doug Forde of Communications Canada discussed in detail the use of the new AM band (1605-1705 kHz). Allotments, channels, power limitations and applications procedures were some of the high

lights covered.

Maps detailing channel plans were shown and naturally, receiver availability was also discussed.

Education and issues

The role of Engineering Education was discussed in a panel forum.

Where are tomorrow's engineers going to come from? What will the role of an engineer be in the years ahead? The difficulties of hiring engineering talent and continuing education and where to

(continued on page 14)



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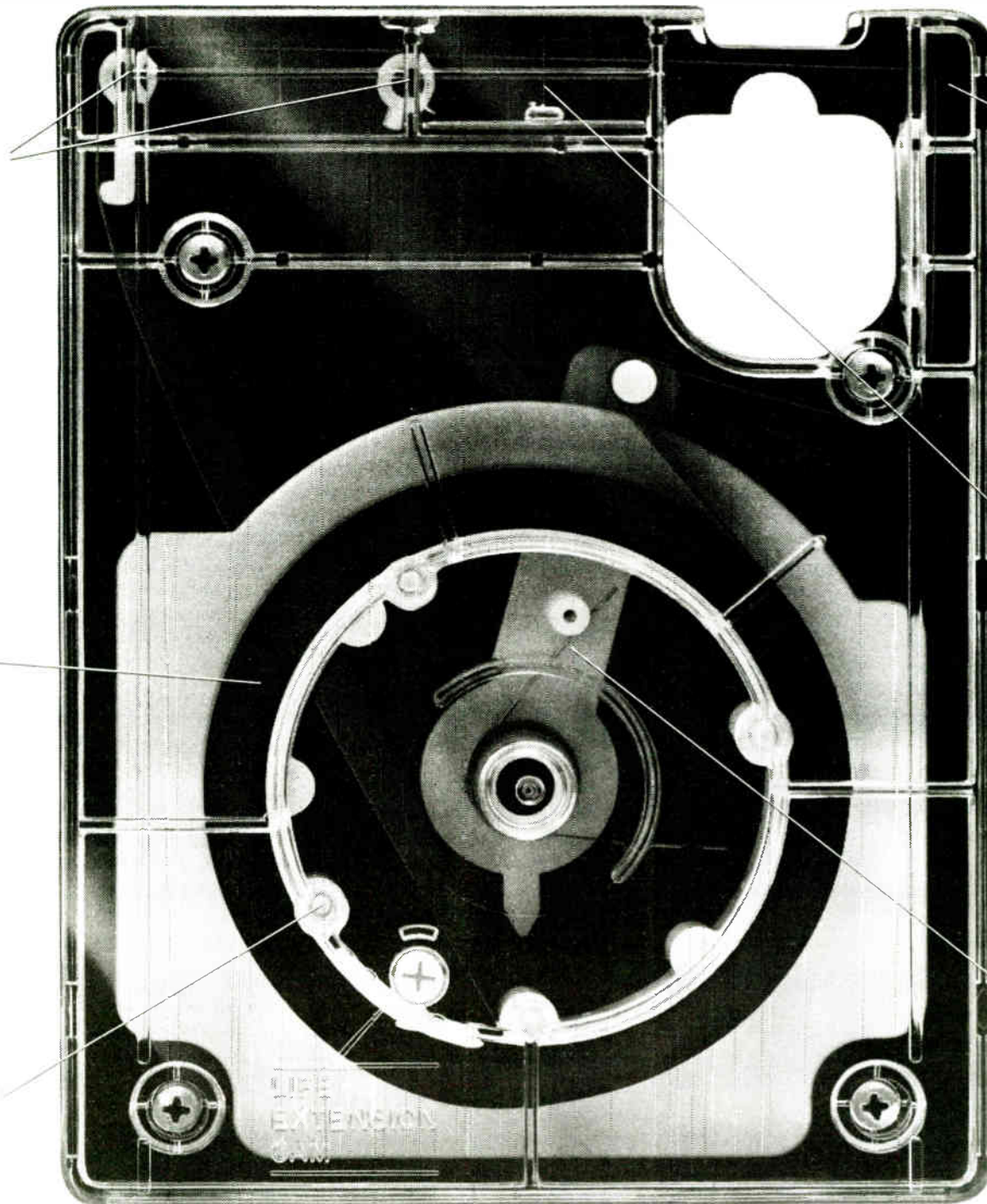
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Night Owls Focus on NRSC, AM Processing

by Barry Mishkind

Denver CO ... About three quarters of the way through the Thursday evening night owl session of the 1988 SBE National Convention, an engineer came to the microphone to ask why there had been no discussion of FM processing.

The response was a quick acknowledgement that FM processing has basically reached the point of diminishing returns.

Manufacturer Bob Orban noted that without totally crunching the audio beyond recognition, it really is not possible for most stations to "get louder."

While some stations are playing with equalization and other methods of creating a "different" sound, there seemed general agreement that, for now, FM processing was a quiet field.

On the other hand, AM processing has several aspects of great interest to engineers and stations. The panelists, Bill Ammons of CRL, Andy Laird, KDAY, and Dane Ericksen of Hammett & Edison, all had a very positive report on what is happening.

Especially interesting was the report by Andy Laird on how the implementation of the NRSC curve helped two stations in the Los Angeles market go from no coverage in certain areas to good coverage.

The discussion had much in common with a report delivered at the spring NAB show by Tom McGinley of Cook Inlet stations and Richard Mertz. Each has a station in Maryland, and they happen to be second adjacents located in close proximity.

Their report showed how the NRSC helps second adjacent interference.

Using pictures from a spectrum analyzer, Laird showed how with simultaneous use of the NRSC curve, KDAY and KMNY, also second adjacents, were able to not only coexist, but expand their service areas.

KMNY, while basically a talk station, utilized the Kahn Powerside™ system in addition to the NRSC curve to provide an additional measure of apparent separation.

Several comments indicated that the NRSC curve implementation is, in fact, having a good effect on AM reception in a number of markets.

The ability to reduce sideband hash and actually provide an increase in service for AM stations is just one of the major benefits of the NRSC efforts. Providing an incentive for manufacturers to develop better receivers is another.

Many AM broadcasters are hoping that will bring high quality AM audio to consumers before too long.

Dane Ericksen called attention to the progress of the NRSC curve into its current two facets, the NRSC-1 audio standard and the NRSC-2 emission standard or "RF mask."

It is important, Ericksen said, that engineers make their thoughts known to the FCC in its Notice of Proposed Rulemaking, Docket number 88-376.

Initial comments can be filed by stations or individuals until November 22, 1988, with reply comments due by December 22, 1988.

In this proceeding, the FCC favors the transmission standard over the audio standard. However, the Commission has included a provision allowing stations using the NRSC-1 audio standard a

presumption of compliance with the proposed emission bandwidth standards.

Bill Ammons noted that there were several low cost ways for stations to implement the NRSC curve, in many cases just a few hundred dollars. Building "home brew" filters would not do the job, he said however, due to the tightness of the standards.

There was agreement that a few hundred dollars was a very small price to pay for the benefits shown already, as well as those promised just ahead. In some cases, stations were offering to buy and install it in adjacent channel stations as a good neighbor gesture.

Barry Mishkind, aka RW's "Eclectic Engineer," is a consultant and contract engineer in Tucson, AZ.

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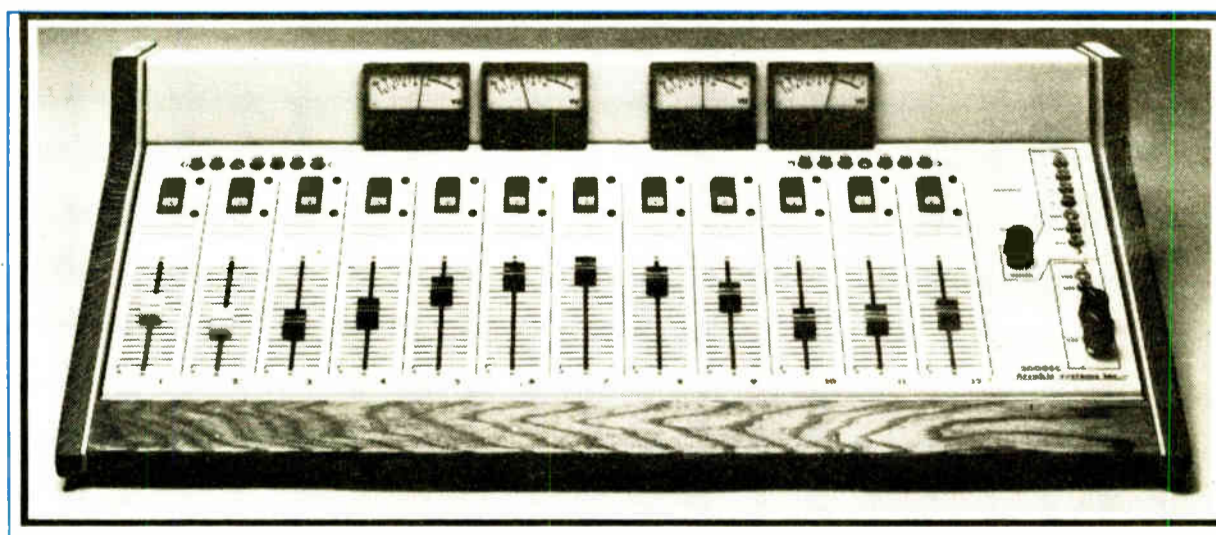
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Sessions Cover Timely Topics

(continued from page 11)
find it were discussed.

David Harris of Purdue University was the panel chairman, and panelists were Larry Titus, president of Titus Technologies, Skip Pizzi of National Public Radio, Roy Pritts of University of Colorado, Harry Tompkins of Hocking Technical College and Jim Wulliman, SBE certification chairman.

An in-depth look at the issues facing regulation and licensing of engineers in the telecommunications field is an issue which affects every engineer.

The issue came to light in a recent NARTE newsletter. SBE President Jack McKain informed the membership that SBE plans to individually petition the

FCC for federal exemption on this matter, thus allowing broadcast engineers to be excluded from any individual state regulations.

Discussion on a yearly standard calendar for the National Convention was also held and chapter awards were also announced.

Processing

Thursday's night owl session focused on NRSC-1 and NRSC-2 standards.

For those not convinced of the benefits of NRSC, Bill Ammons of CRL, Dane Ericksen of Hammett & Edison, Andy Laird of KDAY and panel chair Don Borchert explained in detail how mutual interference problems can be solved and

how additional loudness can be achieved since unwanted sideband power isn't wasted on the upper audio frequencies.

Laird presented a real-world example of how NRSC solved two station's interference problems and both benefitted from increased listenership.

signs.

FM licensing related matters were addressed by Robert Greenberg of the FCC. Greenberg reviewed the current timetable for applications and gave pointers as to how one can minimize delays in filing.

On the AM side, John Sadler also with the FCC, addressed the topic of full and partial proof-of-performances. Sadler explained what is required in each type of proof and when a proof is

With a wide variety of topics, almost every facet of radio and television engineering was addressed in both day and evening sessions.

The two sides of the FM directional antenna issue were presented by Ralph Evans, Jr. of Evans Associates. Exactly what constitutes a directional pattern and working examples of "non-directional/directional" patterns were shown.

Differences between the Vpol and Hpol patterns due to mounting structures were illustrated and the hows and means of an efficient directional FM antenna were explained.

Ron Nott of Cortana Corp. detailed the development and makeup of an AM directional antenna field. The basics of pattern shape and vector makeup were reviewed, giving a good concept of the radiation field which is otherwise invisible to the naked eye.

Nott also explained the effect of element stacking as used in FM and TV broadcasting and gave some insight into "anti-skywave" antenna de-

required.

On the subject of AM DAs, Saturday's night owl session focused on the practical aspects of maintenance and operation. Ed Edison of Hammett & Edison, the session chairman along with Ralph Evans, and John Sadler covered a wide variety of problems and solutions pertaining to DAs.

This was an excellent opportunity to ask the experts about a particular system.

With radio sessions held on Thursday, TV on Friday there was ample time for every attendee to explore the exhibit floor at leisure.

In all, it was an excellent job of coordination on behalf of the SBE and a job well done on the timely and important topics covered in the sessions.

Tom Osenkowsky is a radio engineering consultant and a regular RW columnist.

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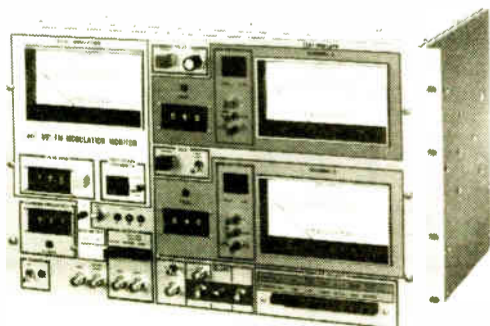
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Reflections on SBE in Denver

by George Riggins

Denver CO ... The Denver skyline has changed considerably since 1942, the last time I had the opportunity to walk around the town.

Few familiar landmarks remain: the State Capital building, the Brown Palace Hotel with the "old fashioned" sitting lobby and charming ladies to get something from the well-stocked bar, the Denver Dry Good Store and the Cook Clock Tower.

First impression of the SBE convention floor was good. The open, well-lit auditorium was welcome. There was no maze of pipes and wires to make one think that he was in the sub-basement of a large building in an area not open to the public.

My only negative thought to the floor

layout was the long orphan row of displays adjacent to the food and beverage area.

Understand that a few of the exhibitors had requested space adjacent to the food/beverage area thinking that there would be good floor traffic. Hope the decisions were correct.

What of the future?

As for the technical part of the program, especially pertaining to the engineer of the future—*We have met the enemy, and he is us.*

We talk to each other about what we should charge for our services or what should be done. But do we talk to the people who are going to buy the services or require the services?

There is no incentive to require our services. FCC has done away with the

need for "minimally" qualified personnel, and since there is no need for a station to hire a licensed person, why bother? It is only money.

As a consequence, there are no entry level positions for anyone who is interested in the technical side of broadcasting.

Yes, I have traced the progress of technical people from the first time a piece of equipment was fixed by accident in order to stay on the air, to moving up through a succession of stations until working in a major market.

About 5% of the aspiring DJs found steady and more rewarding employment as technical people than as entertainers.

The brain drain

Now it is much easier and more rewarding to fix computers, install tele-

phones, service copy machines or work in the aerospace field.

How do I know? A young cousin is married to a computer technician who has the privilege of living and working a couple of hours west of Denver and has only to keep the computers in grocery stores, banks, S & L's and a few other business establishments working and makes more than the majority of those working under the best of union conditions in our industry.

No program director or disk jockey to complain about another station being louder: "They sound better in my automobile" (a factory installed receiver and 5x9 speakers in the doors) or "Why do we need a new tube," and so forth. There are many more comments that each of us has heard and most are not printable.

But the question remains: Where do we obtain the next generation of technical people? There are plenty of interested young ladies and men out there.

What incentive is there for these young men and ladies to enter the technical end of entertainment? As far as I can tell, there is none.

No pay, no entry level work, no glamour and no way to start out in the boonies or tank towns as they were called in the days of the Orpheum Circuit.

There are those stations that could provide an entry level position or training for the interested high school or community college student in exchange for sweeping the floor or otherwise helping after school.

But the excuses I have heard include, "union rules won't let me have anyone other than qualified union members" and "insurance provisions preclude me

(continued on page 21)

Pirate Plans Return to the Airwaves

(continued from page 1)

the radio signal violates international communications treaties.

Court to decide

A hearing in Boston was scheduled for 20 October, in which a federal judge was to decide whether to issue a restraining order against the station as sought by the FCC.

Dubbed Radio New York International (RNI), the station's first on-air effort lasted four evenings, 23 to 26 July 1987, playing primarily vintage rock'n'roll music. It was broadcast on four frequencies, according to Allen Weiner, one of its organizers: 1620 kHz and 103.1 MHz at 5 kW, long-wave frequency 190 kHz and in the 6 MHz region on shortwave.

As a result, Weiner and fellow organizer Ivan Rothstein, along with a *Village Voice* reporter, were arrested and the signal ceased. The two founders were charged with operating an illegal station, each facing a maximum sentence of five years in prison and a \$25,000 fine.

Since then, however, all charges or threats of charges have been dropped, according to Gutman.

The charges were dropped because of doubts about whether or not the broadcasts had a malicious intent, according to

Richard Engelman, chief of the inspections and investigations branch of the FCC's Field Operations Bureau. He said the Commission issued an "extremely strong warning" instead.

New ground

If it indeed does receive court approval, the return of RNI would set a precedent for those in the broadcasting industry, according to Gutman.

"The entire broadcast industry and the government's attitude toward it just have to be rethought," Gutman said. "A statement was made 60 years ago when it was set up in this way and it's time for some correction.

"I'm not suggesting that it's appropriate to snatch places on the band away from people that are using them, but I am suggesting that at least in those places that are not being occupied and that are means of communication, the First Amendment requires that they be available," he added.

Not true, replied the FCC. "It's the same thing we told them and the US attorney told them last year. Broadcasting as they propose to do it is against the law," said Engelman.

"US law precludes the broadcasting within our territorial bounds but also the

law requires the compliance with international treaty and international regulations," Engelman noted.

"International law says that one may not broadcast from international waters. Our position is that the law is quite clear on this matter and they will be barred from going back on the air," he added.

However, Randi Steele, operations manager of RNI maintained that because the ship is beyond the three-mile territorial limit of the US, it is not bound by Commission standards.

For more information, contact Richard Engelman at the FCC, 202-632-6345; or Jeremiah Gutman at 212-807-9733.

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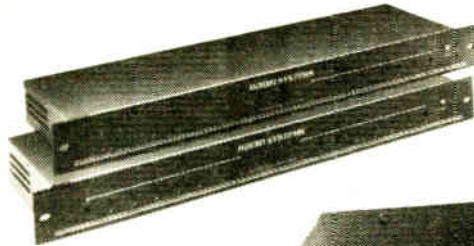
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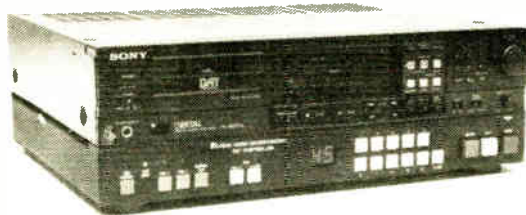
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Recreating Radio's Glory Days

by Frank Beacham

Los Angeles CA ... Some odd items began arriving during the early morning hours at Studio A. First there were the boxes of sand, then a metal grocery cart full of large palm tree branches. Next came the giant, murder weapon-size meat cleaver, the tire on the crates, the tin cups and the big framed wooden door that led to nowhere.

To some it all appeared to be junk. But to master sound effects expert Bud Tollefson, the man who provided sound images of Fiber McGee's legendary overflowing closet in "The Golden Days of Radio," these were the tools that put magic into radio drama.

On this special day in 1988, Tollefson, aided by assistant David Krebbs, was back in a radio studio preparing for one of his most ambitious dramatic projects in more than 30 years.

A treasure

In a room next door, some of the elite of radio drama were beginning a cold reading of a new script of Robert Louis Stevenson's tale of high adventure, *Treasure Island*. Many were working together for the first time in 40 years.

Dan Herlihy, the off-beat Irish leading man of radio, stage and film, was the

narrator. Veteran actress Jeanette Nolan played Mrs. Hawkins and Sean McClory, most recently in John Huston's film, *The Dead*, became Long John Silver.

Character actor Parley Baer, known as Ozzie Nelson's TV neighbor "Darby" and radios' "Chester" for nine years on *Gunsmoke* was cast as Dr. Livesey.

Keeping the group happy was the job of Peggy Webber, a veteran actress, director, producer and writer, who appeared in 21 network radio dramas each week during the heyday of radio.

Richard Wilson, a member of Orson Welles' Mercury Theatre company and an actor in the original *War of the Worlds* broadcast, directed.

The show

As the actors read their parts aloud, novice observers in the room were amazed at the speed with which they develop the characters. For *Treasure Island* there was a single reading, no more.

The studio is located in the George Lucas Cinema/TV complex on the campus of the University of Southern California.

It was donated by USC's classical FM radio station, KUSC, which would air the 90-minute production as "an experiment" in radio drama.

All other costs of "Treasure Island"

were borne by Webber, who planned to use the program as a pilot to launch a new national series of radio dramas under the banner of California Artists Radio Theatre.

Though future programs will be aired live, this first production was taped.

The mixing and engineering skills required for dramatic effects in an improvisational setting is demanding and the learning curve took some time.

"We went through six engineers before I found one who had real experience in radio drama," Webber said. "The main problem we had was finding engineers accustomed to improvising. Most were used to routines and wedded to computers. The engineers we used to work with were much more daring. Post-production was a frustrating process."

The event

The 24 September airing of *Treasure Island* was a major event for KUSC.

Several actors from the show as well as other well-known figures from radio gathered at the station to listen to the broadcast and to participate in *The Making of Treasure Island*, a live interview program that aired following the drama.

"It was like being reborn," said actor Baer. "It was as though the curtain had never gone down on radio. I think radio



The ensemble from KUSC's production of *Treasure Island* gathers for a run-through of the radio script.

is the ideal medium for an actor because if a million people are listening you are giving a million different performances."

Actor Lou Krugman shared the enthusiasm. "We did this kind of thing where we painted pictures with words for so many years, and it's an era that's gone. Having it come back was like looking at a ghost ... and it comes to life again."

Audience response to *Treasure Island* overwhelmed the station. "The lines were flooded like we've never seen them," said Peter Rutenberg, KUSC's production and programming director.

Rutenberg said many other stations claiming to do radio drama are in fact doing "animated readings" without the extensive music, sound effects and acted parts of authentic radio drama.

"This program was produced with exactly the kind of production values that would have been used 40 years ago with, in many cases, the same people who had done it 40 years ago," he continued.

"I think the audiences are burning out on the so-called 'cool' medium of television ... people need to feel more involved in what they are doing," he said.

Radio Reform May Mean Concessions

by Alan Carter

Washington DC ... Radio-only license renewal legislation may not be limited to only one issue.

If radio broadcasters hope to get a bill through Congress that would separate radio and television when it comes to license renewal, broadcasters may have to accept some additional requirements. That is according to several members of a House committee and subcommittee where broadcast legislation originates.

Addressing broadcasters at a session on license renewal reform at NAB's Radio '88 convention were Reps. W.C. Tauzin, (D-LA), Thomas Tauke (R-IA), Dan Coates (R-IN) and Rick Boucher (D-VA), all members of the Telecommunications Subcommittee. Also participating in the discussions was Rep. Terry Bruce (D-IL), a member of the House Energy and Commerce Committee.

The Congressmen told radio broadcasters that Congress would not take kindly to radio-only reform until the fairness doctrine becomes law—an issue that the broadcast industry is fighting.

"It's clear most of us are unhappy with the comparative renewal process," said Bruce. He supported a two-step process by which competing applications would be accepted if renewal applications were rejected. "But you're not going to get that without talking about other issues that affect broadcasting, particularly the fairness doctrine," he added.

Bruce, however, noted some reservations in separating radio and TV issues on Capitol Hill. "You've got a very good ally in television," he said. Radio-only legislation would divide a strong industry, he added.

He said he would support the move but added, "If you do it, do it right the first time." The industry must "have all the bells ringing," he said.

Tauke also questioned broadcasters about the ramifications of separating radio and TV on widespread issue such as hiring practices, minority ownership, children's programming, the fairness doctrine and minority programming. As it stands now, he suggested radio is not at the forefront and is "lost in the stray" of television.

Other legislators also pointed to the fairness doctrine when talking about radio-only reform.

Tauzin said the "price" for separating the two mediums in the license renewal process may be acceptance of the fairness doctrine.

Coates noted that broadcasters may have to accept the fact any radio-only reform may have to be tied with the fairness doctrine even though a case has been made in favor of the reform proposal.

For information on radio-only renewal from NAB, contact the government relations department at 202-429-5301.



US congressmen address the issue of radio-only reform.

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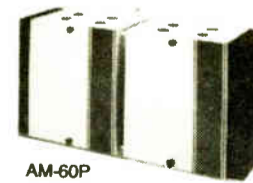
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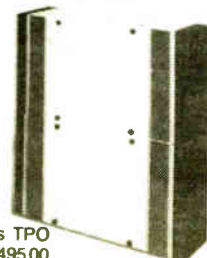
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Radio Shows Should Cooperate

(continued from page 5)

cluded a merger of the exhibition activities of the two conventions while keeping the NAB and SBE meetings separate.

While this proposal is attractive to exhibitors wishing to minimize show expenses (and I have a personal respect for that concern), the two conventions' requirements and "characters" are not compatible.

To say, "Keep up the good work!" is generally our position; however, there is one area of compatibility where cooperation between these two organizations would yield improved use of resources and a better convention for attendees and exhibitors.

After exhibiting at both shows and at-

By Working Together on Seminar Planning, Both NAB and SBE Events Might Be Better Focused

tending some of the technical presentations, it seems clear that the agendas of seminars could be better aligned to match the respective audiences.

With the bulk of the Radio '88 registration being station management personnel, sessions on such topics as sales management, profitability, accounting procedures, programming and the like seemed well suited to the crowd.

However, sessions of a more technical nature, such as the discussions of digital audio processing, directional an-

tennas, etc., might be moved to the SBE venue.

We would like to see the NAB meet with the SBE with a goal of cooperation and the exploration of mutual interests.

It is easy to visualize a win-win scenario in which the NAB could move its radio engineering seminars to a larger engineering audience (thereby expanding the NAB's influence and image) and could inform its members of the availability of high value sessions at a lower cost venue.

The SBE could benefit from the cooperation and the publicity clout of the NAB, together with a greater general value of its seminar package. NAB's Office of Science & Technology could have a booth at SBE and vice versa. Exhibitors and the exhibitions would benefit since each convention would be better focused to the interest of its attendees.

Jack Williams is President of Pacific Recorders & Engineering Corporation and a founding member of the Exhibitors' Advisory Committees of both the spring NAB Convention and the SBE National Convention.

Readers Forum

(continued from page 5)

just wouldn't work very well.

Cut the bandwidth in half and you sacrifice 6 dB of what wideband FM is all about, excellent signal-to-noise ratio. You say goodbye to stereo quality as we know it, and to subcarriers (entirely).

The proposed system would be incompatible with conventional stereo receivers in terms of pilot level and other standards, with digital receivers as to channel spacing, and with all existing receivers in terms of selectivity.

To the best of my knowledge, except for moving the existing handful of pioneer FM stations to 88-108 Megacycles about 42 years ago, when FM receivers were still rarities, the Commission has steadfastly refused to render existing radio or television sets obsolete for any reason.

Apart from considerations of whether or not the marketplace can withstand being cut into 5000 more slices, this is hardly the time to propose a quality-degrading system. Rather, let's talk about quality enhancements, such as FMX, to more fully transmit the amazing fidelity of CDs and other digital recording media.

Transferring all subcarrier services to stations (yet to be constructed) in another band would entail scrapping all existing SCA receivers and creating hardship for reading services and other subcarrier clients for whom specialized receivers are a major investment.

Certainly, too, many a station in the existing FM band would be most reluctant to relinquish its SCA rental income.

Of course, the plan definitely would also wreak havoc with the existing allocations scheme. It's not so simple!

Contrary to Mr. Barry's allegation, TV stations transmit only mono audio, but not stereo, with ± 25 kHz deviation. Those in stereo are allowed nearly triple this amount.

Truly, there is no free lunch.

Rick Levy
Broadcast Signal Lab
Cambridge, MA

Editor's note: RW does not apply technical critique to letters which appear on this page. Readers Forum is just that, a "forum" for our readers to discuss the merits or faults of industry ideas among themselves.

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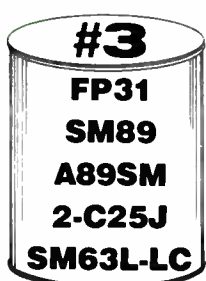
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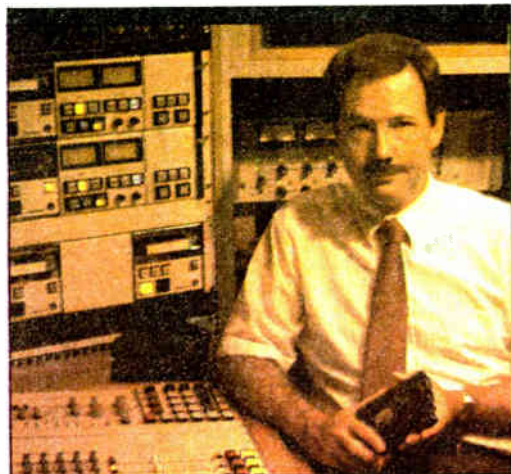
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Passing Thoughts on the SBE

(continued from page 15)

from having anyone not covered by regular employment working on equipment where there is any exposure to injury or damage to the equipment."

Word from the schools

Yes, there were presentations by F. David Harris, PE from Purdue University and Harry Tompkins of Hocking Technical College on the programs that each institution has for training technical personnel but why go to entertainment industries when the same knowledge and experience will open the doors in other more rewarding—monetarily—fields.

I know of other programs at the community college level but I do not recall more than a few students who actually went into broadcasting, even after two to four years of hands-on experience in college FM stations.

For one reason, many of the community college stations finally hired professional engineering managers and then proceeded to hire experienced technicians for reasons that were not always obvious. After graduating with a degree in engineering from the four year col-

lege, another industry was more challenging and rewarding.

One more negative thought. Purchased the *Proceedings of the 1988 SBE & Broadcast Engineering Conference* anticipating finding the facts and figures quoted by David Harris that were derived from his recent survey of several hundred respondents to his mailed questionnaire. The figures were not included with his paper as printed.

Understand that some of the contract engineers started mentioning figures in a round table discussion on contract engineering. *Not to be done!* This could be considered price fixing by some. Maybe OK to say "this is what I charged" to a direct question regarding a specific job, but be careful.

Around the convention floor

Took the time to listen to a factory demo of sound processing without the press of bodies that is always present at the spring NAB. Very impressive to be able to listen to all of the competitors' equipment at one stop.

It seems that on the old Sherwood Tuner and Amplifier with 6L6 tubes, the switch was called "presence." The sound

was not the pleasant mellow sound that I grew up with. I never used the presence switch on the tubed equipment and the sound is still not pleasing to my ears.

Guess I listened to too much of the oldtime Big Band style of arrangement that was broadcast using at most three microphones, two for the band and one for the vocalist. A couple of techies I respect said that in their opinion "processing is a dead subject."

Interested in the comments made to me by Steven Kravitz of Motorola Inc. My unscientific market survey led me to the conclusion that about 10% of the AM stations were in stereo.

Steven tells me that the survey done by Motorola indicates that almost exactly 10% of the stations have converted. Those stations who have converted cover about 96% of the potential listening audience of the US.

I thought I detected some pessimism in Steven's remarks as to the future of AM stereo. Hope not. Motorola was offering an in-dash AM stereo receiver at a ridiculous price.

Steven reported that Chrysler is going to install nothing but AM stereo/FM stereo receivers starting with the 1989 model year cars.

Ford is reported to offer either as standard equipment, or as an option, AM stereo in most of their vehicles. GM has it available as a factory option for most of its automobiles and standard equip-

ment on a select few.

Between 25 and 30 manufacturers are now offering after market receivers for AM stereo. Whether all the receivers will decode all modes of AM stereo or not is a good question. *Caveat Emptor!*

Broadbanding needed

Ron Nott of Cortana mentioned that we must not forget that any coupling network as well as the antenna itself must be broadbanded to get good AM stereo signals out.

Ron reports that several hams have started him experimenting with the possibility of producing a kit so that those of us who live on city lots can get on 160 meters. More on this subject as it becomes available.

Speaking of hams, I hope that I was the only one who thought that the Ham Reception at the SBE convention was a bust! No reason for a ham to come out of the woodwork.

As I remember St. Louis in 1987, I gave out two tickets to each person attending the reception.

One was for the door prizes, and the other was for one round of attitude adjustment at the bar. Did someone forget to see how Chuck Kelly did the St. Louis affair, or was there just an oversight by the Denver committee?

George Riggins has experience in radio and electronics dating back to the 1930s. He is also a licensed ham operator and has had his own broadcast sales and service company, Riggins Electronic Sales, for over 20 years. He can be reached at 213-598-7007.

FCC Plans New AM Rules

(continued from page 3)

would provide a "more accurate picture of what this (the AM) service looks like." The end result, he continued, would enable AM to better compete in the competitive radio market.

Mass Media Bureau Chief Alex Felker said the proposals would not change service areas but would give a more accurate picture of "how coverage is depicted."

Minimum power

In one of the proposals approved for comment, the FCC would allow Class II-S and Class III-S AM stations to establish a separate nighttime antenna system without having to meet the minimum power, city coverage or minimum operating schedule requirements that otherwise would apply to such a change in their nighttime operations.

The Commission sought comment on permitting full-service Class II and Class III stations to voluntarily reduce power below the 250 W minimum power.

The proposal also considered allowing stations to move their transmitters into the coverage area for nighttime operations, according to Felker.

A second rule making the FCC released would replace existing AM broadcast skywave propagation curves with a new propagation model recently developed.

The new model is a result of recent scientific analysis of skywave measurement data that gives a better understanding of field strength in AM, providing a more accurate depiction of the service and interference relationships between AM stations.

One point addressed is changing the reference hours for calculating skywave from two hours after sunset to six hours after sunset, Felker said.

A third area the FCC addressed would revise the methods for calculating the protection afforded to nighttime AM stations.

Nighttime RSS calculations

The Commission proposed modifying its rules that relate to the calculation of nighttime RSS skywave interference levels to the protected groundwave contours of Class II and Class III AMs, and

the skywave service contours of Class I clear channel stations. The Commission also sought comment on including adjacent channel skywave signals in such calculations.

Specifically, Felker explained, the Commission would drop the exclusionary method from 50% to 25% for co-channel stations.

A final proposal the FCC issued would replace the existing groundwave propagation curves with new curves recently developed. The new curves are derived from analytical techniques that overcome mathematical deficiencies associated with the existing curves.

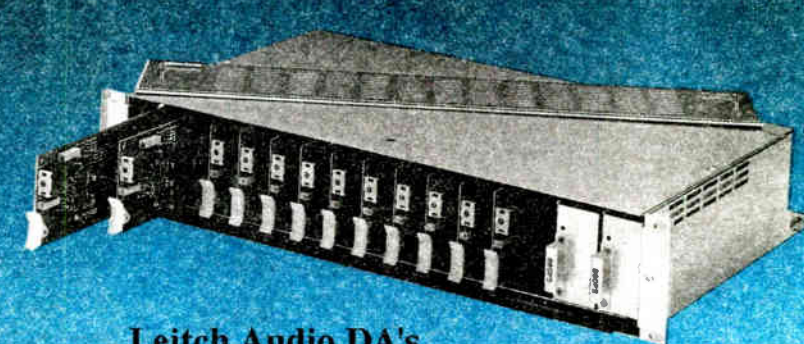
Deadlines for comments had not been established at press time.

For further information on the proposals, contact Diane Hofbauer at 202-254-3394 for Class II-S and Class III-S; Wilson LaFollette at 202-632-5414 for calculating AM nighttime protection, and Larry Olson at 202-632-6955 for groundwave and skywave calculations.



Commissioners Quello (l), Patrick and Dennis hear plans for the new AM rules.

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How to Use Special Purpose Mics

by Bruce Bartlett

Part III of III

Elkhart IN ... In the last two issues we explained microphone specifications to help you select an appropriate microphone for your particular broadcast application.

Let's conclude by covering special-purpose microphones and accessories. Also, a microphone applications chart is offered to help you narrow down your choices.

Several microphones are intended for special purposes. These are boundary microphones, miniature microphones, and stereo microphones.

Boundary mic

This unit is designed to be used on surfaces such as a floor, wall, table, piano lid, baffle or panel. It includes a miniature electret condenser capsule mounted face-down next to a sound-reflecting plate or boundary.

Due to this construction, the microphone diaphragm receives direct and reflected sounds in-phase at all frequencies, avoiding phase interference between them.

The claimed benefits are a wide, smooth frequency response free of phase cancellations, excellent clarity and

"reach," and uniform frequency response anywhere around the microphone.

In the studio, a boundary microphone is typically taped to the underside of a piano lid or to the wall for pickup of room ambience. It can be used on hard baffles between instruments.

Boundary microphones are also available with a unidirectional pickup. They have the benefits of both boundary mounting and the unidirectional pattern.

Such microphones are well suited for lecterns, conference-table miking, stage-floor pickup of drama or musicals and news desks (if paper noise is not excessive).

Miniature condenser mic

The clip-on or lavalier microphone that newscasters wear is a miniature condenser type. It comes in either an omnidirectional pattern or unidirectional pattern.

The omni pattern is less critical for placement and has less pickup of clothing noise and wind noise. The uni pattern reduces pickup of studio noise and gives tighter sound.

Some mini lavaliers come in dual (redundant) designs so that you have a backup if one mic capsule fails on the air. Miniature condenser units also can be

used for musical applications. They can be attached to drum rims, flutes, horns, guitars and so on. The sound quality is on a par with larger studio microphones.

With these tiny units, you can mike a live band for recording or broadcast without cluttering up the stage with boom stands. One or two mini mics can cover a small drum set.

Stereo condenser mic

A stereo microphone combines two directional mic capsules in a single housing for convenient stereo recording. Simply raise the microphone about 15 feet on a stand, place it about 10 to 15 feet in front of a band, choir or orchestra, and you'll get a stereo recording with

little fuss.

Since there is no spacing between the mic capsules, there also is no delay or phase shift between their signals.

Consequently, stereo microphones are monocompatible: the frequency response is the same in mono and stereo. That's because there are no phase cancellations if the two channels are combined.

Taking into consideration the various microphone characteristics mentioned in this series, the chart printed here is a microphone selection guide based on your requirements.

Find all your requirements in the left-hand column. For each one, read across horizontally to determine the recommended microphone characteristic.

Write down all the recommendations to describe the microphone best suiting
(continued on page 28)

Table 1. Microphone Applications Chart

Requirement	Recommended Mic Characteristic
Natural, smooth tone quality	Flat frequency response
Bright, present tone quality	Rising frequency response
Extended lows	Omni condenser or dynamic with extended low-frequency response
Extended highs (detailed sound)	Condenser
Boosted bass up close	Single-D directional mic
Flat bass response up close	Omnidirectional, multiple-D cardioid, or single-D cardioid with bass rolloff
Reduced pickup of leakage, feedback, and room acoustics	Unidirectional, or omni up close
Enhanced pickup of room acoustics	Omnidirectional, or unidirectional farther away
(1) Miking close to a surface	
(2) Inconspicuous mic	Boundary mic or miniature
(3) Moving source mic	
Coincident or near-coincident stereo	Two unidirectional mics or stereo mic
Extra ruggedness	Moving coil
Reduced handling noise	Omni, or unidirectional with shock mount
Reduced breath popping	Omni, or unidirectional with pop filter
Distortion-free pickup of very loud sounds	Condenser with high maximum-SPL spec, or dynamic
Noise-free pickup of quiet sounds	Low self-noise, high sensitivity

Consider the Facts Before Remodeling

by David Hebert

Pasco WA ... Pulling failure out of the jaws of success seems to be a most common occurrence during station expansion/remodeling projects being undertaken these days.

When the project is initially conceived, careful consideration must be given to results one expects to derive from these efforts.

For example, "will this power increase realistically result in a better signal in XYZ city?" or "will this new control room remodeling help the operators perform their job better while improving our amsound?"

So many times I have seen these questions asked after the fact; which is to say that the results that were obtained were not worthy of the effort spent to achieve them.

Unfortunately, this stark reality was greeted in an atmosphere of frustration and bitterness. Many times, the unsatisfactory results could have been prevented by allowing a competent third party review the anticipated project and provide input.

Consider the facts beforehand

An approach that a third party might take in evaluating a project involving relocating an FM transmitter to another site might consider, among other things, the possibility of multipath.

Other items considered might include possible shadowing into potentially important service areas, suitability of proposed equipment chosen, reliability of power service to the new location, his-

tory of vandalism and routine site accessibility on a 12 month per year basis.

One might also consider if the site chosen would be too high above the populated area to allow the use of multi-element antenna arrays and their sometimes limited downward radiation patterns.

A studio reconstruction project might be commenced with questions like, "Will this new console have sufficient inputs and outputs for our operation?"

or "Can we design the equipment arrangement to allow a minimum amount of work for the operator on duty?"

One must consider if, after the initial installation, all the regular input capacity is expended so additional sources cannot be added when necessary.

Second stage

As the project continues the early stages of goal planning then proceed into the second level—acquiring parts and equipment. At this stage, it is a wise idea for the planner to rehearse in his mind the construction scenario as many times as possible.

If this person hasn't any experience with the type of project, then it's a wise idea to discuss this planning with someone who has been through it all before.

At this point, questions should be asked that might range from, "Will this remote control system be compatible with our STL?" to "Does this console require any special preamps for the turntables?"

It may seem silly to mention, but don't
(continued on page 28)

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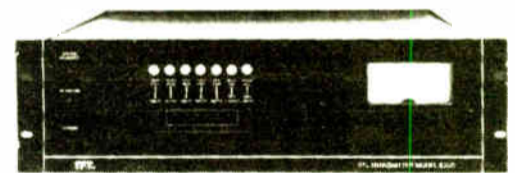
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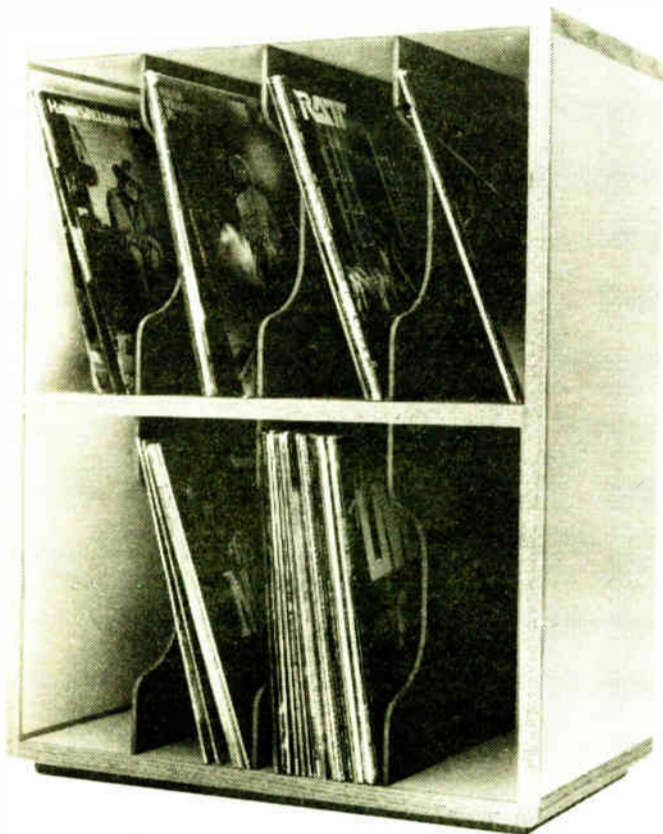
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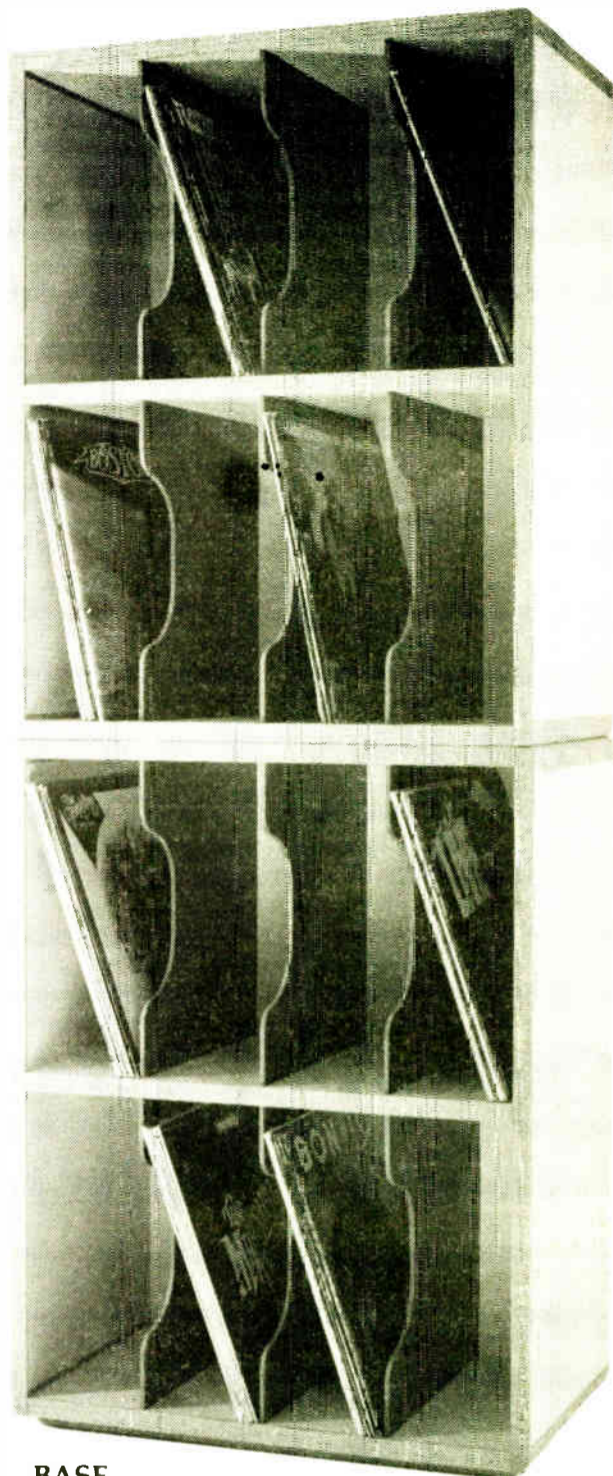
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Gearing Up for the Elections

by John "Q" Shepler

Rockford IL ... This is it! It's your big chance to cover a presidential election and do it right. The excitement has been building all year.

Now, in a day of frantic activity, it reaches its peak ... and then it's over.

This election day will be one of the most significant news events of the next four years. Make good use of it!

Now, here are some tips for better election coverage.

Q-Tips

Every piece of equipment you'll need runs on batteries. Make sure you have more than enough.

Buy the alkaline type by the carton. They'll keep for years.

Replace the batteries and test every piece of equipment a day or two ahead of time.

Throw a bunch in the duffel bag and put some in your jacket pocket. You'll probably still run out.

Mics and cables

Realistically, your mics are going to get bumped around, knocked off tables, thrown in the trunks of cars, and otherwise treated with no respect.

I'd use a pro mic even for cassette recorded interviews. The sound quality really is much better than with the little plastic mic included with the recorder.

It is much, much better than shoving the entire recorder into a candidate's face just so you can use the built-in mic. The professional dynamic microphones are still the best choice. You can drop kick an RE-15 or 635A and still expect to pick it up and go back on the air.

A word on wireless mics. They are fantastic for doing live interviews in a crowded hall. However, there are some pitfalls.

The hand held mics are rugged and a good choice. The belt pac and lavalier mics need better treatment.

The little electret mics will go bad if you drop them even once. They also have their own batteries that need attention.

A diversity system is better than a whip in preventing dead spots.

Any enclosed room can have reflections that cause signal cancellation and subsequent dropouts on the air.

Experiment before the broadcast to determine the spots to avoid. Also try raising the receiver antenna to give a good line of sight to the mic. This might be all you need.

You'll always need more cables than you have. Spend a day making up extra microphone and line cables for your recorders and mixers.

A 100' to 500' reel of shielded mic cable is handy for running audio out to remote trucks or taking microphones into crowded places.

You'll also want extra line cords, power extension cords, 3-prong adaptors, and a multiple outlet strip.

RPU equipment

Who doesn't think of checking out the transmitter before the big event? Don't assume.

I know of a station that had a UHF sec-

ond remote system that was put on the shelf after years of reliable sports service.

The night of a big local election, the engineer grabbed the transmitter from the cabinet, hooked it up at election central a few miles away, and voila! No signal.

The receiver had conked out months ago, but nobody knew it. They never bothered to test the system anymore.

Even if your signal checks out, make sure it works at the exact location of the broadcast, perhaps inside a tall building or shopping center.

If the antenna is located too near a wall, the signal will be greatly attenuated.

In some buildings, you can only get out with a phone line or that 500' mic extension.

Phone lines

Whether you're buying open loops or standard lines, the phone company needs some lead time to get you in the schedule.

You also want to plan some time to make sure everything is working.

So, have the lines installed a day or two in advance and check them out for frequency response, noise, and cross talk.

Sometimes the lines are being arranged by someone else. I'd still check 'em out.

What somebody else thinks is a good line may be nowhere near broadcast quality.

You also want to make sure you can hook up your remote equipment and that AC power is nearby if you need it.

Even if you are planning to use RPU equipment, come prepared to clip into the phone system if necessary.

I was once covering a school board news conference. It was all arranged at the last minute, of course.

When we got inside the old brick building, I found to my horror that not only would a VHF signal not get back to the station, but I couldn't park the truck close enough to snake a cable up to the fourth floor.

In a last ditch effort to get on the air, I called the station from an administrator's phone, unscrewed the mouthpiece and clip-leaded in a cable to our mixer output.

It worked great except for some of the bystanders who added "clicks" to the broadcast by continuously lifting other phones on the same line.

Talking back and listening

In any news situation, events move fast and you better be able to move fast, too.

The communication among your own staff will be nearly as important as what is going out over the air.

You can cover your communications needs in a lot of ways. Some of the usual ones are: extra two-way phone lines, walkie-talkies and two-way car radios.

You could also use portable and car cellular phones, wired and wireless intercoms, SCA feeds, closed circuit TV or even a computer network. Anything that will transfer information is worth considering.

You'll need more than the usual number of headsets.

The studio anchor will probably want

to talk to the candidates, so you'll need two receivers or a splitter and two headsets, one for the interviewer and the other for the candidate.

If there's a group that wants to talk, they'll all want to hear, too.

In the studio all of the guests will need to hear questions from remote sites and from phone callers.

Fortunately, this is as easy as making a box with a bunch of extra jacks in parallel or adding extra jacks under the console.

It's a good idea to add a resistor of 10 to 100 ohms in series with each headset.

That way, if one set shorts, the amp will be protected and the other guests will still be able to listen.

Mixing and feeding

You need mixers in the studio to add extra mics and on remote to drive a phone line or the RPU transmitter.

If you're short on mixers, you can parallel XLR connectors to drive a single mic input with two mics. It seems to work just fine.

Another use for a remote mixer is to mix cassette playback with live mics. That way, some interviews can be recorded when the candidate is available, but the station is on commercial break.

Holding the cassette player up to the

mic doesn't work nearly as well.

Don't count on having AC power where you want it. Plan to run your mixers on batteries and make sure they're fresh.

If you have a hot election in your area, everybody else will be interested, even if they can't afford to send a crew to cover the action.

Plan on being able to feed actualities down the phone. Most stations are already set up to do this from the news studio, but you can't count on being able to get in there.

Consider pressing an older car machine into service in the office area. Add a phone interface, and you have a second feed.

A little switcher box is also handy to feed cart, cassette, or board output as needed.

Other necessities

Feeding a mixer down the phone lines sounds much better than talking into the handset.

If you want even higher quality, a line extender will make your remote sound almost like a studio feed at the cost of 2 phone lines.

If you don't have one of these, you might try equalizing the local phone feeds to improve the fidelity.

A mult box or press box is something you see when covering national candidates. It is a suitcase full of microphone and phone jacks.

(continued on page 30)



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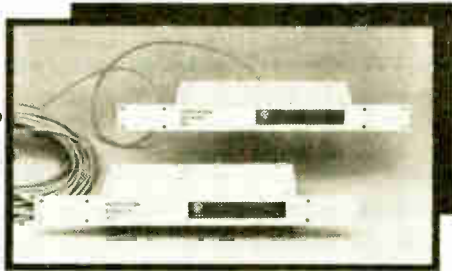
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Any of these problems sound familiar? Get to know Modulation Sciences' composite baseband solutions.

Solutions

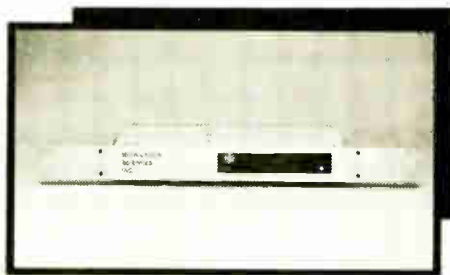
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Clarifying Dial-Up Remote Rules

by Harold Hallikainen

San Luis Obispo CA . . . We started this series of articles (16 months ago) with a detailed look at the FCC's requirements for remote control of broadcast transmitters.

The FCC released a public notice (FCC 88-194 4460) on 12 September "clarifying" the existing rules. This month we'll discuss the clarification (call me for a copy).

The public notice was issued in response to questions regarding the remote control of broadcast transmitters, especially "dial-up" control and to clarify EBS requirements when off-premises control points are used.

Statutory requirement

The Commission points out that the current rules were designed to allow stations maximum flexibility in the remote control of transmitters, but must limit that flexibility to comply with Section 318 of the Communications Act of 1934.

That section requires that a licensed operator be in charge of a broadcast transmitter during periods of operation (although the degree of supervision of the transmitter is not specified).

The Commission does not contemplate specifying all permissible remote control techniques, although they believe the public interest is served by publication of the 12 guidelines in the public notice.

The FCC has now specified which parameters need to be monitored or be adjustable by the operator at a remote control point, as these vary station to station.

However, the FCC expects the station to operate with all parameters within the terms of license and within the rules.

Although not specified in the public notice, it has been general practice to provide sufficient telemetry to insure the station is operating within power limits and, if directional, within specified DA parameters.

Remote control capabilities have normally included carrier on/off, pattern/power change and "power trim."

The public notice specifically allows

the use of dial-up telephone circuits, dedicated telephone circuits, "special" RPU (probably the "P" channels), cue and control or microwave channels for the metering, adjustment and control of broadcast stations.

At the 1988 NAB panel discussion on new technologies, John Reiser of the FCC said that control of transmitters from "floating" control points was permissible if the operator at a notified control point authorized access and was fully informed of what actions were taken.

Insight on Rules

There was some discussion of the possibility of the Chief Operator calling the studio and the operator at the studio "patching" the CO through to the transmitter.

The public notice, however, authorizes floating control points, provided that the station has a designated operator on duty at a fixed position (the "floating" operator cannot be the only operator).

Always available

Item 4 of the public notice places restrictions on the use of dial-up remote controls.

The station licensee must insure that the dial-up circuit remains available at all times for the exclusive use of the duty operator.

Otherwise the licensee must provide a means for the operator to interrupt or preempt any other telephone access to the remote control equipment at the transmitter.

Alternately, the station may employ a method independent of the dial-up circuit that allows the duty operator to turn the transmitter off.

Suggested methods include interruption of the program audio, a second dial-up circuit, STL or a continuous RF cueing and control circuit (such as used by satellite networks).

It appears that a station has three choices: an exclusive dial-up circuit, a preemptable dial-up circuit, or an in-

dependent means of shutting down the transmitter.

New ideas

What makes a dial-up circuit exclusive is not clear. The preemptable dial-up circuit is a new concept—at least to me. The operator could need another communications circuit to pass the preemption instruction to the transmitter site.

That circuit might be a one way circuit, such as an STL, or could be, perhaps, another dial-up line.

Finally, the use of a second dial-up line as the "independent" method of shutting down the transmitter on failure of the first line is a new concept.

The other mentioned methods of shut-

to the duty operator).

EBS functions could, perhaps, be assigned to people responsible for programming instead of transmitter operation, but the station licensee is to insure that EBS requirements are met.

The duty operator can be located at any fixed location providing the FCC is notified within three days of first use [3.1480(c)].

The duty operator must also not have other duties that detract from continuous attendance and the ability to respond to operational requirements.

The notice points out that EBS responsibilities may limit operator locations (can the operator get the required script, tones and programming on the air from the remote control location?).

Most importantly for contract engineers, the operator may supervise more than one station concurrently, as long as the above requirements are met.

Required automatic shutdown

If the remote control system provides automatic alarms of interference causing conditions (automatic alarms are not required by the remote control rules), the alarm must be directed to the duty operator first (then perhaps to other off-premises personnel, such as the CO).

If a "corrective response" is not received by the remote control master equipment from the duty operator, the remote control must shut down the transmitter within five minutes.

The definition of "corrective response" is not given. It appears to be more than an "alarm acknowledge" by the operator.

It might indicate that if the system provides alarms of interference conditions (again, not required) and that alarm is present for more than five minutes, the transmitter must be shut down.

This may be the course of action indicated even if the operator has acknowledged the alarm but not corrected the interference causing condition ("corrective response").

(continued on page 30)

. . . the FCC expects the station to operate with all parameters within the terms of license and within the rules.

ting down the transmitter (program audio, STL, or cue channel) are the more traditional "continuous carrier control."

The public notice summarizes this item by saying the duty operator (note, however, that the rules allow more than one operator to be in charge of the transmitter [73.1860(a)]) must be in control of the transmitter at all times, and the station must be able to meet its EBS responsibilities without delay.

Fixed control point

The public notice appears to allow systems that rely wholly or in part on paging receivers or mobile telephones to contact the duty operator.

However, the duty operator must be continually present at a fixed location, have "positive" means to turn the transmitter off and be able to monitor EBS and carry out EBS functions (if assigned

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Using Special Mics

(continued from page 23)

your application. You may end up with several options.

Accessories

There are many devices used with microphones to route their signals or to make them more useful.

A needed accessory for a vocalist's or announcer's microphone is a foam pop filter or windscreen. When a person says a word emphasizing "p," "b" or "t" sounds, a turbulent puff of air is forced from the mouth.

A microphone placed close to the mouth is hit by this air puff, resulting in a thump or little explosion called a pop. The windscreen reduces this problem.

Pop is also reduced by placing the mic above or to the side of the mouth, using an omnidirectional microphone or using a variable-D unidirectional microphone.

A stand-mounted shock-mount holds a mic in a resilient suspension to isolate it from mechanical vibrations such as stand and floor thumps.

The shock mount acts as a spring which resonates at a subaudible frequency with the mass of the microphone. This mass-spring system attenuates mechanical vibrations above its resonance frequency.

Many microphones have an internal shock mount which isolates the microphone capsule from its housing; this reduces handling noise as well as stand thumps.

Microphone cables are made of one or

two insulated conductors surrounded by a fine-wire shield to keep out electrostatic hum fields.

If you hear a loud buzz when you plug in a microphone, check that the shield is securely soldered in place on both ends of the cable.

Minor adjustments

After acquiring a microphone, you may need to wire its 2-conductor shielded, balanced-line cable to a 3-pin audio connector.

First, solder the shield to pin 1 then solder the hot conductor to pin 2 and solder the other conductor to pin 3. The hot conductor (specified in the data sheet) produces a positive voltage at the instant sound pressure pushes the diaphragm inward.

Inside the cable connector is a ground lug that gives you the option of wiring the connector shell to the pin 1 ground. If the shell contacts metal surfaces in use, a ground loop and hum may result.

In this case, don't tie the shell to pin 1. However, if the cable is in an area having strong RF interference you may want to solder the ground lug to pin 1. This makes the shell act as an RF shield.

It is messy and time-consuming to run several individual mic cables from many microphones all the way to a mixer. Instead, you can plug all the mics into a junction box with multiple connectors.

A single, thick, multi-conductor cable (called a snake) carries the signals to the mixer. At the mixer end, the cable divides

into several mic connectors that plug into the mixer.

Multiple sources

If you are broadcasting a live concert, you need each microphone to feed a signal simultaneously to your broadcast mixer, the band's sound-reinforcement mixer and possibly a recording mixer.

A microphone splitter does the job. It has one input for each microphone and two or three transformer-isolated outputs per microphone to feed each mixer.

In this series we've discussed some microphone types, specifications and accessories. You should have a better idea about what kind of microphone to choose

for your own applications.

There is no universal microphone; each application has its own requirements. Microphone manufacturers suggest uses for each model in the data sheet.

Some have been specifically designed for ENG; others have been designed for studio newscasts; other are intended for group discussions, and so on. Check out the applications sections of data sheets to find specific models that can do the job for you.

Bruce Bartlett is a microphone project engineer and technical writer with Crown International. He can be reached at 219-294-8000.

Remodeling Your Station

(continued from page 23)

forget to secure enough wire for the project and any special tools and test equipment. When the project is actually begun it is imperative that all equipment be on the premises and ready to go.

A most important commodity before construction begins is a realistic allocation of time to do the job right. This factor should allow for breaks for eating and sleeping, as well as any difficulties that may be encountered.

It seems that when we are racing down to the deadline and everyone is tired is when that one important piece of equipment doesn't work or isn't what we thought it was. The fatigue one feels at this point clouds the judgment that is necessary to get beyond this hurdle.

So many times I have been involved in transmitter installations at stations

where the management has made public announcements about when the station will be on the air.

At this point, matters are only made worse because commercials have been sold, and the station has purchased advertising in the local newspaper. It always seems that everything goes wrong when the crew is up against a deadline that may be unrealistic. The pressure felt at times such as this can be almost murder.

We all experience a first time when a large project is undertaken. Advanced planning will keep things moving smoothly and reduce mistakes.

Dave Hebert is president of Dave Hebert & Associates. He is an occasional contributor to RW and can be reached at 509-545-9672.

Splatter matters.

Splatter is a form of radio interference that can drive listeners away from AM radio. It creates distortion in your signal, wastes transmitter power on undesired sidebands and interferes with other stations. Even with an NRSC audio filter, misadjustment of the transmitter or audio processing equipment can still produce an RF spectrum that can exceed NRSC or FCC limitations.

That's why routine monitoring of your station's RF spectrum is a must. But it doesn't mean you'll have to bust your budget on a spectrum analyzer. It just means you need the rugged SM-1 AM Splatter Monitor from Delta Electronics.

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The Splatter Monitor's unique offset feature tunes spectral segments for closer examination 10 kHz to

100 kHz away from the carrier. Unlike a spectrum analyzer, you can listen to the front panel speaker or your own headphones as you measure splatter levels on the front panel meter. The Splatter Monitor also has an alarm output to drive your remote control.

In this day and age where splatter matters, monitoring it doesn't have to cost you a fortune.

To find out more about the new Delta Splatter Monitor, call (703) 354-3350, or write Delta Electronics, Inc., 5730 General Washington Drive, P.O. Box 11268, Alexandria, VA 22312.

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Groups Reject Licensing

(continued from page 1) lives are affected by this, wondering if they're going to be able to support their families or whether the state's going to call them a criminal for practicing," said Robert Thompson, an attorney with Wood, Lucksinger & Epstein in Washington, DC, which is representing NARTE. As the bill's primary antagonist, NARTE so far has gone to court twice over its enforcement. Both times, engineers have been allowed to continue practicing without the licensing, Thompson said.

Reinforce its viewpoint

To reinforce its action-oriented stand, NARTE has urged its membership to fight the licensing effort by writing state legislators. Also, in the May/June issue of "NARTE News," Director William Belshaw aired a number of his fears.

"My concern is for . . . those like me who have years of valid and certified experience," he said. "Are we now suddenly incompetent? Does our education, training and experience become worthless just because we are not registered as a PE (Professional Engineer) by a state in some 'related' discipline?"

The Society of Broadcast Engineers (SBE), at its annual membership meeting, also discussed the issue. Jack McKain, SBE president, said there that the organization plans to individually petition the FCC for federal exemption, allowing broadcast engineers to be excluded from the state regulations.

While the organizations' concerns are acknowledged by the SPE, that group stands by the view that the time has come for broadcast engineers to face the same professional standards as other engineers.

"There are some areas of engineering that have been ignored and radio/telecommunications is one of those. After 50 years of neglect, there are some weaknesses built into the system that you have to correct," said Louis Guy, a consulting engineer and president-elect of the Virginia Society of Professional Engineers.

"SPE subscribes to the principle that all engineering practitioners should be qualified and we believe the state licensing approach is the best available to us," he said.

Broadcast questions

Even so, Guy noted NARTE's allegations that the current standard engineering tests likely do not include questions of particular relevance to radio/TV engineers.

"There is probably truth in what they are saying and, if so, I'm sure that (SPE) as well as the state licensing boards would be happy to work with NARTE to

update and improve the tests so they do a better job of covering the course material and the subject area that the telecommunications engineers have in their specialty."

But, he added, "The basic concept is not that it is a specialty license. It is a generic professional license."

Regardless of SPE's insistence that its stand is for the good of the industry, Thompson, NARTE's attorney, feels the effort might be more self serving.

"The (SPE) has a nasty vested interest in trying to force the government into making everybody a professional engineer. It's a power grab," Thompson said. "They would like to force every engineer—sanitation, maintenance, telecommunications—not only to help their own organization to swell its coffers in a completely anticompetitive way, but also to hold down competition (in the industry)."

"It's best if you keep things free and open and leave it up to

private organizations to police themselves and to certify and then let the public decide who it wants to hire," he added.

That's paranoia

However, Thompson's views are "paranoia," replied Guy with SPE. "Obviously the (SPE) would like to have a whole lot more of the people it's speaking for as dues-paying members, but there is no linkage between having a state license and being a member of SPE. It's not even a requirement."

He added, "I wasn't aware that the SPE or any of the engineering societies had honed in

on the licensing of radio and television engineers."

Whether or not it's SPE's intention to lobby actively for tougher broadcast engineer licensing, NARTE intends to pursue its own campaign at the state level with fervor.

Its current successes, however, may be tentative, fears Thompson.

"We suspect that there are a dozen other states waiting to see if one of these battles goes the other way so they can pounce themselves," he said.

For information, call Robert Thompson at 202-223-6611; or Arthur Schwartz at 703-684-2800.

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Circle Reader Service 15 on Page 27

World Radio History

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Dial-Up Rules

(continued from page 27)

Of course, the "immediate shutdown" under an interference causing condition has been in the rules [73.1410(e)], but this is the first mention of a remote control being required to shut the transmitter down without the operator requesting it.

This new requirement (that is not in the rules) is similar to the three-minute automatic shutdown requirement of the ATS rules [73.1500(e)].

Alarms, warnings and indications (perhaps telemetry of the actual parameter value) must be unambiguous and of sufficient precision for the operator to properly assess an out-of-tolerance condition.

This probably relates to clearly labeling alarm indicators, providing sufficient resolution on remote telemetry and calibrating the remote telemetry accurately enough to insure the station operation is always within

licensed limits.

The system is to be calibrated and tested as often as necessary to insure its proper operation. The test cycle is to depend, in part, on the reliability and stability of the equipment (perhaps using measured telemetry drift rates to determine calibration frequency).

A station has three hours to restore remote monitoring of its operating parameters if its monitoring system fails.

If no operator is at the transmitter and the remote monitoring is not restored within three hours, the transmitter must be

shut down.

The rules do not specify a certain time by which a station must restore remote control, if that is lost, provided the monitoring system is still operating properly.

However, the operator must be able to turn off the transmitter at all times, without exception. Since turning off the transmitter is a control function, some control must always be present.

Again, the Commission has not specified a "test schedule" to determine that the ability to turn the transmitter off is present.

This item of the public notice may or may not require continuous control of the transmitter carrier (full time STL, full time program audio, or other full time circuit, as opposed to dial-up, which is generally not full time).

The public notice appears to give more leeway to some remote control operations, add more requirements to others, and leave others vague.

I'm sure there will be a lot of discussion of this notice. I'll look forward to your comments.

Harold Hallikainen is president of Hallikainen & Friends, a broadcast equipment design, manufacture, sales and installation firm. He can be reached at 805-541-0200.

Elections

(continued from page 25)

The press corps gets an audio feed by plugging a mic cable into any available jack.

This takes the place of having your own microphone on the podium, which isn't always allowed.

If you're planning to host a press conference where other stations or a national press corps need an audio feed, consider buying or building a multibox.

You can use a distribution amp or simply tap of the line output of your mixer, pad down to mic level, and connect to standard male mic plugs.

Remember, this is taking the place of a microphone and needs to act like one.

The level should be -55 dBm @150 ohms. Transformer coupling is recommended to avoid ground loop hum.

You'll be smart to lug around an extra set of everything, including mixers, mics, cords, cassette recorders, receivers, and batteries.

If you don't want to haul the entire station's inventory up 20 stories to the grand ballroom, at least keep a car trunk full of extras.

Elections can be fun, and they can get pretty nerve wracking, too. You'll enjoy the events a lot more, if you spend a little time preparing. You also have an opportunity to be a hero to the news team.

Even something as simple as handing a live headphone to a candidate or cueing up an interview tape for the next live broadcast is greatly appreciated when the pressure mounts.

Election day doesn't come often, but when it does, what goes on the air is pretty important.

You'll be doing a service for the community as well as the station to make sure the election broadcasts sound the best they possibly can.

John Shepler is an engineering manager, broadcast consultant, writer and regular RW columnist. He can be reached at 815-654-0145.

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Shure M64 phono preamp, BO, P Cibley, 138 E 38th, NY NY 10016. 212-986-2219.

PR&E SDA-8 2 x 16 stereo audio DA, rack mt, XLR connectors & metering, new, BO, B Royster, KOM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Shure M64 phono preamp, BO, P Cibley, Cibley Music, 138 E 38th St, NY NY 10016. 212-986-2219.

Ramko DA's, 6RVE (2), \$100 ea; (2) Excalibur DA-1's, \$50 ea. M Legner, 703-971-7069.

Vital AA-1A (11) audio dist amps w/rack mount main frame 1 in 6 out. G Mundkowsky, 12918 Smalley, Grandview MO 64030. 816-966-0731.

Bogen TA-100, MX30 & Challenger, audio PA amps, \$100 or \$40 ea; Newcomb custom audio amp, built EQ, \$75. Dynakit preamp, stereo, vgc, \$40. J Dexter, 1604 Missouri Ave, Artesia NM 88210. 505-746-6590.

Belar RFA-1FM RF amp, 92.7 MHz, never used, BO, M Strong, KKBS, POB 1756, Guyton OK 73942. 405-338-5493.

McIntosh MA-5100 stereo amp/preamp, fair condition, \$300. W Dudley, Location Sound, 6919 19th St, Tampa FL 33610. 813-237-6516.

Want to Buy

QRK/Alpha I or II preamps, for parts, any cond, advise cond & price. C Keith, ALI Bdctg, Box 313, Keene NH 03431.

RCA amps old or new, monitor booster, etc. B Davies, Virgo Prod, 5548 Elmer, N Hollywood CA 91601. 818-761-9831.

Elect by Marantz, McIntosh, Altec, WE, Westrex, Century, IPC, etc C Dripps, 4337 Maxson Rd, El Monte CA 91732. 818-444-7079 (Fax) or 818-444-6863.

Marantz #9 or 7 tube amp & preamp Y Chung, 1129 S Robertson Blvd, LA CA 90035. 213-274-1921.

McIntosh MI350, MC3500, 275, MI200, MI75, C-20, C-22, etc. tube type amps or preamps Y Chung, 1129 S Robertson Blvd, LA CA 90035. 213-274-1921.

ANTENNAS & TOWERS

Want to Sell

ERI GS-CPS-10, excel cond, BO, B Howard, KOFO, US S9 Highway & Radio Rd, Ottawa KS 66067. 913-242-1220.

RCA BFA-8A 8 bay HP med pwr FM antenna, gd cond, tuned to 102.5 w/heaters, \$1500/BO. D Woodcock, WNNC, 5606 Medical Circle, Madison WI 53719. 608-271-1025.

Stainless G24/25 200' black iron tower, 20' sections, tapered base, new sandblast, prime & paint, on ground, \$2000 J Blodgett, WGTG, 308 Westgate Pkwy, Dothan AL 36303. 205-794-4770.

Rigid line, 380' of 3-1/8" in 20' sections, \$100 per section or all for \$1800. C Haynes, POB 31235, Jackson MS 39206. 601-948-1515.

Andrew 47N-3 1-5/8" to female N, \$60; 47W-3 1-5/8" to N male, \$35; 47L-3 1-5/8" to LC female, \$70; 3-1/8" to 7/8" reducers (3), \$40. J Cunningham, KEOR, Rt 2 Box 113B, Stonewall OK 74871. 405-265-4496.

Andrew Heliac, 140' of 5/8" cable, new, \$100. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

FM tower, 600'; 450' of 3" rigid transmission line; 40,000' #10 copper wire. J Stevens, WLAU, Rt 10 Box 420, Long MS 39440. 601-425-5145.

Utility tower, 340', on ground, ready to move, gd cond, \$12,000/BO. DF Dixon, 142 David, Lugoff SC 29078. 803-438-5788.

ERI 10 bay CP FM at 95.7 MHz, excel cond, BO, B Howard, KOFO, Box 16, Ottawa KS 66067. 913-242-1220.

Jampro JLCF-7 FM antenna, 7 bay for 12" face or leg mount, 106.3 MHz, 195' 1-5/8" coax air dielectric w/EIA connector each end, \$5000/all. B Dickerson, WEAG, POB 520, Starke FL 32091. 904-964-5001.

CCA (Shively) FM 6 bay low power CP FM, 97.7 MHz, rebuilt 8/87, 1 spare bay, avail now. D Walker, WOXY, 513-868-3842.

Andrew HJ7-50A xmsn line 130', 1-5/8" line w/GP 87R, GB 87G connectors w/fittings, gd cond. D Walker, WOXY, 513-868-3842.

Jampro JSCP-2 FM antenna system, will tune to your freq w/factory warranty, also 10 radomes, excel cond, BO, D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

Phelps-Dodge 4 bay HP antennas, \$1200. W Carnes, K11RT, POB 8234, Jacksonville TX 75766. 214-586-2162.

Rohn 25G guyed, insulated, 180' AM tower, w/guys, on ground, ready to ship, \$1300. D Kelly, KWPN, Box 84, West Point NE 68788. 402-372-5423.

Three tower 10 kW phaser; tuning unit 1 MHz 100 kHz; tower & beacon, 250', call for prices/info. P Buxton, WTAI, 6420 Stringfield Rd, Huntsville AL 35806. 205-859-6100.

RCA TFU-24DM UHF TV ant on chnl 41, \$500. C Haynes, WJMI, POB 31235, Jackson MS 39206. 601-948-1515.

Unflanged coupling w/bullets, (6) 3-1/8" (3) 1-5/8" unflanged couplings w/bullets, (2) 1-5/8" 90° unflanged couplings, no bullets. R Lane, KTYD, 5260 Hollister Ave, Santa Barbara CA 93116. 805-967-4511.

ERI 10 bay CP FM, at 95.7 MHz, excel cond. B Howard, KOFO, Box 16, US S9 Hwy & Radio Rd, Ottawa KS 66067. 913-242-1220.

Andrew 1-5/8" motorized transfer switch, \$400; 3-1/8" motorized transfer switch, \$1200. M Patton, WXOK, 6819 Cezanne, Baton Rouge LA 70809. 504-292-4189.

Various 3-1/8" coax hardline elbows, right angles, joints & flanges. M Patton, WXOK, 6819 Cezanne, Baton Rouge LA 70809. 504-292-4189.

Want to Buy

Towers, 1000', gd cond, prefer on ground, immed cash. L Magnuson, Flagship Comm, 2000 Indian Hills Dr, Sioux City IA. 712-239-2100.

Guyed towers, (2) 500'. G Gilbert, CSRG, POB 50539, Denton TX 76206. 817-383-1357.

Self-supporting tower, 200-300'. D Van Zandt, Cornerstone Radio, 2596 State Rd 44, New Smyrna Beach FL 32069. 904-427-9000.

Guyed tower w/24" tapered top, at least 100', 700-800' overall height. D Furr, POB 707, Columbus MS 39701. 601-328-1420.

Towers 220' +, self-supporting to hold dish. AACT Inc, 156 Lazelle Rd, Worthington OH 43085. 614-846-9234.

Broadband high power FM CP antenna, 4 bay, from 102-106 MHz. D Agnew, 402-488-4275.

Self supporting tower, 200-300' zone B. D Van Zandt, Cornerstone Radio, POB 500, Petersburg IL 62675. 217-632-2266.

AUDIO PRODUCTION EQUIPMENT

Want to Sell

SAE 1800 parametric EQ, stereo rack mount w/wc chan, gd cond, \$125. G Ernst, Bayside Sound, POB 166, Lincoln City OR 97367. 503-996-6020.

WDVT off air, selling equip, all under 3 yrs old & very gd cond, call for list/prices. B Gellhaus, WMRG, POB 73, Cheltenham PA 19012. 215-635-4815.

Burwen TNE 7000A impulse NR, unsurpassed for dubbing LP's, \$285. B Laughlin, L-Pad Elect, 615 E 70th St, Kansas City MO 64131. 816-361-0548.

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539 1/2 octave EQs (2), used... \$690 ea
546 dual parametric EQ, new... \$430 ea
5549 1/2 octave EQ, new... \$515 ea
6250, 200W power amp, new... \$496 ea
6300, 380W power amp, (3), new... \$915 ea
6500, 600W power amps, (4), new... \$1415 ea

Orban 9100B1 AM NRSC standards processor, only 3 mos old, excel cond, w/manuals, \$3500. M Taylor, WXRC, 357 1st Ave NW, Hickory NC 28601. 704-322-1713.

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Comrex TCB-1 telco coupler, new, BO, Burwen DNF-1100A dual chnl dynamic noise filter, gd cond, \$400. Switchcraft 17QD17, new patch cords, also new ADC 4 & 6' type PJ-14, BO, B Royster, KOM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

dbx 900 series, rack mount card cages (3), \$400 ea; 942 decoder modules (8), \$125 ea; 941 encoder module, \$125; de-esser module, \$275; model 140A encode/decode unit, \$325, will deal on whole package. M Bostic, WKLX, 259 Monroe Ave, Rochester NY 14607. 716-454-3040.

Audio Tech System, audio exciter (2), \$125 ea; Ed Cor stereo HA400 headphone amp. M Legner, 703-971-7069.

Tascam PB-32H (2), \$75 ea. Tascam PB-32-P, \$75; Teac PB-64 (2), \$75 ea. M Legner, 703-971-7069.

dbx 905M & 902M parametric EQ & de-esser, like new, \$500. B Weiss, KLSI, 3101 Broadway Ste 460, Kansas City MO 64111. 816-753-0933.

Orban 8100A Optimod w/8100AST studio chassis, mint cond, \$3500. P Christensen, WIVY, 3101 Univ S, Jacksonville FL 32216. 904-721-9111.

Howe Phase Chaser, excel cond, \$695, NPN patch bay, studio interconnect, new, \$200. T Hodgins, KHSS, Whitman Towers Penthouse, Walla Walla WA 99362. 509-522-5412.

Eventide H-949 Harmonizer w/de-gitch, excel cond, \$1600. F Scheidt, 15 Charlotte St, Rochester NY 14607. 716-232-5210.

Want to Buy

Bulk tape eraser, gd cond, reasonable price. D Norlin, KVCO, POB 1002, Concordia KS 66901. 913-242-1435.

AUTOMATION EQUIP.

Want to Sell

SMC 250 (4) monaural Carousels w/Harris SC-90 type interface, interface hardwired to 1 unit, other 3 plug in, pick up only, \$200 ea or \$700/all. C Lewis, WMFD, POB 5307, Wilmington NC 28403. 919-763-6363.

SMC Automation System, DP-1 brain, AS-16 switcher w/remote control, (2) 250RS Carousels, (2) 250 sequential Carousels, 521 twin PB, 510 single PB, 590 desk record ctr, w/CCU, LA-246 AGC, PA-A supply, AC panel & monitor amp in 3 racks, currently in service, avail 12/88, you ship, \$5000/BO. P Craddock, KWBC, 116 Railroad, Navasota TX 77868. 409-825-6484.

Cetec 7000GLS, (4) ITC 770 R-R's, (2) Schafer 24 tray Carousels, (1) 48 tray Instacart, vgc, now in service, \$16,500/BO, delivery negotiable. T Hite, WAUC, POB 908, Wauchula FL 33873. 813-773-5008.

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API 550A stereo EQs, \$550. F Chambers, 813 Putnam Ave, Brooklyn NY 11221. 718-453-6499.



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Want to Buy

Carousels for Harris 9002, also need non-working units for parts. B Williams, WDOC, POB 309, University Dr, Prestonsburg KY 41653. 606-886-2338.

Real-time announce clock, any make, any model, for automation system, must be capable of 24 hr operation & in at least repairable cond. D Salter, WSTX, POB 428, Christiansted, St Croix USVI 00821. 809-773-0390.

Spare parts for Harris System 90, IGM Go-Cart system would consider buying system that is out of commission for parts. P Tinkle, WCMT, POB 318, Martin TN 38237. 901-587-9526.

SMC Minipro w/350 Carousels & Otari R-R's. J Torstano, KNIS, 6363 Hwy 50E, Carson City NV 89701. 702-883-5647.

SMC 352RS Carousel, need one or more. G Stinnard, WEJL, 149 Peru Ave. Scranton PA 18503. 717-346-6555.

Keyboard for Harris System 90. T Low, KBEE, POB 3131, Modesto CA 95353. 209-523-7756.

CAMERAS (VIDEO)

Want to Sell

Sony DXC-1650 single-tube color camera, w/CCU & manual, \$150; C-mount zoom lens for same, \$50. G Odell, The Film Group, Box 9, Wethersfield CT 06109. 203-527-2972.

Panasonic WV 200CLE 3-CCD cameras (3), new, less than 30 hrs, 12:1 lens. Mil, case, \$5000 ea. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Thomson MC301 camera, excel cond, 14:1 Fuji lens, shipping case, w/RS2000 CCU & 330' cable, \$3000 pkg. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Norelco PC72 cameras (3), 15:1 Angenieux lens, gd cond, fair tubes, spare CCU, lots of parts, Sr video remote controls, \$2000 ea; various Norelco PC70, PCP70, PCP90 modules, yokes, parts. H Larson, Matrix Mobile TV, PCB 536, San Luis Obispo CA 93406. 805-544-5657.

Telecine lens & mounting flange for Philips LDH-1/20 cameras, \$135. G Odell, The Film Group, Box 9, Wethersfield CT 06109. 203-527-2972.

QuickSet 6245 head; QXD-1 5602 full size dolly, 4" wheels; QXT-7 6312 tripod, 3/4 size w/elevator, \$1100. Larry, 412-763-8359.

CEI 310 (2) cameras complete & gd cond, \$3000 ea/trade. H Henson, Henson Prod, 3796 Bethania Sta Rd, Winston-Salem NC 27106. 919-924-8717.

Canon Z9 pistol grip zoom/VTR control w/mounting bracket for pan handle, \$175; Fujinon MCA-1A panhandle mount bracket for Fuji pistol grip, \$50; power cable, coiled, from belt to camera XLR-4F(L) to XLR-4M, \$30; Peter Lisand quick release, \$60. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

RCA TK-76 portable/studio bdct camera, excel cond, \$3000/BO; RCA TK-44 studio cameras (5), full CCU's, \$5000 ea. G Urban, 314 W 52nd, NY NY 10019. 212-677-2200.

Sony DXC1800 w/3/4" recorder, VO4800 complete, in excel cond w/tripod, field carrying case, cables, rechargeable batteries & charger/power supply, BO. B Cook, POB 4390, Woodland Park CO 80866. 719-687-6357.

Long focal length lenses for IO camera: 16" IE lens & 406" IO lens, both w/cases. B Humpherys, Utah State Univ, Logan UT 84322. 801-750-3133.

RCA TK-14 image orthicon cameras (3), complete w/power supplies, focus current regulators, Angenieux hyperuniversal zoom lens & standard complement, 600-800' of cable, manuals & spare parts. B Humpherys, Utah State Univ, Logan UT 84322. 801-750-3133.

Telecine TM-2100 mono, w/10:1 Angenieux zoom lens, w/manual; RCA PK-330 (2) studio vidicon camera chains w/10:1 Angenieux zoom lens, control units & cable, w/manuals. B Humpherys, Utah State Univ, Logan UT 84322. 801-750-3133.

Norelco PCP-90 plumbicon color camera, \$300; Houston Fearless studio pedestals, \$100; RCA PK-701 color studio camera, \$395. C Haynes, WJMI, POB 31235, Jackson MS 39206. 601-948-1515.

Want to Buy

Panasonic PK 957/958. G Pfeiffer, WNJU, Ste 11033, One World Trade Ctr, NY NY 10048. 212-775-1706.

Philips LHD-1/20 service manual for telecine equipped cameras inc any updates or mods for same; service manual/descriptive lit/catalog of Telecine telecine equip. G Odell, The Film Group, Box 9, Wethersfield CT 06109. 203-527-2972.

Dumont or RCA TV camera, want old TV equip. A Wiener, Briton Rd, Monticello ME 04760. 207-538-9538.

CART MACHINES

Want to Sell

ITC Premium Series R/P w/3 tones, gd cond w/manuals, \$550. M Taylor, WXRC, 357 1st Ave NW, Hickory NC 28601. 704-322-1713.

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Audi-Cord Modi-Cart 100 stereo R/P, gd cond, w/manual (3) \$700. M Taylor, WXRC, 357 1st Ave NW, Hickory NC 28601. 704-322-1713.

BE 5500 5 play cart machine, manual, \$2000. S Karwin, KCMJ, 440 S Ferrell, Palm Springs CA 92262. 619-329-6818.

PR&E Tomcats, (3) PB units in 19" rack mount, \$3775. M Bailey, Word Bdctg, 3565 Timberglen Ste 1607, Dallas TX 75287. 214-306-7716.

Spotmaster 500AR, \$25 & you ship. C Haynes, POB 31235, Jackson MS 39206. 601-948-1515.

Harris Criterion 80 mono R/P, fair cond, no manual, \$350. B Henry, KLLK, POB 1520, Willis CA 95490. 707-459-1250.

Tapecaster 600RP R/P unit, mono, works; (2) Spotmaster 370 mono players, desk mount, one works, one doesn't, BO. P Craddock, KWBC, 116 Railroad, Navasota TX 77868. 409-825-6707.

Tapecaster RP-700 stereo R/P, \$150/BO. M Black, WEOS, Hogart William Smith College, Geneva NY 14456. 315-789-8970.

Parts mostly Fidelipac 300 Series, some Scotchcart, misc. sold by pound, \$2/lb plus shpg. M Ring, WTNV, 134 Mullin St, Watertown NY 13641. 315-788-0790.

PR&E Tomcat, new stereo recorder & (2) stereo PBs, rack mount, Maxtrax heads, spare parts, BO; ITC SP rack mount kit, motors, cards, semiconductor, pinch rollers, xindr cards, switches, rack ears for 3D, SP, WP, RD, Series 99 & 750 Series R-R, BO. B Royster, WQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Gates Criterion 80 mono play w/record amp, \$235; (3) mono play units, \$185 ea. G Wachter, KFYI, E31 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

ITC Series 99 mono R/P, excel cond, meets full factory spec, all auto features, will guarantee for 90 days, \$1195. E O'Donnell, WIBW, POB 119, Topeka KS 66601. 913-272-3456.

Harris Criterion w/record amps (2), gd cond, extra parts, working, w/instr manual, BO. R Colaner, WRCW, 4601 Hills & Dales Rd NW, Canton OH 44768. 216-477-8585.

Sparta 600 stereo R/P & stereo PB, both excel cond, w/manuals, \$450/both. B Henry, KLLK, POB #52C, Willis CA 95490. 707-459-1250.

ITC stereo Premium R/P w/all tones, excel cond, also mono R/P w/all tones, stereo unit, \$1500 & mono unit, \$1000; BE 5301 mono triple deck, \$1000. B Mounjo, WIDD, POB 1240, Elizabethton TN 37644. 615-543-5849.

ITC SW Senes play, mono, all 3 tones, \$795; Harris Stereo R/P CCL, \$1195; Spotmaster 610 bx R/P 8 slots, \$150. P Willey, H&W Bdct, 372 Reservoir Rd, N Adams MA 01247. 413-663-3419.

Harris Criterion 80, new 150 Hz & 8 kHz, detector cards, rack ears & 150 Hz gen cards, BO. B Royster, WQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

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BE 3200 7276 mono triple tone, \$1300. B Weiner, KNYO, 210 Allen, Glendale CA 91201. 818-409-0185.

Tapecaster 700 R/P, \$200; (2) Tapecaster 700P, \$100 ea; Spotmaster 70-Ten stereo, \$300; Spotmaster 505 BRS stereo PB, rack-mount, \$50; Sparta 800 R/P, \$75. M Legner, 703-971-7069.

Harris mono PB older, w/desk top & rack mount bracket, missing power cord, pinch roller & manual, although similar manual avail, worked fine when removed w/exception of noisy motor, \$100/BO. D Slentz, Gemini/Dover, Box 1678, APO NY 09283.

Nortronics, 1 record, 2 play heads, 3 chan fits stereo cart machines ITC, never used, \$20 ea. T Duffy, POB 521, W Haven CT 06516. 203-934-6992.

Collins mono cart, great cond, plus lots more, \$150. L James, BEST Prod, 611 N Greer, Pittsburg TX 75686. 214-856-2892.

ITC RP mono (3), not new but very little use, excel cond, \$900 ea. F Lauerman, WMAM, Roosevelt Rd, Marinette WI 54143. 715-735-6631. aft 2PM CT.

QRK & Tapecaster mono PB, need some work, \$50 both. B Cain, W'FPG, 2707 Atlantic Ave, Atlantic City NJ 08401. 609-348-4646.

Ampro CT2500B PB machine, \$100; Spotmaster 500B (1) R/P, \$150 & (2) 505B PBs, \$100 ea. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

Ampro 2514 PB, sterec, three-tone, new head, \$600; ATC CR stereo record amp w/interconnect cable. M Paton, WXOK, 6819 Cezanne, Baton Rouge LA 70809. 504-292-4189.

Gates Criterion 80 w/record module, BO. C Springer, KLMR, POB 896, LaMar CO 81052. 719-336-2206.

BE 5304, B Raines, DIR, 32 E 57th, NY NY 10022. 212-371-6850.

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ITC SP case & rack mt kit, new, \$150. W Axell, KSAV, POB 2269, Ft Bragg CA 95437. 707-964-KSAY.

IGM Instacart late model, 48 tray mono, excel cond, comp factory refurb, never unpacked. J Holmes, WRGM, 2900 Park Ave W, Mansfield OH 44906. 419-529-5900.

Tapecaster 600RP, excel cond, record amp, needs some work, \$200. P Krieglger, KRCK, 423 N 47th St, Omaha NE 68132. 402-553-0980.

Want to Buy

BE 3000 & 2100 cart machines wanted. Exporter needs 90 used machines, working cond, not more than 6 yrs old, reasonable price avail. Send particulars to: RW, POB 1214, Falls Church VA 22041. Attn: Box 1-1.

Spotmaster 1000 or 2000 mdls, any cond, any style, for parts, advise cond & cost. C Keith, ALI Bdctg, Box 313, Keene NH 03431.

ITC WP Series PB. G Stonebraker, KMYO, POB 1360, Aztec NM 87410. 505-632-3402.

ITC 3D PCBs, mono/stereo, advise cond & cost. C Keith, ALI Bdctg, Box 313, Keene NH 03431.

Any non-working cart machines in decent shape, must be stereo. R Hines, Hines Eng Srvs, 265 Emming St, Cincinnati OH 45219. 513-721-7625.

Criterion 80 or BE R/P machine. R Ramirez, WSOB, POB 1246, Madisonville KY 42431. 502-667-5440.

Recent ITC stereo R/P & stereo 3D PB in gd cond. D Agnew, 402-468-4275.

ITC 3D motor. M Morning, WRTA, POB 272, Altoona PA 16603. 814-943-6112.

CASSETTE & REEL-TO-REEL RECORDERS

Want to Sell

MCI JH-110 8 trk 1", gd cond, in Lang cabinet w/RTZ-1, used for video sync, radio prod, \$4750. J Rose, 20 Marion St, Brookline MA 02146. 617-277-0041.

JVC CD-1636 portable new prof stereo R/P cassette deck, Sen-Alloy heads, super ANRS, BO; Ampex 351-2, stereo PB only w/Schaffer elect, excel cond; Scully 270-2, new stereo repro only 14" decks, mint cond, also PR&E Multisync motor drive amp for Ampex/Scully decks, BO. B Royster, WQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Ampex AG-600B FT, 3.75-7.5, gd cond, no case, \$300/BO. P Craddock, KWBC, 116 Railroad St, Navasota TX 77868. 409-825-6484.

Crown 700, clean, working, BO. C Keith, ALI Bdct, Box 313, Keene NH 03431.

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Pentagon 8 position cassette duplicator, \$475. H Casteel, Megastar, 701 Desert Ln Ste 4, Las Vegas NV 89106. 702-386-2844.

Sony TC850 1/2 trk stereo, w/remote control, \$325. G McCoy, KZEN, 1608 16th St, Central City NE 68826. 308-946-3816.

Otari ARS1000DC mono PB decks (2) excel cond, \$1000 ea. M Rollings, WRTL, POB 115, Rortola IL 61866. 217-893-1460.

Scully 280 excel electr & mech cond, heads worn, needs edit button & assembly, \$400. B Straughan, Straughan Prod, 1617 Monroe NW, Wash DC 20010. 202-232-0636.

Scully 280 1/2" 4 trk head stack & hardware, \$300. J Dickson, WMUU, 920 Wade Hampton Blvd, Greenville SC 29609. 803-242-6240.

Teac 40-4 4 chan 4 trk, mint cond, built in mic mixer, \$800. B Mounjo, WIDD, POB 1240, Elizabethton TN 37644. 615-543-5849.

Otari ARS1000DC, BO. T Driggers, 818 Quail Ct, Healdsburg CA 95448. 707-433-9370.

Teac X300R 1/2 trk stereo w/auto reverse (2), gd working cond, \$300 ea or \$500 for two. B Pitts, Studio One Prod, POB 251, Winfield AL 35594. 205-487-6400.

Ampex AG44C mono in console w/servo motor, like new cond, \$1500; Ampex AG44B 2 trk w/varispeed & control trk lockup, extra PB head for 1/4 trk stereo, in console, like new cond, \$2000; Ampex AG44B 4 trk 1/2" in console w/varispeed & control trk lockup, like new cond, \$3200. K Nordine Jr, 6106 N Kenmore, Chicago IL 60660. 312-262-8500.

Ampex AG 600-2, gd cond, w/o cover, \$400/BO; Ampex 601 rack mount, gd cond, \$150/BO. B Ladd, WNR, 108-1/2 E Main, Bellevue OH 44811. 419-483-2511.

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Stancil-Hoffman R-70 R-R (2), both \$50. C Haynes, POB 31235, Jackson MS 39206. 601-948-1515.

Scully 270 R-R reproducers, 2 trk stereo, 7.5 & 15 ips, one missing guide, screw & washer, manual, pick up only, \$400/all. C Lewis, WMFD, POB 5307, Wilmington NC 28403. 919-763-6363.

Ampex 440 in use, 1/2 trk, 1 chan elect, \$1300. K Reising, WRZQ, POB 690, Columbus IN 47202. 812-379-1077.

Ampex 440C 2 trk in roll around, excel cond, \$1295; Ampex 354, vgc, as is, \$395; Dokord-er 4 trk, multisync, echo, \$395. P Willey, H&W Bdct, 372 Reservoir Rd, N Adams MA 01247. 413-663-3419.

Wollensak 1520AV portable FT, just record, 7.5 & 3.75 ips w/manuals, \$275. J Ellingson, 913 Warwick Dr, Cedar Falls IA 50613. 319-277-8535.

Revox PR99 play only, 2 trk stereo w/25 Hz sensor, high speed, mint cond, \$1000/BO. K Harnack, 1385 Lamar, Memphis TN 38104. 901-278-1306.

Ampex 354 2 trk, gd cond, \$100. C Washington, WFRK, 1725 Mt Vernon Rd, Leesburg FL 32748. 904-365-0659.

Ampex 350-351 model remotes (2), \$150 ea; Ampex 2 trk (2), in Russ Lang type cabinets, \$365 ea; Ampex FT in cases (350), \$325. Mr. Oliver, 212-874-7660.

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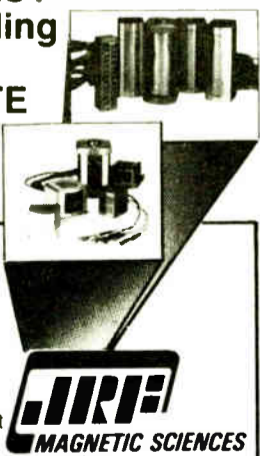
Ampex 4 trk, 350 elect, 300 dk, w/sel sync, very cheap, working fine; Ampex 3 trk in console, same as above. Mr. Oliver, 212-874-7660.

Ampex 4 trk, 350 elects, 300 deck w/Sel-Sync, \$525; Ampex 3 trk in console, \$425; Ampex 2 trk (2), \$375 ea; Ampex FT in cases, \$325. Mr. Oliver, 212-874-2074.

Ampex 600, Ampex 601, Ampex 601-2, Ampex 970, may need some alignment & overhaul but basically in sound cond, BO. G Kristiansson, Villa Skansen Inc, 122 Fairmont St, S Burlington VT 05401. 802-864-9779.

Otari MX5050 2 chan R/P, vgc, \$850; Mag-record 1022 2 chan R/P, gd cond, \$200; Teac A-2340 4 chan simul-sync R/P, vgc, \$450. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

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Ampex AG440 1" 8 trk, gd cond w/roll about stand, sel-sync, test tape & manuals, \$2500. C White, 35 Osborne Ave, Kenner LA 70065. 504-443-5611.

Revox A77 2 trk 7.5-15, gd cond w/remote, \$495. B Borrelli, Media Group, 462 Merrimac, Methuen MA 01844. 508-688-5573.

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Tascam 34-B, as new cond, \$1500/BO. B Leslie, Pro Recdg Svc, 13709 Maple Leaf Dr, Cleveland OH 44125. 216-662-1435

Otari ARS1000 less than 6 mos use, excel cond \$1000. G Vogel, KHIH, 7900 E Berry Pl, Englewood CO 80111. 303-779-8797.

WPYO PR-10 gd cond, BO. W Borneman, WBYO, Box 177, Boyertown PA 19512. 215-369-1075.

Scully 280B stereo (2), needs work; MCI JH-1110 stereo, w/remote, needs work, all three in roll around cabinets, \$700 ea. cash & carry only T Devine, WVLK, POB 1559, Lexington KY 40592. 606-253-5900.

Ampex 700 remote control, new; Editall 1/4" (S-3) splice block, like new; Nagra preamps (2) XOYO, unused. Jensen 206 synchronizer P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322

Otari MX-5050 capstan motor, rebuilt by Otari w/PC board, \$135; Ampex 440 4 trk pwr supply, BO. R Rhodes, Rhodes Music, POB 1550, Radio City Sta, NY NY 10101. 212-245-5045

Pentagon C-34 TMS stereo cassette copier, used less than 20 hrs, \$1000/BO. G Kristianson, Villa Skansen Inc, 122 Fairmount St, S Burlington VT 05401. 802-864-9779

Magnecord PT-6, (4) plus one for parts, dubbing amp & regular amp, mounted in rack (also avail) & used for making 3 copies from master; also rack mounted fan & adapter for 10" reel, master, BO. G Kristianson, Villa Skansen Inc, 122 Fairmount St, S Burlington VT 05401. 802-864-9779.

Electro Sound 505 R/P amp 2 roll cabinet, very nice, \$1200/trade for low power working xmtr. RJ Smith, Gospel Spotlight of N GA, POB 406, Summerville GA 30747. 404-857-5815.

Studer-Revox HS-77MKIV FT mono, 15 ips, special factory order, under 10 hrs use, mint cond, \$995/BO/trade. Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-766-9101. 10 AM-noon PST.

Revox A77 1/2 trk, 3.75-7.5 w/variable speed, gd cond, \$300. G Give, The Video Connection, 31844 Rancho Amegos, Borsall CA 92003. 619-749-7662.

Tascam 34, 4 chnl, excel cond, extremely low hrs, w/manuals, \$850. B Osborne, A/V Assoc, 4760 E 65th, Indianapolis IN 46220. 317-253-8562.

Marantz/Superscope CD330 portable 3 head stereo cass deck w/limiter & mic pads, Dolby, service manual, \$135. R Cannata, Cantrax Recorders, 2119 Fidler Ave, Long Beach CA 90815. 213-498-6492.

Teac 3440 4-trk, new heads, \$400. M Patton, WXOK, 6819 Cezanne, Baton Rouge LA 70809. 504-292-4189.

Revox PR99 PB only, 2 trk, superb cond, \$1000/BO. K Harnack, Harnack Eng, 1197 Gibbons Ave, Memphis TN 38127. 901-353-4837.

Marantz/Superscope CD330 portable stereo cass deck, limiter, mic pad, Dolby, monitor speaker, ops & service manuals, original carton, excel cond, \$150 firm. R Cannata, Cantrax Recorders, 2119 Fidler Ave, Long Beach CA 90815. 213-498-6492.

Ampex AG440B-4 1/2" 4 trk, \$2700. A Baker, Bdct Prod of America, 804 E 38th, Indianapolis IN 46205. 317-925-7371.

Ampex 350 mono w/Inovonics elect, solid state, rack mount, \$500. A Baker, Bdct Prod of America, 804 E 38th, Indianapolis IN 46205. 317-925-7371.

Berlant BR30 (2) 10" reel transports c/w heads, gd motors & elect, operating cond, w/spare motors & heads, \$250/both plus shpg. J Smith, Mobile Bdct Svcs, 758 St Michael St, Mobile AL 36602. 205-432-7807.

Ampex AG 600-1 half-track stereo, perf cond, \$650. G Kenny, BMA Inc, POB 817, Neosho MO 64850. 417-451-1440.

Ampex 440-C FT, very clean, \$1000 ea. N Erickson, Rainbow Rcd Stds, 2322 S 64th Ave, Omaha NE 68106. 402-554-0123.

Magnecord 1028 w/manuals (2), \$175 ea. J Schloss, KICD, 2600 Hiway Blvd, Spencer IA 51301. 712-262-1240

Scully 280-B (2), two track & mono, w/variable speed, gd to excel cond, \$1200. D Schmitz, Irving Prod, 3202 E 21st, Tulsa OK 74114. 918-744-1221

Ampex AG350 mono w/solid state elect, rack mount, \$800. A Baker, Bdct Prod of America, 804 E 38th, Indianapolis IN 46205. 317-925-7371

Want to Buy

MCI/Sony capstan & reel motors, any cond., recdg heads, most mfgs, machines, new, used. Relapped then sold. Amp Services, 224 Datura St No 614, W Palm Beach FL 33401. 800-826-0601. in FL 305-659-4805.

Revox A-77 rack mount assembly, consider tape carts in trade. D Peluso, KFMS, 101 Convention Ctr Dr #P-120, Las Vegas NV 89109. 702-732-7753.

Pioneer RT707, 1/4 trk only (2), J Vukelich, Bdct Svcs, 4551 Flag Ave N, Minneapolis MN 55428. 612-537-1431

Sony TC-510R pre-end auto-reverse cassette recorder w/real-time readout. Roy or Jim, Liberty Audio, 824 W Broad, Richmond VA 23220. 804-788-7008

Otari MX5050B-11 & ARS-1000 R Hendryx, KALP, Box 9650, Alpine TX 79831. 915-837-2144

ITC 750 or 850 in gd cond. G Stonebraker, KMYO, POB 1360, Aztec NM 87410. 505-632-3402.

Multitrack transport or recorder, any cond, wanted by non-profit org (IRS qualified), will pick up. B Goldes, Balalaika Orch of Detroit, 1937 Byrd, Dearborn MI 48124. 313-271-3261.

Dictaphone 1000 or 4000 system or components. Larry, 412-763-8359.

Otari MX5050BQII, must be in very gd cond, B Hanson, KCMQ, POB 459, Columbia MO 65205. 314-449-2433.

Otari 5050B or equiv, need several stereo half track R-Rs, gd cond. D Agnew, 402-488-4275.

Revox A77's (2). R Ramirez, WSOE, POB 1246, Madisonville KY 42431. 502-667-5440. VT 05401. 802-864-9779.

CONSOLES

Want to Sell

Ramko DC-8M dual mono console, original & gd cond w/normal wear. in service, avail 12/88, \$1000/BO. P Craddock, KWBC, 116 Railroad St, Navasota TX 77668. 409-825-6484.

Sparta remote prod console w/(2) TTs, 5 chan mono board, \$300. B Spitzer, KKLK, Rapid City SD 57701. 605-343-6161

Alltec Lansing antique audio console, cond unknown, w/manual. M Black, WEOS, Hogart William Smith College, Geneva NY 14456. 315-789-8970

Micro-Trak Sport III portable prod package w/4 inputs/2 chan, 3 headphone outputs & telco dial pad in case, \$285. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

Micro-Trak 6618, 6 chan 18 input stereo, excel cond, \$800; Gates Statesman 5 chan stereo, gd cond, \$600. Don, 2003 Brewster Rd, Bellevue NE 68005. 402-733-4747.

BE 150S 5 chnl stereo upgraded to BE 260S model, \$2150. M Bailey, Word Bdctg, 3565 Timmerglenn Ste 1607, Dallas TX 75287. 214-306-7716.

Numerk MX3000, excel cond, 6 mic input mixer, \$125. R Branske, 5347 S Spaulding, Chicago IL 60632. 312-737-3303.

Shure SE-30 gated compressor/mixer, excel cond, \$300. E Reith, 1715 Illinois Rd, Northbrook IL 60062. 312-866-5727.

Autogram AC-8/IC-10 (10), MT-1 matching & BT-1 bridging input transformers, also new switches, pots, knobs, 1819 lamps, diodes, BO; ESE slip-in 12-24 hr clock for AC-8/IC-10 consoles, BO. B Royster, WQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

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Harris Diplomat 10 chnl, \$975. P Willey, H&W Bdct, 372 Reservoir Rd, N Adams MA 01247. 413-663-3419

Gates Gatesway Producer 4 chan, mono, gd cond, w/manuals, BO; Gates Gatesway II 8 chan, mono, fair cond, BO. S Coston, 2109 Stalham, Chesapeake VA 23324. 804-397-9206.

Peavy 601R 6 chnl mixer, 3 band EQ, brand new, excel cond. XLR & phono & 1/4 inputs, LED VU's rack mountable, \$350; DOD 4 chnl mike mixer, 1 rack space high. EQ & effects on each chnl, \$300. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

Gates Stereo Statesman, excel, \$600; Gates Yard, gd cond, \$250. J Cramden. 315-487-2393

Collins 212 G-1, gd cond, BO. W Borneman, WBYO, Box 177, Boyertown PA 19512. 215-369-1075.

Harris Mono 5 vgc, w/manual, \$400. B Cain, WFPG, 2707 Atlantic Ave, Atlantic City NJ 08401. 609-348-4646.

Quantum QM12P 12 chan stereo, 22 inputs, in service, \$3000. K Thomas, POB 207, Atlantic Beach FL 32233. 904-388-7711

Ampex MX35 mixers (2), \$250 ea, xformers, \$25 ea, mic & line inputs, switchable, Sigma mixers mic inputs (3), \$125 ea & echo bleeds, \$15 ea; Altec mixers 1567, \$250 ea w/VU meters xformers, \$25 ea, treble-bass att, Harmon-Kardon mixers, \$80 ea, DPR7's, Mr. Oliver, 212-874-2074.

McCurdy SS-8600, 13 in, 2 out, 2 EQs, tone osc, excel cond, \$2500. E Dausman, 55 Columbia Ave, Berkeley Hts NJ 07922. 201-665-2550

Ampex-Sigma 3761 (2) 4 chan mike mixers, excel cond, \$75 ea or \$125/both. B Leslie, Pro Recdg Svc, 13709 Maple Leaf Dr, Cleveland OH 44125. 216-662-1435.

Tangent Series 4 20 input by 4 by 2, price inc road case & comm module, \$2500 firm. T Evans, Reel Prods, POB 427, Allston MA 02134. 508-343-0673.

Wheatstone SP5, great prod console, \$12000. S McCloskey, WBHH, 916 Bay St, Beaufort SC 29902. 803-524-9210.

Ampro AC-105 10 chan, \$2500; Sparta Centurion II 12 chan slider, \$3000. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

Yamaha 916 prod board, \$2000. M Legner, 703-971-7069.

Quantum QM-8 8 in 4 out, excel cond & Speck 16 in 8 out remote power supply, easily portable, \$1195 ea/BO/trade. Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-766-9101. 10 AM-noon PST.

Sparta AS-40B 8 chnl stereo, excel cond, w/manual, \$1200. J Stevens, 150 E Olive #108, Burbank CA 91502. 818-953-5099.

LPB Signature II stereo 10 chnl, brand new, \$5000/BO. R Shannon, Randcraft Comm, 408 Jane Way, Lutkin TX 75901. 409-564-3723.

Biamp 1682 16 chnl stereo mixing console, \$300. C Haynes, WJMI, POB 31235, Jackson MS 39206. 601-948-1515.

Gates Yard input transformer bank, \$75 plus shpg; GE BC1A power supply, gd cond, but needs minor work, \$30 plus shpg. G Heidenfeldt, 2880 W Lake Rd, Wilson NY 14172. 716-751-6187.

McMartin B-802 stereo w/mono mix-down, \$550. B Kuiper Jr, WFUR, POB 1808, Grand Rapids MI 49501. 616-451-9387.

Sparta A-20-2 8 x 2 w/Daven pots (has cue), ch 7 & 8 w/rocker switch & Canon connectors on rear, \$500. A Baker, Bdct Prod of America, 804 E 38th, Indianapolis IN 46205. 317-925-7371.

Gately 16 x 8 w/EQ, 4 effects buss, quad monitoring, Canon connectors for line & mic inputs & Canon connectors for outputs, \$2800. A Baker, Bdct Prod of America, 804 E 38th, Indianapolis IN 46205. 317-925-7371.

RCA stereo console, excel cond, \$1750. P Martin, Pioneer Bdct, 4359 S Howell, Milwaukee WI 53206. 414-482-2638.

Tascam 30, 8 input, 4 buss output mixer, 8 trk monitor submix, 3 band EQ, RIAA phono inputs, excel cond, w/manual, \$750. B Osborne, A/V Assoc, 4760 E 65th, Indianapolis IN 46220. 317-253-8562.

Micro-Trak 6618 6 chan stereo, excel cond, \$1200. C Ratliffe, WADE, POB 1210, Wadesboro NC 28170. 704-694-2175

Broadcast Audio Mark IV-8 8 chnl stereo, priced to move, 3 yrs old, R Lane, KTYD, 5260 Hollister Ave, Santa Barbara CA 97116. 805-967-4511.

Collins 212T 2/4 chan console w/18 linear faders, operating, w/manual, \$900. J Smith, Mobile Bdct Svcs, 758 St Michael St, Mobile AL 36602. 205-432-7807.

ATI Vanguard Series 8 chnl stereo, slide pots, 12 inputs, 2 yrs old, new cond w/spares, \$1950. C Murray, KMGE, 925 Country Club Rd, Eugene OR 97401. 503-484-9400.

Ramsa WR8112-8118, B Raines, DIR, 32 E 57th, NY NY 10022. 212-371-6850.

BE 4 chan mono, like new, \$500. D Handy, WTIF, 104 E 7th St, Tifton GA 31794. 912-382-1340.

Want to Buy

PR&E BMX line modules, any cond, need at least 3 immed, will need more in future. P Mitchell, KPOI, 741 Bishop, Honolulu HI 96813. 808-524-7100.

Tascam MX-80 8 x 2 mixer w/rack ears. G Steadman, WBUR, 630 Commonwealth Ave, Boston MA 02215. 617-353-2790.

Any stereo 6-8 input consoles, non-working but in decent shape. R Hines, Hines Eng Svcs, 265 Emming St, Cincinnati OH 45219. 513-721-7625.

Harris Executive wanted in gd cond, R Ramirez, WSOE, POB 1246, Madisonville KY 42431. 502-667-5440.

Parts for Gates Diplomat console, cheap; parts for RCA BC-8A console, cheap. C Gill, POB 371, Indianapolis IN 46206. 317-923-2800.

DISCO & SOUND EQUIP

Want to Sell

Yamaha MS10 powered speaker amp, \$75. P Cibley, 138 E 38th, NY NY 10016. 212-986-2219.

JBL L-19 new 2 way system-matched pair, BO; Technics SL-1200MK II, new lid in box, also used SP-10 MKII lid, BO. B Royster, WQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

JBL 4311 studio monitor speakers, excel cond, no grills, \$400/pr. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

Jensen C3781ST 600 ohm 15" duplex, 4 pos HF atten switch from radio station client room, closest to \$150. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

Scott Tuner FM 311-C, \$100; lead screws for disc cutting, Presto 6N, 224/104/160/120 lines per inch, \$50 ea; C apps disc cutting needles w/hot stylus, needles new, \$7 ea, boxes \$25 ea. Mr. Oliver, 212-874-2074.

Ampex 620 speaker-amp in portable tan case, \$100; Altec speaker & small cab 604B, \$225; EV 12TRX (2) in cabs EV, \$225 ea. Mr. Oliver, 212-874-2074.

dbx 157 Pro NR, 2.4 chan, total 8, simultaneous play/recording units, \$600 ea; McIntosh 2100 power amp, \$300. H Fenster, Univ Rehearsal & Recdg, 17 W 20 St, NY NY 10011. 212-929-3277.

Pultec MEQ5 mid-range EQ's (2), \$1000 ea. R Rhodes, Rhodes Music, POB 1550, Radio City Sta, NY NY 10101. 212-245-5045.

Altec 604B cabinet, \$300. Mr. Oliver, 212-874-7660

Yamaha MS10 powered speaker, \$75. P Cibley, Cibley Music, 138 E 38th St, NY NY 10016. 212-986-2219.

EMT 140 tube reverb, \$1400. T Papa, Santa Monica Snd, 2114 Pico Blvd, Santa Monica CA 90404. 213-450-2119.

E-V S1202, B Raines, DIR, 32 E 57th, NY NY 10022. 212-371-6850.

Yamaha E1010 analog delay, \$200; Realistic SCT-74 dubbing stereo cassette deck, high speed, \$100. B Roberts, 5504 87th St, Lubbock TX 79424. 806-794-6023.

Speakers (2) designed for 10,000 sq ft auditorium, array of top name speakers, 21/solid wood cabinet, \$800/BO/both. M Murrell, WTCX, Rt 1 Box 592, Dayton TN 37321. 615-775-4363.

Want to Buy

Old systems & components by Altec, JBL, Jensen, Tannoy, UREI, WE, etc. C Dripps, 4337 Maxson Rd, El Monte CA 91732. 818-444-7079 (Fax) or 818-444-6863.

JBL speaker w/150-4C woofers, N-500, N-400 x-overs. Y Chung, 1129 S Robertson Blvd, LA CA 90035. 213-274-1921.

dbx DX-40 processor or (2) dbx 150's, B Roberts, 5504 87th St, Lubbock TX 79424. 806-794-6023.

LIMITERS

Want to Sell

Thomson-CSF 4450-A Audimax, never used, \$1695; Thomson-CSF 4500 Presence EQ, never used, \$795; CBS-Labs 400 Volumax, good buy, \$100. H.M. Dyer Electronics, 2



Broadcast Equipment Exchange

MICROPHONES . . . WTS

Neumann U47 w/pwr supply, \$1725. Mr. Oliver, 212-874-7660.

RCA 74B ribbon mike, just rebuilt, \$215; 1935 Western Air Patrol AM radio w/2 short-wave bands, completely restored in & out, very nice, \$125. R Button, R&R Recdg, 48 Shattuck Sq #6, Berkeley CA 94704. 415-843-6733.

Vega Pro 63 dual diversity FM wireless mic, excel cond, \$1200. J Stizinger, 23800 Via Irena, Valencia CA 91355. 805-259-2011.

RCA Junior Velocity similar to 44, perfect cond, chrome body (2), \$275 ea; also rare static ribbon (2), \$75/both. W Dudley, Location Sound, 6919 19th St, Tampa FL 33610. 813-237-5516.

E-V 668, older version of RE20. G Kenny, BMA Inc, POB 817, Neosho MO 64850. 417-451-1440.

Want to Buy

Old RCA & WE mics, esp RCA skunk mic MI3043, BK-4A, BK-10, 50A or SK-50; WE 394, 640, 618A & AKG D-20. J Webb, 15117 Hamlin St, Van Nuys CA 91411. 818-769-6738.

RCA or WE 44BX 77D's, 639s, etc, working or not. B Davies, Virgo Prod, 5548 Elmer, N Hollywood CA 91601. 818-761-9831.

Shure SMSB, S Johnston, WGH, 281 Independence Blvd Ste 101, Virginia Bch VA 23462. 804-826-1310.

MISCELLANEOUS

Want to Sell

Bezels, (20) 3/4", fit 513 series Dialight switches; also (20) 3/4" buttons, red, green, white, sell all or part cheap. J Nickel, KJSK, Box 99, Columbus NE 68601. 402-564-2891.

Andrew 1920A auto dehydrator, gd cond, w/manuals, \$1000/BO; Extel AH11R, 141R printers (2), dot matrix, gd cond, both work, w/24 ribbons, \$500/BO. D Woodcock, WNW, 5606 Medical Circle, Madison WI 53719. 608-271-1025.

Plastic record sleeves, 12", 8/pkg (40), BO. Orban MRF-1, BO; Heathkit GRF 1010 (2), \$55 ea. PR&E 2 & 4' tapped rack rails for wooden cabinets, 1-3/4" on up 19" blank rack filler panels & rack screws, all new, BO. B Royster, KQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Inventory closeout-sale of tape carts, audio connectors, studio accessories and supplies at dealer cost and below. Request free list.

BESCOM

P.O. BOX 3141
Bristol, TN 37625
(615) 538-7068

Spotmaster (2) new 20 space rack mount cart rack, one used 40 space cart rack; (2) 300 space lazy susan round wooden cart racks & 200 space wooden wall mount racks, BO; CBS Labs BTR, STR, etc, BO. B Royster, KQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Large amount misc items, such as telco type relays, splicing blocks; quik-kits; composite clippers & more, call for details/prices. B Royster, KQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

The World Transcription Library, 16" disc w/catalog, mint cond, \$1500/BO. R Bellavia, WSBC, 4949 W Belmont, Chicago IL 60629. 312-282-WSBC.

Spantal voice pagers, \$22 ea, like new (100). Mudge, DataTel Comm, 8577 Sandy Crest Dr, Union Lake MI 48085. 313-698-2336.

Amp fans (2), \$20 ea. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

Metro Data K-100 keyboard w/phone coupler & D-100 xmtr unit, use for programming on cable channels or for low power TV, excel cond, \$800. K Crosthwait, Rt 5 Box 77, Kingston TN 37763. 615-376-5763.

Standard equip racks 70" (4), \$50 ea. C Washington, WFRK, 1725 Mt Vernon Rd, Leesburg FL 32748. 904-365-0659.

Heath Elect course, mint cond, AC, DC, semiconductor & microprocessor courses & two experimenter-trainer modules w/all parts, \$475. M Dille, Producers Studio, 86 E Broadway Ste 10, Eugene OR 97401. 503-683-1400.

Lambda LNS-P-24 24 V power supply, new; (3) Shalco mono 600 ohm step attenuators. R Simonson, KHAT, 4949 Yankey Hill Rd, Lincoln NE 68516. 402-423-1530.

NAB Eng book, like new, 6th ed, approx 30 volumes, misc elec books, BO for whole lot, \$35. J Dexter, 1604 Missouri Ave, Artesia NM 88210. 505-746-6590.

Half-cabinet, 19", gray, two locking doors, unused, ideal for repeater installations, (10), \$200 ea. Larry, 412-763-8359.

IBM displaywriter office word-processor, w/printer, DD disk drive, \$2500. Larry, 412-763-8359.

GE 30F1445, oil filled capacitor, 1.5 uF, 15 kV, non-PCB, 8W x 4L x 8H w/brackets, new. \$400/BO. W Shulz, WFYR, 130 E Randolph St, Chicago IL 60601. 312-861-8100.

Scott tuner FM 311-C, \$175; disc cutting lead screws 224/104/160/106/120, \$45 ea; Capps disc cutting units w/meters w/pigtails for hot stylus, \$8.50 ea; hot stylus units w/meters (2) heats needles for disc cutting, \$25. Mr. Oliver, 212-874-7660.

Ampex MX35 mixers (2), mic-line in, \$250; xformers for line input, \$30 ea, uses two, 4 inputs; Altec mixers portable also 1567A's, \$250 ea; xformers for Altecs, \$30 ea, uses five, if needed, 5 inputs; Sigma mixers, mic in 250 (3) mixers & echo bleeds, \$140 ea. Mr. Oliver, 212-874-7660.

Selenium rectifiers (2), new, HD current; RCA TK-45 color cam remote cont joystick; Varagon TV7 zoom lens complete innards; Canon 35mm 72 wide angle lens C mount for TK 11 B&W, BO. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

Patch bays (4) single input, nearly new, \$60 ea. Mr. Oliver, 212-874-7660.

Lang model 36" high, 19" standard wide, wheels, \$55. Mr. Oliver, 212-874-7660.

Knobs from 1st generation RCA TV EQ; Jones plugs & sockets from old RCA TV; major sound effects discs; instruction manuals; 1st generation TV EQ from TK30s forward, BO. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

Wegener FM cable modulator, mono at 103.9 for putting AM daytimer on FM cable, \$800. D Kelly, KWPN, Box 84, West Point NE 68786. 402-372-5423.

New FM, Class A radio station seeks, tower, transmitter & studio equipment, call N. Norris, 313-234-4335.

Capacitors, G2B 0.0001 at 10 kV, \$20; type 1950 0.0005 at 6 kV, \$20; Type E 0.0005 at 12.5 kV, \$15; Type 1996 0.002 at 12.5 kV, \$15; Type F3B 0.002 at 8 kV, Type F2L 0.001 at 5 kV, \$7.50. L Owens, 2824 Dan Patch Dr, Lexington KY 40511. 606-252-5072 aft 5 PM ET.

Resistors: (8) Ohmite 100 ohm 175 W, \$7.50 ea; (4) Ohmite 10 ohm 100 W, \$5 ea; (8) Ohmite 5 ohm 50 W, \$3 ea. L Owens, 2824 Dan Patch Dr, Lexington KY 40511. 606-252-5072 aft 5 PM ET.

Anderson Jacobson A242A acoustic mod- em, half or full duplex; Anadex DP8000 tractor feed printer; Radio Shack TRS-80, Mdl 1 printer; Radio Shack TRS-80 Mdl 1 monochrome video monitor, all items worked when removed from service, BO on ea. T. Driggers, Driggers Bdct, 818 Quail Ct, Healdsburg CA 95448. 707-433-9370.

Teletype ASR33, (3) one working, two for parts, BO. C Edwards, WWJM, 210 S Jackson St, New Lexington OH 43764. 614-342-1988.

Generator, 10 kW diesel, 208 V, 3 phase, electric start, on trailer, \$2000. G Kenny, BMA Inc, POB 817, Neosho MO 64850. 417-451-1440.

Extel AF-11R (3) teleprinters, 1 ea Lenkurt 25A line interface unit, 1 ea B&I Elect ST-104 alarm unit, 2 ea factory service manuals, assorted PC boards & spare parts, \$600/lot. B Humpherys, Utah State Univ, Logan UT 84322. 801-750-3133.

Handbook of Radio Publicity & Promotion, new copy, \$20/BO; (4) Acoustaliner wood veneer speakers, used in mobile disco, weigh about 75 lbs ea, handle 900 W RMS, \$1000/all. G Johnson, WAGN, 413 10th Ave, Menominee MI 49858. 906-866-5551.

Want to Buy

Equip needed to build new class A FM, from tower to mic. S Norris, 313-234-4335.

Broadcast pins, network, Olympic, station, M Black, WEOS, Hogart College, Geneva NY 14456. 315-789-8970.

Schematics, blue prints for consoles, studios, etc, books on bdct elect courses, cheap. K Meazes, POB 71098, LA CA 90071. 213-666-9570.

Wire recorder that works. H Russell, Admix Bdct Svc, 960 Woodward Dr, Charleston WV 25312. 304-744-0022.

Manual for Narda 443 power meter. J Gerike, KWIX, 300 W Reed, Moberly MO 65270. 816-263-1500.

Old 'On the Air' sign, 50's or earlier, also old mics. B Hawkins, 6255 52nd NE, Seattle WA 98115.

Info on DA antenna & phasor design to learn from, cheap. C Gill, POB 371, Indianapolis IN 46206. 317-923-2800.

MONITORS

Want to Sell

HP 335B FM mod monitor, gd cond, \$100. G Gunter, KMAB, 650 N Boulton, Jacksonville TX 75766. 214-586-2162.

TFT 780 FM receiver module for TFT EBS, currently at 94.5 MHz, \$200/BO. M Black, WEOS, Hogart William Smith College, Geneva NY 14456. 315-789-8970.

McMartin TBM2000A SCA monitor, \$500. G McCoy, KZEN, 1608 16th St, Central City NE 68826. 308-946-3816.

Belar RFA-1 RF amp; Belar SCM-1 SCA monitor; TFT EBSO EBS encoder/decoder/fixed freq rcvr; CBS Audimax 4450, all in gd working cond, BO. M Bostic, WKLX, 259 Monroe Ave, Rochester NY 14607. 716-454-3040.

Collins 900C-3 monaural or stereo mod monitor w/manual, \$875. D Hill, KXAL, POB 1393, Mt Pleasant TX. 214-572-6536.

Collins SCA monitor, working, also many others; McMartin 1969 model, stereo monitor tuned to 97.3, \$600 & test equipment also, \$100. L James, BEST Prod, 611 N Greer, Pittsburg TX 75686. 214-856-2892.

Belar TVM1, TVM2, RF amp, TV aural mod monitor, \$2700. B Weiner, KNYO, 210 Allen, Glendale CA 91201. 818-409-0185.

Gates AM 80 AM mod monitor. M Patton, WXOK, 6819 Cezanne, Baton Rouge LA 70809. 504-292-4189.

McMartin mod monitor, stereo, tube type, \$500. P Martin, Pioneer Bdct, 4359 S Howell, Milwaukee WI 53206. 414-482-2638.

Want to Buy

Manual or copy for McMartin TBM 3500 FM mod monitor. C Gill, POB 371, Indianapolis IN 46206. 317-923-2800.

Manual or copy for McMartin TBM 3000 FM freq monitor. C Gill, POB 371, Indianapolis IN 46206. 317-923-2800.

MOVIE PROD. EQUIP.

Want to Sell

Movie cameras: 16mm snd on film Pro 1200 Auricon in new cond, \$2000; 35mm w/2000' & several 400' magazines, Bertheot zoom, all new, \$2500; also 35mm synchronizer 3 gang, \$125, 2 gang, \$110; proj Singer automatic threading in excel cond, \$165. JAN 16mm snd proj, mint working cond, \$200. L Meister, WBAI, 32* River Rd, Nutley NJ 07110. 201-667-2323.

16mm splicers, synchronizers, moviscoopes, full cote, rewinds, Bach-Auricon sound system, B&H to DR, Frezzi 1000 inverter; Siemens interlock projector, all well cared for. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

RECEIVERS & TRANSCEIVERS

Want to Sell

Sansui G-7700 stereo receiver, 120 W/chnl, digital tuner w/lots of inputs, \$300. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

CONSULTANTS NEED

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Broadcast Equipment Exchange

RECEIVERS . . . WTS

Hallicrafters SX-43, vg w/Sams Photofact schematic, \$75; Scott receiver, floor mdl, nickel plated chassis, Wunderlich tubes, multiband, \$100. J Dexter, 1604 Missouri Ave, Artesia NM 88210. 505-746-6590

Regency HX2200 handheld scanner, ranges 118-174, 406-512, 800-950, NiCads, charger, case, like new in box, \$220 H Goldman, PRO, 31 Mulberry St, Springdale CT 06907 203-322-2537

Bearcat BC-15 10 chan scanner, like new, \$100. B Weiss, KLSI, 3101 Broadway Ste 460, Kansas City MO 64111. 816-753-0933

Contact 360 receiver and down converter for AC format, \$2500 P McQuade, KATO, PO Box L, Safford AZ 85548. 602-428-1230.

Hughes video satellite receiver, M Patton, WXOK, 6819 Cezanne, Baton Rouge, Louisiana 70809. 504-292-4189

Regency HX2200 handheld scan, ranges: 118-174, 406-512, 800-950, NiCads, charger, case, like new, \$220 H Goldman, PRO, 31 Mulberry St, Springdale CT 06907 203-322-2537.

Want to Buy

McKay-Dymek AM-5 hi-fi AM tuner or equiv G Liebsch, WPTF, POB 29521, Raleigh NC 27626. 919-790-6315

Motorola MOCAT CB radios K Linden, 3605 Michael Ct, Annandale VA 22003 301-953-0612

REMOTE & MICROWAVE EQUIPMENT

Want to Sell

Marti M306B-T RPU xmtr, gd cond \$100. G Gunter, KMAB, 650 N Boulton, Jacksonville TX 75766 214-586-2162

Marti STL-8 dual STL & Marti remote control: TRC-15A Moseley remote, all like new. J Cramden, 315-487-2393

Gentner SPH-3 telco interface, great shape, \$300. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619 800-874-7599

Moseley DRS-1 20 channel expandable digital remote control system with extra spare parts and boards, \$1950 G Wachter, KFYI, 631 N First Ave, Phoenix AZ 85003 602-258-6161

Satellite dishes, 8 ft. fiberglass, 12 ft. fiberglass, in sections, or 8 ft black mesh, with mounts, \$250 each, you pick up in Arkansas. L Fuss, Contemporary Communications, PO Box 4010, Opelika AL 36803. 205-749-3340.

* * BAX * *

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ACTION-GRAM

Equipment Listings

Radio World's Broadcast Equipment Exchange provides a FREE listing service for all broadcast and pro-sound end users. Simply send your listings to us, following the example below. Please indicate in which category you would like your listing to appear. Mail your listings to the address below. Thank you.

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Make: _____ Model #: _____

Brief Description: _____

Price: _____

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Company Name: _____

Address: _____

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Phone Number: _____

WTS: WTB: Category: _____

Make: _____ Model #: _____

Brief Description: _____

Price: _____

Contact Name: _____ Title _____

Company Name: _____

Address: _____

City, State, Zip: _____

Phone Number: _____

WTS: WTB: Category: _____

Make: _____ Model #: _____

Brief Description: _____

Price: _____

Contact Name: _____ Title _____

Company Name: _____

Address: _____

City, State, Zip: _____

Phone Number: _____

WTS: WTB: Category: _____

Make: _____ Model #: _____

Brief Description: _____

Price: _____

Contact Name: _____ Title _____

Company Name: _____

Address: _____

City, State, Zip: _____

Phone Number: _____

**Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a *paid* basis. Listings are available on an \$18/25 word basis. Call 1-800-336-3045 for details and complete display rates.

BROADCAST EQUIPMENT EXCHANGE

PO Box 1214, Falls Church, VA 22041

Comrex PTLX & RTLX two line freq extension system with extra receiver and automatic level set unit, \$10,000 J Stolz, WCVG, 813 Highway 50, Milford OH 45150. 513-248-1072

Fairchild Dart 384 digital satellite recr, like new, 15 kHz & 75 kHz, \$14,695 D Ganske, WISM, 1819 Mitchell Ave, Eau Claire WI 54701 715-836-9476

Moseley LVK, TSK-1, BO; also complete spare semiconductor kits for TRC-15AW, PCL-505/C, PCL-303/C, BO, B Royster, KOM Bdtg, 1019 Cordova, San Diego CA 92107 619-223-3413

Rust RC-2400/Mod 45 transmitter/receiver system with manual, model 45 remote control relay panel, \$200 D Loucks, KTKL, 2132 West 42nd, Casper WY 82604. 307-265-6700.

S-A 15 kHz dual digital decode card for ABC news feed, \$800, T Brandenburg, KGTS, College Place WA 98324. 509-527-2991

Wegener sat receiver, 1601 mainframe, all cards for Transtar stereo country, Panda boards and demods, Best Offer, T Bigby, KXLA, PO Box 990, Rayville LA 71269 318-728-6990.

Laux rcvr for SMN country format, G Gilpin, WAGR, POB 2265, Luumberton NC 28359 919-729-3394

Marti RMC20 remote control complete studio transmitter set w/3 slaves hand delivered or telco, in working order, \$1700/BO, R Ryley, KWIC, 1690 N Major Dr, Beaumont TX 77706. 409-866-8899

S-A 6650 satellite receiver, excel cond, BO W Borneman, WBYO, Box 177, Boyertown PA 19512. 215-369-1075

Marti receiver on 161.73 MHz, great cond, \$150 L James, BEST Prod, 611 N Greer, Pittsburg TX 75686 214-856-2892.

Moseley TRC15A remote control w/Hallikainen TEL171 digital metering installed, \$1500, D Kelly, KWPN, Box 84, West Point NE 68788. 402-372-5423.

Moseley WRC-10T studio unit, good condition, out of service 5/88, \$400 B Frank, KANO, 100 East Main, Anoka MN 55303 612-427-7550

Moseley PBR-30 RC system, \$800, J Stromquist, WNCB, 2816 Hagberg St, Duluth MN 55811 218-722-3017

Moseley PCL 505-C microwave/STL, Moseley TRC-15 transmitter/receiver with subaudible and subcarrier J Kramden, KJKL, 183 Jane Dr, Syracuse NY 13219. 315-487-2393

AdCom 7010 agile FM sat demodulator, \$500, G Gerke, Armada Broadcast, POB 444, Wisconsin Dells WI 53965 414-254-2546

Marti RPT1 UHF & VHF, \$350; Marti RMC-2AX transmitter end only remote control; Marti SCG-8 subcarrier generator; 950 MHz cavity resonators; VHF yagis, brand new in box. M Patton, WXOK, 6819 Cezanne, Baton Rouge LA 70809. 504-292-4189.

Want to Buy

TFT 7700B or Moseley 505/C composite STL system, R Hixon, Trans World Radio, 700 Shunpike Rd, Box 98, Chatham NJ 07928. 201-966-2700.

TRC15 remote control unit, J Foley, KBOX, 110 W Laurel Ste H, Lompoc CA 93436. 805-541-2715

SCPC receiver with 3:1 expanding with block down converter, J Foley, KATY, PO Box 841, San Luis Obispo CA 93406. 805-541-2715.

Comrex single line frequency extension system L Houch, Rollin Recording, 210 Altgelt, San Antonio TX 78201 512-736-5483.



Broadcast Equipment Exchange

STATIONS . . . WTS

Radio station, 1 kW daytime AM. FCC approval to increase to 2.5 kW, approx 4 acre tower site, recently renovated office bldg on approx 1/4 acre in business district, new bldg & prod equip, \$420,000. J Brown, POB 958, Douglasville GA 30133. 404-920-2281 or 404-949-6365.

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NW of San Antonio, TX, 500/250 W AM, assume & small down. 512-691-0716.

Want to Buy

FM CP wanted, any market, anywhere, exp broadcaster, total or partial buy-in, mgmt exp. C Shapiro, 413-584-2924.

AM, FM, TV or CP for right price/terms, principals only. G Haston, 1119 San Antonio St, El Paso TX 79970. 915-533-4700.

STEREO GENERATORS

Want to Sell

Moseley SSG-3T, gd cond, \$85; Collins stereo gen card for Collins 310Z-1.2 exciter, also spare semiconductors for 310Z-1 exciter, BO. B Royster, KQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Harris TE3 stereo gen, BO. T Driggers, 818 Quayle Ct, Healdsburg CA 95448. 707-433-9370.

Want to Buy

Gates M-6146 or similar unit that mates w/Gates M-6095 exciter. M Meyer, WWCK, 3217 Lapeer, Flint MI 48503. 313-744-1570.

Any make/model stereo gen, cheap. P Krieger, KRCK, 423 N 47th St, Omaha NE 68132. 402-553-0980.

SWITCHERS (VIDEO)

Want to Sell

ISI 902 switcher, 10 inputs, 2ME, 8 rotary wipes, positioner, pgm, preview outs, gd cond, \$1000. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Vital 114-10X video switcher, RGB chromakeyer, flip flop mix, 1 ME & audio follow, \$5000. T Judge, TAG Communications, 75 Weaver Road, W Millford NJ 07408. 201-697-6454.

Want to Buy

Large video prod switcher w/at least 20 inputs & 3 ME's. H Henson, Henson Prod, 3796 Bethania Station Rd, Winston-Salem NC 27106. 919-924-8717.

TAPES, CARTS & REELS

Want to Sell

Used carts, various lengths, 50" ea. T Hunt, KILA, 2201 S 6th St, Las Vegas NV 89104. 702-731-5452.

A&D

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NAB reels, 10.5" metal 1/4", all in gd cond, 1-10, \$1.50 ea, 11-100, \$1.25 ea, 100+, \$1 ea. Falk Recd Svcs, 7914 Fegenbush Ln, Louisville KY 40228. 502-239-1010.

Plastic reels, hundreds of empty 7.5", BO; Ampex 641 tape, in boxes, \$1/reel. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

Pre-recorded music, 17 reels, some never used, from Music Director Series, \$20 ea. C McGinty, WEKC, 710 Croley Bend Rd, Williamsburg KY 40769. 606-864-7843.

Fidelipac carts (150) need rebuilding, \$50. B Cain, WFPG, 2707 Atlantic Ave, Atlantic City NJ 08401. 609-348-4646.

Tape carts, all lengths, Mastercarts, Fidelipacs, \$1.50 ea. P Martin, Pioneer Bdct, 4359 S Howell, Milwaukee WI 53206. 414-482-2638.

Scotchcarts, approx 1500, lengths from 2.0 to 7.5 min, mostly 3.5 to 5.5 min, all in gd cond, mix of black and brown shells, \$2 ea/BO on whole lot. M Bostic, WKLX, 259 Monroe Ave, Rochester NY 14607. 716-454-3040.

Ampex reels, (200) w/hub 1 mil 642 tape, erased music syndication tapes, little use. \$5/reel plus shpg. T Moore, WBCO, 403 E Rensselaer, Bucyrus OH 44820. 419-468-2326.

Fidelipac '50s, '60s & '70s carted Gold library, mono, 800 plus titles, \$1500 plus shpg. P Martin, Pioneer Bdct, 4359 S Howell, Milwaukee WI 53206. 414-482-2638.

Fidelipac 300 audio carts (100), \$2 ea. H Casteel, Technichrome, 701 Desert Ln, Ste 4, Las Vegas NV 89105. 702-386-2844.

Want to Buy

Records & tapes of music from '40s-'60s, music documentaries, etc. S Stevenson, POB 735, Blaine WA 98230. 604-531-4576.

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Programmer: turnaround/startup. Market: 20,000+. Plan now, dominate by summer. Det.: S Temoat, 211 Green, Pratt KS 67124-1604.

Former KFRC eng avail FT/PT in San Fran North Bay area, exp: digital, audio, RF. T Driggers, 818 Quail Ct, Healdsburg CA 95443. 707-433-9370.

DJ looking for work at medium/small market station, 14 yrs exp. Write: D Tucker, 407 S New Madrid St, Sikeston MO 63801.

Engr, 20 yrs exp, seeks position as radio CE, or as bdct equip sales rep, want Western NY, but will consider anywhere. P Shirley, POB 292, Mumfords NY 14511. 716-538-2976.

Exp Sr Bdct Eng, can handle turnkey construction, facilities design & FCC paperwork, major market exp, group oriented, will relocate anywhere, excel refs. Write: RW, POB 1214, Falls Church VA 22041. Attn: Box 10-1-88RW.

GM w/exp as CE, PD, SM is looking for small mkt station to manage, 19 yrs exp in

all types of formats, call anytime. P Plank, POB 1401, La Quinta CA 92253. 619-564-4065.

Eng mgr seeks position as group tech director, 20+ yrs bdct industry w/previous TD exp, as well as tenure w/equip manufacturers (both mktg & eng). Write: RW, POB 1214, Falls Church VA 22041. Attn: Box 9-1-88RW.

CE seeks position in Midwest, 18 yrs exp FM & AM high power directional, FCC general license. Write: RW, POB 1214, Falls Church VA 22041. Attn: Box 9-3-88RW.

GM avail, prog & ops oriented, believe substance sells, music's important, but no jukeboxes, 35 yr radio/TV vet, 15 yr management small-medium mkt. Call John, 912-564-2922.

CE wishes to relocate to Vermont, presently working at AM/FM, resume on request. Write: RW, POB 1214, Falls Church VA 22041. Attn: Box 9-2-88RW.

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Small, rapidly growing tower installation & maint firm seeks team chief with 3-4 years exp with knowledge of broadcast & communications industry. Benefits. 916-638-8833.

Bdcast radio network seeks tech trainer who primarily will be responsible for the planning, development, coordination & delivery of NPR production & engineering tech training programs for public radio system personnel & independent producers. Requirements include 6 yrs experience in bdct eng/prod to include 2 yrs as a tech trainer. Demonstrated ability & experience to train effectively. Send cover letter & resume w/salary requirements to: National Public Radio, Personnel Dept., 2025 M St., NW, Washington DC 20036. EOE/AA

Corporate CE for 1 kW daytime 1170 kHz, class A FM w/pending power increase to 50 kW & three tower directional 690 kHz. Moving to beautiful new facility. Excellent opportunity for the right person. Must have own tools. Call Jim at 414-324-4441.

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Audioapak, Fidelipac, 3M, mono & stereo, used bdct carts. Herb, ATI Mark V Products, 1395 Manassero St, Anaheim CA 92807. 714-779-8833.

1/2" video tape, for Sony AV-3600 Series VTR's. A Ross, Univ of WA, Media Svcs, CDMTC, WJ-10, Univ of WA, Seattle WA 98195. 206-543-4011 X230.

Thesaurus, World, Lang-Worth & Associates transcription libraries, in top cond. C Fuller, VOICES, 119 S Constance Ln, Country-side IL 60525. 312-579-9578.

Audio tape, 1" R-R, used once, on reel or hub. T Houston, Custom Audio Rcd, 929 California Ave, Bakersfield CA 93304. 805-324-0736.

TAX DEDUCT. EQUIP.

Need equip to start small educ station, have test gear to trade or will except donation of equip (tax exempt). B Dean, Down East Machine School, Rt 1 Box 388, Machias ME 04654. 207-255-4735.

Eng student desiring dona of old bdct equip (anything in repairable cond, will pay all shpg charges, EE student at Purdue. C Gill, POB 371, Indianapolis IN 46206. 317-923-2800.

Christian non-comm station seeks donated or low cost bdct equip inc FM xmtr, tax write-off. T Barnes, House of Prayer, 1520 V Ave, Lagrande OR 97850. 503-963-9143.

KBUT, small educ station, needs equip donations, cart machines, Marti rem systems, sat decoders & demods, will pay shipping. M Olson, KBUT, Box 308, Crested Butte CO 81224. 303-349-5225.

Christian radio station seeks donation of 3.5-10 kW FM xmtr, antenna system & studio equip. J Cunningham, KRAS, Box 8, Stonewall OK 74871. 405-265-4496.

Non-comm ed FM seeks donation of junk antenna or components to be used for parts in reworking standby antenna, ERI pref but any make acceptable, attractive tax write-off may be arranged, will pick up if distance not too great, write or call. A Nielsen, WDNX, Rt 2, Savannah TN 38372. 901-925-9236.

Donation of equipment to non-comm ed station, cart, R-R, patchfield, etc. M Blacc, WEOS, Hobart/William Smith College, Geneva NY 14456. 315-789-8970.

TEST EQUIPMENT

Want to Sell

Tek 453 scope, less probes & manuals, \$350 ea, also other test gear, will trade. B Dean, Down East Machine School, Rt 1 Box 388, Machias ME 04654. 207-255-4735.

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Hitachi V-1070A oscilloscope, 100 MHz, 4-channel, delay, readout, excel cond, 2 yrs old, private owner asks \$1300. Call 913-272-0704, ask for Ron.

Microwave Assoc MA7L188-S001 microwave filter & tee for 1/8" coax line, new, \$35. J Cunningham, KHKC, Rt 2 Box 113B, Stonewall OK 74871. 405-265-4496.

Dielectric 1100-A directional wattmeter w/single element socket, 1-5/8" EIA flanged line section & 2117.5 kW 50-125 MHz element, like new, \$300 firm. C Lewis, WMFD, POB 5307, Wilmington NC 28403. 919-763-6363.

Potomac AG-51 audio freq gen, vgc w/manual, about 3 yrs old, \$1400 firm. C Lewis, WMFD, POB 5307, Wilmington NC 28403. 919-763-6363.

Anritsu ME453M microwave link analyzer, perfect cond, w/all options, \$14,100. H Casteel, Megastar, 701 Desert Ln Ste 4, Las Vegas NV 89106. 702-386-2844.

Sound Tech 1710A, 1000A, 1100A, 1200A, BO; Interstate Elect F-34, BO; Fidelipac wow & flutter meter, BO; Harris stereo gain set, portable, BO. B Royster, KQM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Potomac FIM-71FM/TV field strength meter, like new, \$2750. K Thomas, POB 207, Atlantic Beach FL 32233. 904-388-7711.

G-R primary freq standard, BO. J Keller, WKOK, RD#2, County Line Rd, Selinsgrove PA 17870. 717-266-5838.

EICO 950 capacitance resistance bridge, \$25; Bird 43 Thru-line wattmeter w/detectors, \$195; RCA Voltomyst electronic multimeter, \$45; HP 200C audio osc, \$75. J Dexter, 1604 Missouri Ave, Artesia NM 88210. 505-546-6590.

Precision LCR bridge, AN-URM-90, w/book, \$100. R Simonson, KHAT, 4949 Yankey Hill Rd, Lincoln NE 68516. 402-423-1530.

EICO 377 audio gen, \$50. S Weber, KGRV, POB 1598, Winston OR 97496. 503-679-8185.

HP audio signal gen for parts, missing power xmtr, BO. P Dowie, Gd Snd, 171 Drexel, Lansd. PA 19050. 215-626-9322.

dbx 10/20 computer EQ/analyzer, stereo 10-band EQ w/10 memories, digital SPL meter, pink noise gen, mic & manual, rackmt, EC, \$395. S Hofmann, Cameron Univ Theatre, 2800 W Gore Blvd, Lawton OK 73505. 405-581-2428.

Goldline ASA30B 1/3 octave portable spectrum analyzer w/PN2 pink noise gen, never used, \$500/BO. N Lederman, Oval Window Audio, 78 Main, Yanmouth ME 04096. 207-846-6250.

Gates MO-3625 gain set, \$35. B&W 410 noise & dist meter, \$35. L Owens, 2824 Dan Patch Dr, Lexington KY 40511. 606-252-5072 aft 5 PM ET.

Leader LDM-170 dist analyzer, A-1 cond, \$450. E Braun, KODA, 4810 San Felipe, Houston TX 77056. 713-622-1010.

Tex 529 video waveform monitors (12), all gd cond, \$400 ea. G Urban, 314 W 52nd, NY NY 10019. 212-677-2200.

Tek RM-529, waveform monitor, gd clean cond, \$250. M Murphy, 11621 Valle Vista Rd, Lakeside CO 92404. 619-561-2726.

Wavetek 1801A RF sweep gen, 1-900 MHz; Tek 560 scope plug-ins. M Patton, WXOK, 6819 Cezanne, Baton Rouge LA 70809. 504-292-4189.

Tek 527 waveform monitors tube type, as is, \$75. C Haynes, WJMI, POB 31235, Jackson MS 39206. 601-948-1515.

Trompeter LPL-75 video patch plugs, gd cond, 1" pin spacing, \$4 ea; Cohu 2614-400 (2) video multiplexers w/cables & manuals, \$50 ea. B Humphreys, Utah State Univ, Logan UT 84322. 801-750-3133.

Want to Buy

Potomac AM field strength meter, gd cond. V Baker, POB 889, Blacksburg VA 24060. 703-552-4252.

Probe for Boonton 91H RF sensitive voltmeter. J Schloss, KICD, 2600 Hiway Blvd, Spencer IA 51301. 712-262-1240.

TRANSMITTERS

Want to Sell

LPB 20 W solid state AM, \$500. K Bagdasar, KCMN, 2880 E Fountain #200, Colorado Springs CO 80910. 719-636-5266.

RCA BTA-250L AM 250 watt xmtr. Will tune to your frequency. \$1500 plus crystal plus shipping. J. Gray, 10 Trinity, Ft. Thomas KY 41075. 606-781-5715.

Collins 830 10 kW FM for parts, \$2000/BO. K Harnack, WPAD, POB 450, Paducah KY 42001. 502-442-8231.

Collins 21E AM, 5 kW, 1480 kHz, gd cond. K Kuenzie, KSLQ, 102 Elm St #203, Washington MO 63090. 314-239-6800.

Versa Count V-322 fully operational 10 W exciter, BO. J Grimes, WQNA, 2201 Toronto Rd, Springfield IL 62707. 217-529-5431.

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LPB carrier current transmitter, splitters & power interfaces, BO. M Black, WEOS, Hogart William Smith College, Geneva NY 14456. 315-789-8970.

RCA 20E-1 20 kW FM w/exciter & spare parts, 9 yrs old, perfect cond. Don, 2003 Brewster Rd, Bellevue NE 68005. 402-733-4747.

Harris TE-3, new rack mount, 15 W TE-3 FM exciter, new, BO; Harris FM01G/H parts, etc. BO. B Royster, KQM Bdcg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

PR Z-1A (2) & Z-1R crystals for LPB carrier current xmtrs, 522, 560, 590 kHz, all for \$20. M Pinhero, 1528 4 Delane Ave, Charlotte NC 28211. 704-365-4912.

Gates FM5B 5 kW FM. W Carnes, KIIRT, POB 8234, Jacksonville TX 75766. 214-586-2162.

Westinghouse FM-10, 20 yrs old w/manuals, you remove & haul, BO. G Liebisch, WPTF, POB 29521, Raleigh NC 27626. 919-876-0674.

RCA 500MX AM xmtr. P Habecek, KACO, 238 W Main, Belville TX 77418. 409-865-9448.

Collins 21-E 5 kW AM, very clean in top shape, \$8750 firm; also 1 kW FM Bauer 607, \$3800 w/exciter, very clean. J Crampen, 315-487-2393.

CCA FM1000D 1 kW, W/130 cable & antenna whips, tuned to 91.3 MHz, gd cond, \$5950. T Brandenburg, KGT S, College Place WA 98324. 509-527-2991.

Visual DFM-10K-B/DFM-10-A 10 kW FM xmtr w/harmonic filter & 10 W FM exciter, needs some work, \$2500. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

LPB AM RC5A 640 kHz; (7) T-8 interfaces; T2-4; (3) splitters, BO. M Black, WEOS, Hobart William Smith College, Geneva NY 14456. 315-789-8970.

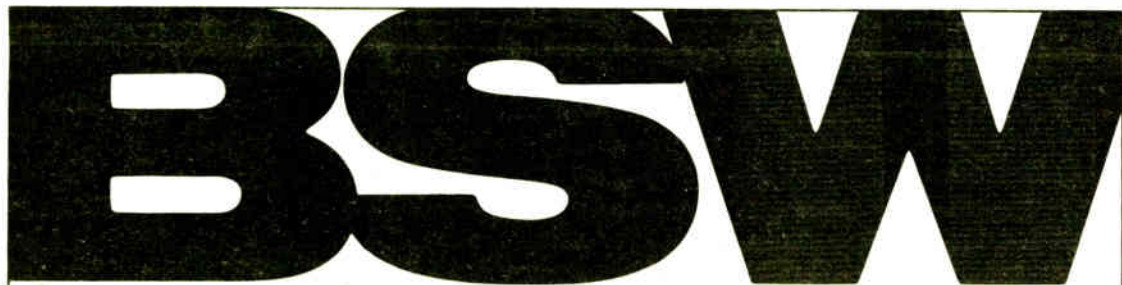
LPB AM1 RC5A 1620 kHz, 5 W output, Steleton FX20, FM stereo 20 mW out. J Titus, WSAM, 566 Bnarciff Rd, Pittsburgh PA 15221. 412-243-1674.

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Check as appropriate:
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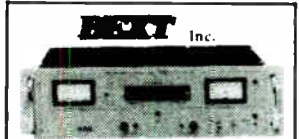
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McMartin B-910T 10 W xmt or 15 W exciter, comes w/stereo gen, set for 91.1 MHz, \$1000. P Russel, WBOR, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.



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Harris/Gates FM 10G in vgc, 260' of 1-5/8" transmission line. D Witala, WLDR, 118 S Union, Traverse City MI 49684. 616-947-3220.

Parts, large inventory for RCA BTF-20E1, all in gd cond, BO. J Schloss, KICD, 2600 Hi-way Blvd, Spencer IA 51301. 712-262-1240.

ITS 1615 ITFS system, xmitter, antenna & 377' 6" waveguide, \$42,500 2 yrs ago, sell for half price or trade, avail 10/30/88. B Ellis, KOZK, MPO Box 21, Springfield MO 65801. 417-865-2100.

BE 30 FM exciter, perf cond, c/w manual, \$5000. J Smith, Mobile Bct Srvs, 758 St Michael St, Mobile AL 36602. 205-432-7807.

RCA mod xformer for BTA 5F xmt, new in orig crate, \$600 plus shpg; RCA BTA 50F, 50 kW AM in excel cond, complete, in storage ready for use, w/electro-static air filter, solid state rectifiers & much more, w/manuals & floor layouts, \$18,000 plus shpg; RCA BTA 5F, 5 kW AM ready for immed use, excel cond, w/manuals & floor layout, \$10,000 plus shpg. G Heidenfeldt, 2880 W Lake Rd, Wilson NY 14172. 716-751-6187.

GE 4BT1A1 250 W FM xmt & exciter, '64 vintage, vgc, w/manual, \$1500/BO, you ship D Willey, Life Bctg, POB 96, John Day OR 97845. 503-575-1840.

RCA BTE-15A FM exciter w/built-in BTX-1B SCA gen (manufactured by Moseley), \$175 all. M Gollub, WMJS, POB 547, Price Frederick MD 20678. 301-535-2201.

Xmt, 50kW AM, old but great, RCA BTA 5-H 5 kW AM & 250W AM xmt, all used or in use. J Kramden, KJKL, 183 Jane Dr, Syracuse NY 13219. 315-487-2393.

CCA FM 10 kW, never used, back up, \$5000. D Miller, KNPT, POB 1430, Newport OR 97365. 503-265-2266.

Want to Buy

FM xmt, 5 or 10 kW, w/ or w/o exciter; 0.001 MFD G3 or equiv transmitting capacitor; 500' of 3" or 1-5/8" foam or air xmission line; TV exciter on chnts 21-60, 3-5 chnl small video switcher; (4) 4-1000A tubes. R Wright, WLLX, 1208 N Locust, Lawrenceburg TN 38464. 615-762-6200.

ITA 1000A AM, RF thermocouple & RF choke. D Burns, KRSN, 400 N Mesa, Los Alamos NM 87544. 505-662-4342.

Harris or Continental 25 kW or better. M St Cyr, 517-487-5986.

47.48 MHz crystal for RCA BTE-10C FM exciter MI-560302-34; parts for BTE-10C/BTE-10C xmt. R Hixon, Trans World Radio, 700 Shunpike Rd, Box 98, Chatham NJ 07928. 201-966-2700.

Gates FM 5 kW pref, but will buy any gd 2.5-5 kW. J Hyden, WMFL, 1275 S Jefferson, Monticello FL 32344. 904-997-3536.

Low-band chan 4+ VHF xmt, 10-30 kW w/VSF filter, harmonic filters; also low-band VHF xmt, 10-30 kW, w/ VSB filter, harmonic filters retuneable to chan 4+. J Fuehrer, NTV Network, POB 220, Kearney NE 68848. 308-743-2494.

FM, 5 kW. K Kuenzie, KSLQ, 102 Elm St #203, Washington MO 63090. 314-239-6800.

Johnson Desk Kilowatt & other related AM amateur transmitters. C Iannace, 283 Main St #A4, Farmington CT 06032. 203-677-1332.

LPTV transmitter, 1 kW, any make, used/demo. John, 1218 Pioneer Blvd, St Paul MN 55101. 612-222-5555.

FM exciter, 50 W. A Bowab, WDLT, 2402 Wolf Ridge Rd, Mobile AL 36618. 205-344-3698.

Panaxis FM10S, used 10 W stereo FM exciter, or similar 10-20 W needed ASAP. J Smith, 516 Leedom St, Jenkintown PA 19046. 215-572-6953.

Carrier current xmt; also want gd 5 kW AM xmt. P Habcsek, KACO, 238 W Main, Belleville TX 77418. 409-865-9448.

Exciter in gd cond, mono or stereo needed immed, will give payment & tax writeoff. D Alan, Jamestown Comm College, 525 Falconer St, Jamestown NY 14702. 716-483-0302.

Gates/Harris FM20H3 or FM20K, must be within 500 mile radius of St Louis MO. K Brooks, KREI, POB 461, Farmington MO 63640. 314-756-6476.

UHF 1 kW TV xmt. AACT Inc, 156 Lazelle Rd, Worthington OH 43085. 614-846-9234.

Continental 20 kW FM xmt, negotiable. L Blakeney, WBBN, Rt 2, Box 273B, Taylorsville MS 39168. 601-729-8100.

Harris FM2.5H3 in gd cond. A Stinnett, WPTN, 528 N Willow, Cookeville TN 38501. 615-526-7144.

Harris TE-3 exciter. D Van Zandt, Cornerstone Radio, POB 500, Petersburg IL 62675. 217-632-2266.

FM xmt, old junk, or manuals to learn from, cheap. C Gill, POB 371, Indianapolis IN 46206. 317-923-2800.

TUBES

Want to Sell

LM-Ericson 6761 (30), used in RCA video tape equip, BO. R Rickly, WVAB, 8443 Day Dr, Parma OH 44129. 216-845-6043.

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EIMAC 4CX300A transmitting tube, unknown cond. J Nickel, KJJSK, Box 99, Columbus NE 68601. 402-564-2891.

4-500A (4), pulled from service, \$50 ea. D Handy, WTIF, 104 E 7th St, Tifton GA 31794. 912-382-1340.

EIMAC 4CX-10,000D & (2) sockets; also 4CX2503 socket & RCA DR-2000 numitron tubes for ESE timers, BO. B Royster, KOM Bctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Satcons (6) from RCA TK-45; Vidicons (5) from RCA TK-27/28; Image Orthicon 5820A; RCA TK11; receiving tubes, spans 40 yrs from OA2 to 5025, 750+ pieces. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

Want to Buy

Ind & bdc triodes, TH-150, 6366, 6425F, 6696, 7237, 7804, 8132, 8670A, 5-4/5-6, 6-3, 3CX2500H3, 3CX5000H3, 3CX20,000H3. P Nemeth, 5901 W Hwy 22, Crestwood KY 40014. 502-241-1502.

Desperately seeking 6072/6072A, need 1000 pieces, send quantity & price. Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-766-9101. 10 AM-noon PST.

TURNTABLES

Want to Sell

QRK 12C (2), 3 speed, S20 tonearms, \$150 ea. B Spitzer, KKLS, Rapid City SD 57701. 605-343-6161.

Sparta/Gates GT12/CB1200, gd cond, \$50 ea or \$200 for 5. M Rollings, WRTL, POB 115, Hootail IL 61866. 217-893-1466.

Technics SL-1100A, BO; Stanton 310 preamp, Grado G-1 plus & Shure V-15IIIG & more, BO; Discwasher Discsit, D-4, SC-2, BO; Technics SP-10MKII. B Royster, KOM Bctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Technics SP10MKII, w/base & power supply, \$200. D Rowland, 7310 Corporate Dr #104, Houston TX 77038. 713-541-1566.

Gray Research 108B viscous-damped 16" tonearm, w/extra slides, silicon fluid, like new; GE VR11 phono cartridge w/stilus; PS audio II phono preamp stereo/mono switch, very high quality. P Dowie, Gd Snd, 171 Drexel, Lansdown PA 19050. 215-626-9322.

Sparta (2)/QRK12C (3) TTs, need work, \$200 or \$50 ea. D Loucks, KTKL, 2132 W 42nd, Casper WY 82604. 307-265-6700.

Micro-Trak 303 12" tonearm, as new cond, \$50. B Leslie, Pro Recdg Svc, 13709 Maple Leaf Dr, Cleveland OH 44125. 216-662-1435.

Rek-O-Kut CVS12 w/variable speeds, 25-100 rpms (2), \$110 ea; Rek-O-Kuut B12H 3 speed, hysteresis motor, \$110. Mr. Oliver, 212-874-7660.

Sparta TEP2 (2) mono preamps, \$15 ea. C Springer, KLMR, POB 890, LaMar CO 81052. 719-336-2206.

Want to Buy

EMT 927, 930 w/EQ or w/o. Y Chung, 1129 S Robertson Blvd, LA CA 90035. 213-274-1921.

RCA MI11895 16" tonearm; also MI11865 RCU universal pickup & MI11866 RCA styli & tip style any cond. RL McDonald, Mission Rcdgs, 5231 Horton St, Mission KS 66202. 913-722-2677.

Vintage TTs for collection, '50s & '60s, any cond; components PBT, Pickering 800 first type, RCA 70 series 16" platter, Fisher Lincoln automatic turnover, Lafayette PK 400, Gray 33H, etc. G Garavelli, Via Buozzi 41, 27029 Vigevano (PU) Italy, 0381-72446.

Stereo tonearm, 16" w/head shell, mint cond, for Gates TT. F Luna, KAYN, 1550 Camino a la Posada, Nogales AZ 85621. 602-281-8488.

Any make/model, need one or two working used TT's, pref w/preamps & tone arms. J Smith, 516 Leedom, Jenkintown PA 19046. 215-572-6953.

Mint 16" transcription TT, complete w/arm, cartridge(s) & preamp. C Fuller, VOICES, 119 S Constance Ln, Countryside IL 60525. 312-579-9578.

TV FILM EQUIP.

Want to Sell

RCA film island, complete, online, \$4000; RCA TP66 film proj, BO. R Rickly, WVAB, 8443 Day Dr, Parma OH 44129. 216-845-6043.

Telecine & film equipment: 16mm RCA TP66 (6), \$4,995; 35mm FR35B, \$15,750; TP55 multiplexer, \$1750; TP7B slide projector, \$1500; TK27B camera, \$2500; eastman PD1 multiplexer, \$1500; 16mm CT500, \$4500. Accepting film cameras, editing, studio equipment as part trade. International Cinema, 6750 NE 4th Court, Miami FL 33138. 305-756-0699, Fax: 305-758-2036.

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RCA TK27 film chain w/RCA TP66 16mm proj & Simplex 35mm proj, \$3000/BO. T Judge, TAG Comm, 75 Weaver Rd, W Milford NJ 07480. 201-697-8454.

Laird Telemedia 5050 telecine auto light control, working when received, no manual, BO. D Stenz, Gemini/Dover, Box 1678, APO NY 09283.

RCA TK27 w/TP66 16mm & Simplex 35mm & slide projector, complete, excel cond, \$2000; Buhl biplexer w/JVC camera, 16mm & 8mm & Super 8mm projector, \$2000. T Judge, TAG Comm, 75 Weaver Rd, W Milford NJ 07480. 201-697-8454.

Want to Buy

LPTV equip, camera equip, recorders, etc. AACT Inc, 156 Lazelle Rd, Worthington OH 43085. 614-846-9234.

VIDEO PROD. EQUIP.

Want to Sell

Misc items, inc Gates/Harris TE-201 color film camera; Athena 4000 film projector; Quanta character gen & RTI, Microtime, RCA, GVG, ESE, Sony, Orban equip, call for details. J Fuehrer, NTV Network, POB 220, Kearney NE 68848. 308-743-2494.

Conrac CLD14 14" rack mount BW monitors (5), gd cond, tube type, \$50 ea; DMI 20 sec slomo disk units (2), worked when last used, 2 more for parts, BO; GVG 731 color video insert keyer, BO; Conrac compo video to RGB decoder & scope driver (2), BO; CBS Labs 8000 compo video 2H enhancer, BO. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Mindset II character gen & animation system, 2 disk drives, graphics tablet, titler, lumina, PC paint, animator, Glyph software, \$3000. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Dynasciences Image Enhancer 832, \$125; Ampc proc amp, \$125; studio lights (5) all for \$200; RCA TTs-1A delay EQ system, \$150. C Haynes, POB 31235, Jackson MS 39206. 601-948-1515.

Chyron IIIB char gen, 1 keyboard, 1 disk drive, DSK unit, 10 fonts, var sizes, mounted in road cases, needs wk, \$4000. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Harris Video 6520 receiver, brand new, \$400 firm. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

Mindset 3000 character gen & animation system, 20 meg hard drive, all software, \$5000. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Sony Betacam BVV1A w/component adapter & Porta-Brace case, \$3500/BO. M Glaser, MRG Productions, 516-489-1071.

Panasonic NV 8500 (2), w/SMPT time coding controller capability w/connectors; Panasonic NV-A500, gives SMPT time coding, 18 pin connectors; Panasonic C-110 (2) w/connectors, 8 pin; Panasonic WJ-530, will sell as whole package, \$4000. P Gorman, Gorman Video, 18 Brookdale Dr, San Rafael CA. 415-456-8362.

Microtime Digitrol, 4-VTR controller w/cables, \$675; Microtime Digitrol II, 8-VTR controller w/cables, \$975; Microtime 2121 Faroudja image processor, \$875; Microtime start/stop tone gens (4), \$75 ea. C May, Rural Route Video, 360 Browning, Ignacio CO 81137. 303-563-9533.

Switchcraft audio patch bays (2) w/ADC terminal block, \$75 ea; Trompeter JS1-40/J3W video patch bay, \$75; (4) rack mount VTR I/O patch panels, \$10 ea; lot cords, 50#, \$50. C May, Rural Route Video, 360 Browning, Ignacio CO 81137. 303-563-9593.

Rack mount 4 x 1 video/audio switchers (2), passive for monitors, \$25 ea; (2) 4 x 1 rack mount audio monitor/speaker, \$40 ea. C May, Rural Route Video, 360 Browning, Ignacio CO 81137. 303-563-9533.

JVC CR-6000U U-matic video recorder, \$200; JVC CP 5000U U-matic video player, \$150; Ikegami PM 171-T 17" B&W TVs (2), \$100; JVC KY 1900 TV camera, \$1500; Leitch SPG 120 N pulse gen, \$1000. R Ose, Am Comm Svc, 1 American Plaza Ste 310, Evanston IL 60201. 312-869-8001.

CVS 516 digital TBC, \$1500. A Denke, American Motion Pictures, 7023 15th Ave NW, Seattle WA 98117. 206-789-1011.

Panasonic NV9200A 3/4" VCR, excel cond, \$495/BO. A Chaney, Video Eng, 1415 Oaknob Way, Sacramento CA 95833. 916-922-3456.

Want to Buy

GVG 906A video AGC module. J Fuehrer, NTV Network, POB 220, Kearney NE 68848. 308-743-2494.

DVS Phaser II frame sync & color osc module for RCA TG3. L Johnson, WGNX, POB 98087, Atlanta GA 30029. 404-375-4646.

VIDEO TAPE RECORDERS

Want to Sell

Ampex VR1100 quad VTR w/highband head, proc amp, BO; Microtime 640 TBC, needs work, w/manual, BO. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

Panasonic NV9500, NV9200, NV950 3/4" edit system, gd cond, \$4000 set; (2) Panasonic NV9500, NV9200 3/4" VTR's heads OK, need belts, tune up, \$1000 ea. H Larson, Matrix Mobile TV, POB 536, San Luis Obispo CA 93406. 805-544-5657.

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Panasonic NV9200A 3/4" VCRs (3), excel cond, \$495/BO. A Chaney, Video Eng, 1415 Oak Knob Way, Sacramento CA 95833. 916-922-3456.

JVC CP-5000U 3/4" U-matic players, \$200; Panasonic NV-9400U portable 3/4" w/Portabrace, 2 battery chargers, service manual, gd cond, \$2500. R Nimitz, Univ of Notre Dame, Box 1088, Notre Dame IN 46556. 219-239-6423.

RCA TR600A (2), full blown, excel cond, never used in bdc, \$8000 ea/trade. H Henson, Henson Prod, 3796 Bethania Sta Rd, Winston-Salem NC 27106. 919-924-8717.

Want to Buy

Ampex/RCA VR 1000 & on, 2", 1", 1/2" etc, older espec. J Anthony, Video Parts Co, POB 25, Shenorock NY 10587. 212-713-5757.

High band RCA headwheels #5 MIL, need sev; RCA TCR 100A's & parts, need sev. H Henson, Henson Prod, 3796 Bethania Sta Rd, Winston-Salem NC 27106. 919-924-8717.

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