Radio World®

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Bill To Tackle State Licensing

by Charles Taylor

Seattle WA Federal legislation is being drafted to quell the state licensing of engineers and likely will be introduced when Congress reconvenes in later this month, according to an attorney representing the National Association of Radio and Television Engineers (NARTE).

The bill, to be sponsored by Rep. Matthew Rinaldo (R-NJ), will focus on the argument that broad state engineering statutes are not applicable to telecommunications engineers, according to Robert Thompson, an attorney with Wood, Lucksinger & Epstein in Washington, DC.

John Arnold, press secretary for the congressman, verified that a study on the need for legislation is possible through Rinaldo's involvement as ranking Republican member of the House Telecommunications and Finance Committee. The study would be conducted by the General Accounting Office.

The state licensing issue surrounds mounting efforts in a number of states to require telecommunications engineers to meet various requirements—including a minimum term of experience, passage of a written or oral exam and a four-year academic degree—to legally practice and advertise as a consulting engineer.

So far, the issue has been pressed by state boards in Washington, New Mexico, New Jersey and Michigan, where registrars challenged consulting engineers who had not met requirements.

In each case, NARTE convinced the state to back down without going to trial, Thompson said.

Law doesn't apply

The strength of NARTE's argument against state licensing surrounds the fact that when broad engineering laws were passed, the telecommunications discipline didn't exist, according to Thompson.

He explained: "Fifty years ago, we had horrible fires, we had buildings and bridges that collapsed and we had land surveyors that botched up. So there was an outcry from the public to meet a need for quality control."

Thus, states passed protective laws requiring minimum standards for engineers, he said.

"Now many of these states believe that they have the right to come in under

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Ethnic Blend Urged in Newsroom

Las Vegas NV Minorities, pushing a hard line to broadcast management, claim that not only should a multicultural newsroom be encouraged, but that they deserve extra support to excel in a traditionally white management environment.

The suggestion was among a number of passionately expressed viewpoints at the focal session of the Radio-Television News Directors Association (RTNDA) show here 30 November to 3 December.

The role of minorities in broadcasting has been a sensitive issue in the industry for some time.

The RTNDA Board of Directors, noting the lack of support and a decline in the percentage of minorities working in broadcasting, voted unanimously to promote the hiring of minorities as its top convention issue.

The organization also announced joint sponsorship with NAB and the Black Educators Association of the Minority Broadcast Career Training Program, which will place and support a minority college graduate in a full-time newsroom job for one year. The program is slated to begin this summer.

Support also was present on the exhibit floor, where members of four minority broadcast organizations offered information, and collected and distributed resumes from minority candidates for interested news directors.

"It makes a difference," said Hatim Hamer, director of broadcast resource programs for the NAB's Employment Clearinghouse, which was alerted at RTNDA to 20 minority newsroom openings. "These are the people with the power to hire and fire."

A panel discussion on minority issues included members of Hispanic and Asian journalism organizations and black and white news directors.

Lloyd LaCuesta, president of the Asian American Journalists Association, who was discouraged by low attendance and questioned broadcasters' interest said newsrooms should hire minorities "not just for the sake of getting them in

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Ponelists ot RTNDA discuss the work done to ochieve minority equality in news.

NAB Stays Cool Under Class A Fire

by Alan Carter

Washington DC Although concerned about some Class A FM members who have resigned and others withholding partial dues, the NAB does not view the action as a major issue, according to Senior Radio VP David Parnigoni.

In addition, several NAB spokespersons, who declined to be named, have maintained that some of the protesting members are behind in their dues payments to the organization.

The membership action is in protest of NAB's opposition to an across-the-board 3000 W power increase for Class A's. NAB supports a power hike but on an application basis that addresses interference concerns.

To date only two Class A members have notified NAB that they would withhold half of their dues and "a few" have resigned, Parnigoni said. "We will look to see what happens in another 30 days," he added.

According to broadcasters involved with the Class A drive, the numbers of members who initially said they would withhold dues are as many as 12 in parts of Connecticut and New York.

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FCC Gets Federal Budget Bailout

by John Gatski

Washington DC The FCC averted a potential budget shortfall that could have shut down the agency for five days sometime this year, adversely affecting the pace of processing applications and monitoring regulations, Commission officials said.

The Commission received a Fiscal Year 1989 supplemental $1.4 million from the Office of Management and Budget (OMB), subject to congressional approval, that eliminates the possibility of a five day furlough—unpaid days off—for the agency's 1767 employees.

"It doesn't look as bleak as at did," FCC spokesperson Audrey Spivak said. "We would have had to shut the agency down (without the funding)."

The FCC budget problems began in October when it received $99.6 million for FY 1989—$5 million less than the $104.7 million it requested, FCC officials said.

With that shortfall, Commission Chairman Dennis Patrick forecasted furlough days, which would have meant a slowdown in application filings and processing and reduction of FCC monitoring operations.

With the additional $1.4 million, the Commission will be able to avoid closing shop, but the rest of the budget shortfall will have to be made up through savings from an agency-wide hiring freeze, discretionary spending reductions, anticipated early retirements and some voluntary leaves without pay, Spivak said.

Spivak said that furloughs probably would have started this month had the supplemental budget appropriation not been approved.

For more information, contact Audrey Spivak at the FCC, 202-632-5050.

Circle 37 on Reader Service Card

News Briefs

Forest Service Data

Washington DC The NAB has given the US Forest Service additional information to combat higher fee costs for broadcasters who use federal land, while reiterating its position that broadcasters should be entitled to full or partial waivers of proposed site fees in accordance with the service's own rules and regulations.

NAB said the service must have a more accurate assessment of the fair market value of the right-of-ways granted broadcasters.

The Forest Service had delayed any fee increase until 1 January.

Radio Free in Europe

Washington DC The Soviet Union has stopped jamming Radio Free Europe and Radio Liberty, allowing the shortwave radio programming to be heard in the Soviet bloc.

US officials announced the cessation of jamming when engineers in the Munich headquarters of the two services noticed the jamming had stopped on 29 November—the first time since the broadcasts began in the 1950s.

Radio Free Europe goes throughout Eastern Europe and Radio Liberty goes into the USSR and Afghanistan.

Smulyan Chairs Radio '89

Indianapolis IN Jeffrey Smulyan, president and chairman of Emmis Broadcasting, has been named chairman of the NAB's Radio '89 steering committee.

"This is the premiere convention for radio broadcasters," Smulyan said. "It gives them an opportunity to hear what their contemporaries are doing, get firsthand views from members of Congress and federal agencies and see the latest in broadcast equipment and software."

Radio '89 will be held 12-16 September in New Orleans.

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Duopoly Rule Benefits Stations

by Alan Carter

Washington DC A change in the FCC duopoly rule allowing radio licensees to have two AMs or two FMs closer together is being used to upgrade service and provide more flexibility for some stations.

Previously the Commission prohibited common ownership of two or more AMs or FMs whose 1 mV/m contours overlap. The new rule adopted in October reduced the overlap restriction to the 5 mV/m contour for AM and to 3.16 mV/m for FM.

One broadcast group benefiting is United Broadcast Co., whose holdings include WDJY-FM in Washington, DC, and WYST-FM in Baltimore—two stations in an overlap situation.

Under the old rule when WDJY changed its directional antenna in 1979 and sought a power increase, the FCC restricted the station's directional antenna to 1.6 kW toward Baltimore with an ERP of 40 kW to minimize the overlap, according to United Engineering Director Richard Mertz. But with the change, the station can increase its directional to 20 kW and go to its full 50 kW ERP, he said.

The rule change also would allow WDJY to change transmitter sites to obtain a better coverage area.

"Breathing room"

"I do have limitations," Mertz said, "but they are much easier to live with. We have some breathing room."

A group in the Pacific Northwest, 4-K Radio—which operates KLER-AM/FM, Orofino, ID; KORD-AM and KZZK-FM, Pasco, WA; KORT-AM/FM, Grangeville, ID and KOZE-AM/FM, Lewiston, ID—is also looking to increase power for its stations.

The stations are within 100 miles of KOZE in Lewiston, which each has to protect and group secretary-treasurer Michael Ripley said he and partner Eugene Hamblin, president, are evaluating where the best advantages lie.

4-K operates some of the stations under waivers from the duopoly rule, Ripley said, and the change should make operation more effective.

"It's the only way small radio can survive," Ripley said. "It allows you do to a lot more things as a group that are very difficult for an individual station to do."

Still investigating

Several engineering executives for major group owners were less affected by the change but were looking at possible applications.

At Group W, AM Stations Engineering Manager Glynn Walden said an interesting scenario suggested to him was the possibility that a group could establish a "suburban radio group" similar to a trend found in the newspaper industry with community papers around major metropolitan markets.

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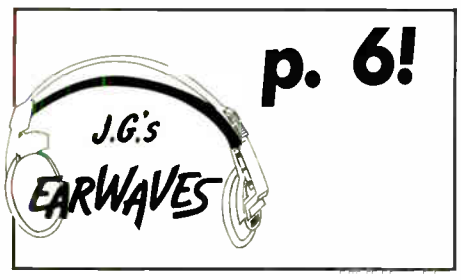

Drug Bill Extends to Broadcasting

by John Gatski

Washington DC The election-year passioned omnibus drug bill, which passed Congress and President Reagan signed 18 November 1988 may have effects reaching as far as the broadcasting industry.

The bill makes it possible for government agencies to deny grants, contracts and professional licenses, such as FCC licenses, to individuals who are convicted of drug possession and trafficking, according to the US Justice Department.

"That is the interpretation of the bill," said Paul McNulty, minority counsel for the House Subcommittee on Crime.

Although the provision of the bill is not expected to go into effect until 1 September, the denial of licenses will apply to individuals applying for a license or license renewal from the FCC, he said.

According to his understanding of the law as it applies to individuals, the courts can decide the length of time a license is denied for a possession offense.

For individuals convicted of drug trafficking, however, the loss of license penalty is more severe: five years for the first conviction, 10 years for the second and a permanent denial for those who are convicted of three trafficking offenses, McNulty explained.

He said he was not sure how or whether the bill would have an impact on an FCC license when an individual was convicted of a drug offense.

FCC spokesperson Audrey Spivak said it is too early for the Commission to have taken any action based on the drug bill.

"We are aware of the bill, of course, but we don't have any guidelines," she said.

Spivak said currently there are no FCC procedures for checking criminal records of license applicants, and such guidelines would have to be formulated under the bill.

For additional information, contact Paul McNulty at 202-225-7087 or Audrey Spivak at the FCC, 202-632-5050.

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Circle 8 On Reader Service Card

Hike Filings Draw Dividing Line

by Alan Carter

Washington DC Nobody seems to oppose granting Class A FMs a power increase from 3000 W to 6000 W. The difference of opinion is over the method of implementing the increase.

The New Jersey Class A FM Broadcasters Association, which initiated the increase in a petition to the FCC, and many Class A's want an across-the-board hike—without exception.

But the NAB, several other trade associations and some other broadcasters have suggested an increase with stipulations, including evaluation on application-by-application basis when suggested minimum separations are met.

The division is clearly recognizable in the more than 80 comments filed by a 22 November. Reply comments were due 22 December. (See 15 December RW for initial comment story covering NAB and New Jersey Class A group positions.)

The Commission proposed, under one condition, a 3000 W power increase for all Class A's except those currently short-spaced. The second method would require an increase in spacings between Class A stations and other classes, in order to implement the increase and then only on an application-by-application basis.

Little interference

Among the commenters, Michael Rice, president of Nutmeg Broadcasting which is licensee of WILI-FM, Willimantic, CT, and a vocal supporter of the Class A movement, said a 3000 W increase would create "no practical interference" to an adjacent Class B.

"The small overlap zone . . . would be located in another state, and well out of the local or regional service area of the Class B station," Rice wrote in his comment. "But the power boost would allow WILI-FM to fill in some areas of weak signal within its 70 dBu contour."

Among the other Class A comments, Barry Broadcasting Co., licensee of WBCH-FM in Hastings, MI, said it would not benefit from the NAB's proposal, unless it was permitted to directionalize to protect a Class B. But the broadcaster argued that several stations on the same frequency as WBCH apparently could increase their power with no

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NAB Calm in Face of Resignations

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They said the dues withheld will be forwarded to the New Jersey Class A FM Broadcasters Association, which started the drive for the power increase now before the FCC.

Reports indicate that five NAB members have resigned and others have said they would follow if NAB doesn't back down, according to some broadcasters. Parnigoni said it would not be appropriate to detail membership withdrawal but termed it a "really insignificant number."

The NAB Executive Committee, meeting 6 December as part of its monthly session in Washington, reaffirmed the organization's support for a power hike but on individual applications, Parnigoni said. The Executive Committee also remains committed to addressing controversial issues, he said.

Parnigoni said the Executive Committee believes it's important that the association not back off important issues. "We do not want to be neutral," he said. "What we want to do is what's best for

"There was a concern (expressed by the committee) that this is not a one-issue association," Parnigoni continued. "You can't promise, but if you're going to do your job, you're going to ruffle some feathers and you hope that's only temporary."

Parnigoni noted that the Class A power hike is "a very emotional issue."

NAB officials hope that members who have taken action or are considering it will have second thoughts after re-evaluating the situation.

An NAB spokesperson confirmed that "one or two" of the stations that resigned are six months or more behind in their dues.

Parnigoni said that NAB's policy is to automatically reclassify members that do not pay full dues and to drop them after six months if payments fall below minimum dues level.

One Class A station manager who said he resigned, Bob Channick, GM of WCCQ-FM, Joliet, IL, said he knows of five stations that have pulled out. He also said more will follow unless NAB changes its position. "It's just a matter of getting mobilized."

Radio World confirmed that several other stations have resigned, including Channick's sister stations, WCKR-FM/WLEA-AM, Hornell, NY. An Illinois station that confirmed its resignation declined to go on record.

"The NAB is a great organization. However, in this case, they really let us down," WCKR/WLEA GM Kevin Doran said. "This is a very serious issue affecting a lot of stations."

For information from NAB contact public affair at 202-429-5350 or David Parnigoni at 202-429-5420.

Class A Torch Bearer Sells NJ's WJLK-FM

Asbury Park NJ Press Broadcasting, whose VP Bob McAllan is a driving force in the Class A FM fight for a power increase, is selling its Class A station here and buying a Class B.

Press signed letters of intent on 18 November 1988 to sell WJLK-AM/FM and buy WBUD-AM and WKXW-FM in Trenton, NJ.

Press will sell the WJLK combo for $12.5 million to Devlin and Ferrari Broadcasting Co. of New York, the spokesman said. John Devlin is a former executive of CBS, ABC and RKO radio networks, and Jon R. Ferrari is a publicist and agent in the entertainment field.

No price has been announced on the purchase of the Trenton stations from Bresson-Hafler Associates of Philadelphia, the spokesman said.

McAllan said that despite the sale of WJLK, Press Broadcasting still is committed to the Class A power hike movement.

"We might be selling a Class A station, but we are not selling our interest in Class A's," he said.

The group has applications in for three Class A's under Docket 80-90 and is "looking at buying" another Class A, McAllan said.

McAllan serves as president of the New Jersey Class A FM Broadcasters Association and he said the board will have to make a decision about whether or not he will retain the slot.

Plunging Feet First Into 1989

by Judith Gross

Falls Church VA Ready or not, here it comes . . . **1989**, that is. I'm **not really ready** for it as I scribble this, but will be by the time it hits your eyes.

Usually about this time you hear all kinds of **predictions**, looking ahead and what not. With a **new President** in the White House in a few weeks, guess we'll have a new astrologer making predictions based **on the stars**.

My own **personal predictions** for 1989? I wouldn't etch these in stone or anything, but this will probably be the year the **anti-copying controversy** dies and DAT comes into its own. Consumers will discover it, but it probably won't be the revolution everybody had hoped for.

Stations will keep on discovering DAT for things like **recording in the field** and for production.

Bigger stations will discover digital in the form of those **desktop PC editing systems**. NAB showtime should be about right for that.

CD technology will continue to improve and be refined. Look for better materials and more interactive varieties. Also, probably a **recordable CD** sometime in '89.

Do not expect any dramatic movement away from the **staples of the industry**—things like cart machines. They'll be around for awhile, as digital struggles to find its own at a price radio stations **can afford**.

But do look for a beginning to the push for a way to **interface digital devices** to each other. NAB is going to get involved in this one and it will be a standard **the industry needs** and will welcome with open ports.

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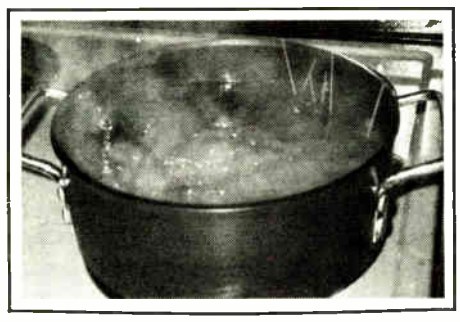
For AM? More of the same. Let's go out on a limb here and say the erosion of audience has **leveled off** at its current 24%. There will be more experimenting among formats and the like (how about **punk country**?).

An **NRSC standard** in some form will become mandatory before too long and there will be more talks with receiver manufacturers about putting on the white hats and helping AM with **better radios**.



This may be the year the AM stereo controversy finally **fizzles out**. The only question is, will any more stations realize the **benefits of going stereo**, now that a company like Chrysler has said all its AM radios will be stereo from now on?

But the hand-wringing and complaining about **AM's woes** will no doubt go on. We all need something to moan and squawk about.

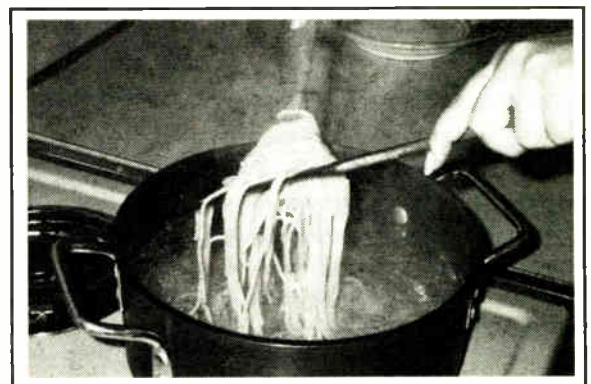
For FM? Well the **Class A** thing will get resolved one way or the other. **Translators will be tackled** as well. Judging by the Commission's track record and edging out on that limb again, translators will probably be allowed to **continue to proliferate**. And the Class A's? Too close to call it.

How about **conventions**? Still too many and too long and at times too close together. **NAB** is late this year: the end of April in Las Vegas (get those one-armed bandit arms in shape now).

Radio '89 is mid-September in New Orleans, so diet early in the year in anticipation of all that good cooking.

And the **SBE National** is the second week in October in Kansas City (here I come).

One last prediction for '89. The Mets will take the National League pennant and the World Series. OK, so if I'm wrong, **sue me**.



RF—the pasta for engineers. No arcing or sparking upon cooking. Hmmm . . . does your transmitter look like this inside?

☆☆☆

A couple of quick notes. It's nice to see that **Congress** is paying a little more attention to **radio's problems**. Let's hear it for New Jersey representative **Matthew Rinaldo** who has proposed bills both to ease the **state licensing** snafus and to solve the **AM stereo** controversy. I take back everything I ever said about Joisey.

Kudos to **Ron Russ** who has become CE of Heritage station **KDAY** in LA. Former CE **Andy Laird** is now **VP of Heritage's engineering/radio group** and will maintain the radio division engineering office at KDAY.

RADAR says 96% of the population listens to radio, some **190 million** in the course of a week. In just 15 minutes, the average radio listeners number **24 million**. Not bad. But the latest RADAR report says that FM is still getting 76%; AM only 24%.

I think it says something about **what people want** in radio, public radio, at least, that *A Prairie Home Companion*, which has been off the air with new shows since host Garrison Keillor called it quits a year and a half ago, is still public radio's **most popular show**.

Minnesota Public Radio continues to broadcast past shows and Keillor does a live performance of the show several times per year. MPR even got a **new corporate underwriter** for the program recently. The best is in the past?

And **Eric Braun**, assistant CE at KODA sent me a nifty package of **RF spaghetti**. Eric says he has a tough time distinguishing between it and non-RF spaghetti, so I decided to **try for myself**.

Didn't think to ask Eric whether or not it should be served with **sauteed capacitors** and resistors, so I settled for plain old tomato sauce. My pal Lise helped me whip up a batch. Gee Eric, we couldn't tell the difference either.

Eric adds that he's thought of **taping the package** to some old transmitters and phasor cabinets he's worked on because spaghetti is what they **were inside**.

☆☆☆

For those who have asked about our **coveted mugs**: the first edition is all out—second edition is on its way, stand by.

And finally, what you've been waiting for. My list of things we **Don't Want to Hear Any More About** in 1989:

AM stereo **wars**; **VOA modernization** and its accompanying snags; **"AMization"** of the FM band; attendance at conventions being **"quality not quantity;"** mega-million buck **station buyouts**; the woes of **deregulation**; **Jessica Hahn's** radio career . . .

Also: **synchronous AM noise** in FM transmitters; **Howard Stern** simulcasts of any sort to any city; AMers **whining about AM's plight** instead of taking action to help it; studies or committees, task forces and ad hoc groups devoted to **studies about AM's problems**; **cliche call letters** spelling love, kiss, power, etc; and jokes about **pocket protectors**.

Heard something interesting? Spill your guts to **Earwaves**. *Write PO Box 1214, Falls Church VA 22041, or call me at 703-998-7600. Best tidbit of the month wins a coveted* **Radio World** *mug.*

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.

SPE motivated by profit

Dear **RW**:

Business for Professional Engineers must be pretty slow these days for the Society for Professional Engineers to be pursuing more sources of income.

This is what I read in what the SPE is doing. In order to be registered as a Professional Engineer, a person must attend a school accredited by the Accreditation Board. This may be impossible for someone already working and unable to attend full time school.

For some people, the only school available may be by mail because of their location. Then there is the standard written exam. Most of what is in this test has no relation to keeping a broadcast station operating.

Arthur Schwartz, general counsel for SPE, seems to think a lot of station engineers are less than qualified and competent. Isn't it amazing how we incompetents manage to keep our stations on the air!

Fact is, there are not many station engineers that can meet the criteria demanded by the SPE. And if only SPEs are qualified to work on a broadcast station, stations will have to pay a PE rate three or four times what they now pay a station engineer.

I believe the net result of all this would cause medium and small market stations to fall into disrepair because they can't afford the high cost of engineering full time.

On the other hand, how many station engineers are really engineers? The term engineer relates to one who designs. As far as I know, we are all operators in the eyes of the FCC.

If Mr. Schwartz is comparing a station operator replacing parts in a transmitter or audio console to an engineer designing an AM directional, then perhaps Mr. Schwartz should have a chauffeur's license to have passengers in his car.

If more control is needed for qualified station operators, the Society of Broadcast Engineers is the logical choice for this. These are people who savvy the broadcast station in day-to-day operations.

It appears to me that the Society for Professional Engineers is more interested in druming up business for its members than in the well being of broadcasting.

To prevent bad engineers from doing bad work is one thing. But to prevent almost an entire work force from doing work is something else.

It is interesting that after all these years of broadcasting that the SPE should be pushing for this at a time when AM directional work is drying up.

How have we managed to keep things running this long without the SPE?

Fine.

Ed Jurich, CO
WWMX
Baltimore, MD

AMs hampered by coverage

Dear **RW:**

After dallying for several weeks I am writing this letter in response to several articles and editorials I have read in recent trade publications concerning the predicted demise of the AM band.

I formed a company and acquired this station after I spent more than 25 years toying with radio on the periphery as a part-time announcer-sportscaster-producer-writer. After eight months as a full time owner-operator I cannot agree that AM is dying.

I believe the future for AM is providing local service that cannot or will not be provided by 100,000 W [sic] regionals. Stations like this one may be killed but that would be true whether it is AM or FM because of license restrictions.

My listeners have two basic complaints: "You're not on long enough" and "I can't get you at my house."

Neither complaint has anything to do with second adjacency interference, poor quality, technical deficiency etc., etc. It has to do with one thing: that old adage, signal, signal, signal.

We cannot sign on until 7:45 AM after most people are already at work. We have a critical hours power restriction which means our signal cannot reach listeners on their way to work past the city limits. And we are directional which means listeners on the dull side of the pattern can't hear us, period.

The listener knows only that he can't hear as far as the county line, he couldn't care less about any other problems. For some reason it's our fault in his mind.

Any station, AM or FM, with those problems is bound for failure. In short, in my estimation this license should never have been granted by the FCC. It was granted, obviously, to provide local service but nobody checked to see if it would.

Someone along the line should have had the guts to say, "You cannot make it with all those handicaps" and refused to issue the ticket. Instead a licensee is set up for failure and then the hand wringers start the eulogy.

It is extremely frustrating to meet potential listeners who want to listen to a local radio station but who cannot do so due to governmentally imposed restrictions to protect whom??? A so-called clear-channel station more than 500 miles away? Clear channels 50 years ago was a useful idea; today it should be scrapped.

I would be happy to accept an assignment to the new 1605-1705 kHz band if I could get the two things my listeners want: a full time signal, and one strong enough they can hear at least to the county line.

I am not afraid to compete with the regional FM giants or the AM clear-channel dinosaurs because I can provide local service our residents cannot and will not get anywhere else, if I can get an even break.

If and when AM dies, the low-power, local station will be among the first to go and that leaves only the regional, governmentally fostered monopolies who won't cover the local board meetings and high school sports.

That's another loss to our modern, homogenized society. That, indeed, is a shame because there are plenty of listeners who are loyal to their local stations and there are plenty of owners who would be glad to give service if allowed to do so.

Paul Carden, Owner-Operator
WKIP
Dallas GA

BRUCE BENTLEVER, SPOKESMAN FOR THE SOCIETY ON UNPROFESSIONAL ENGINEERS, SPEAKS IN BEHALF OF STATE LICENSING.

Technical Integrity

The heated controversy over a power increase for Class A FM stations has unfortunately obscured the technical facts on which such a decision must be based.

The group of Class A's in the most populous regions of the country, fired up and organized by New Jersey Class A's, want a blanket 3000 W boost for all Class A's and claim that only insignificant interference to Class B's and C's will result.

More realistic is the compromise offered by the NAB which calls for new minimum spacing requirements but would allow some two-thirds of all Class A's the immediate increase and the rest on a case-by-case basis.

The NAB's position also takes into consideration the unique circumstances of stations along the Canadian and Mexican borders, while the New Jersey Class A position does not.

It's true that the populated communities around many Class A stations have shifted and it's understandable that those stations would want to continue to serve their communities of license.

But the bottom line of any change in a station's coverage has to be the question of interference. Any increase in power without regard to interference would only erode the FM band and run the risk of putting FM in the same plight now faced by AM stations.

It is an unfortunate reality that the Class A stations who would benefit from the NAB's compromise are not in the most populous areas of the country.

But those who could not boost power immediately could make some changes—which might be costly but not impossible—to increase power at a later date.

If an industry is going to have effective engineering standards at all, it is important that these standards not be subject to economic and political pressures.

Since the NAB represents all classes of stations, the question of helping Class A's had to be weighed against the potential to cause interference.

It appears the compromise proposed by NAB would help the greatest number of stations while avoiding an increase in interference.

It deserves the industry's support.

—RW

Radio World

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Opinions Mixed in NRSC Docket

by Alan Carter

Washington DC An FCC proposal to eliminate restrictions on daytime contour protection on the AM band is not an idea generally supported in comments filed with the Commission.

As part of a rule making to mandate NRSC audio and transmission standards the Commission, in an unrelated issue, suggested that AM stations have the option of proposing facilities whose coverage area would be subject to some "received" interference from other stations.

The proposal would allow a power increase, provided that the 0.5 mV/m contours of other co-channel facilities, and the relevant contours of adjacent channel facilities, remain protected and the 1.0 mV/m contour of the proposed facilities is not overlapped by the 0.05 mV/m contour of any other co-channel authorized facility.

Broadcasters responded to the proposal under Docket MM 88-376 in comments due 22 November. Reply comments were due 22 December.

More harm than help

Among the opponents, the NAB said the proposal would only serve to increase interference in the already congested band.

"The elimination of the daytime contour restrictions would degrade, not improve, the quality of AM broadcasting service," the NAB said.

The association said interfering overlap would mean listeners would have to endure greater interference and also "mocks the FCC technical standards and the overall drive for AM improvement and interference reduction."

NAB also said receiver manufacturers would not be given a universal standard for interference protection, upon which sound, high-fidelity technical receiver designs can be based. "This lack of standard would result in receivers built for a high interference environment."

The group continued by arguing that giving broadcasters the right to degrade their individual signals by experimenting with received interference, affects the entire AM industry, not just the applicants.

NAB also stated that the FCC was mistaken in assuming that improved service to listeners within the immediate service area would outweigh the marginal service that listeners would receive at or outside these stations' 0.5 mV/m contours.

(continued on page 31)

Ham Rule Change Plead

by John Gatski

Washington DC Several broadcasting and newspaper groups have asked the FCC to liberalize a three-year old policy, now being considered under a proposed rule making, that regulates broadcast of news-related events by amateur radio.

The groups seeking changes to the amateur radio rules include: the NAB, the Radio Television News Directors Association, NBC, CBS, ABC, NPR, Turner Broadcasting System, American Society of Newspaper Editors, and Reporters for Freedom of the Press, according to joint comments filed 23 November.

The FCC prohibited the use of amateur radio broadcasting for news and news-related events prior to 1985.

In 1979, the Commission denied a request from the NAB asking for a revision of the rules forbidding rebroadcast of CB emergency broadcasts and use of amateur radio for broadcasting services.

But in 1984 following the 1983 Grenada invasion, in which some news was obtained from amateur radio, the FCC took up the issue again and approved rebroadcasts of non-broadcast stations including amateur and CB.

In 1985, the FCC finally approved an amateur radio policy, which the Commission now is considering for rule making under Docket PR 88-139.

The latest amateur radio proposal was made as part of Commission efforts to update and make a comprehensive list of rules involving amateur radio.

New rules

Under the proposal, which comes under a reorganization of the amateur radio policies (Part 97), the new rules only would allow the broadcast of news events by amateur radio under specified

(continued on page 13)

NAACP Charges "Tokenism"

by John Gatski

Washington DC The NAACP has filed complaints with the FCC against license renewal applications for 22 North Carolina and South Carolina radio stations alleging that the stations have not hired enough minorities.

Several station managers were surprised at the complaints and believe their stations are in compliance with Equal Employment Opportunity (EEO) requirements. Six California TV stations were also named in the complaints.

"The reason it took us by surprise is that our total employment is almost 50% black," said Robert Harrison, GM at WLWZ-FM/WELP-AM, Easley, SC.

Harrison said the station used to have a problem recruiting blacks. However, he said the situation eased when the station switched in December 1987 from light rock to an urban contemporary format, which is popular among black listeners.

Hard to recruit

"We were very surprised by the complaint," said Ronald Brown, GM at WRCM-FM, Jacksonville, N.C. "We felt we were doing an adequate job with our EEO program.

"It insinuates that we have discriminated," he added. "But I think we have tried to have a good EEO program in order to have a program to help minorities."

Brown said two of the station's 20 employees are minorities—one is a trainee and the other is on leave, pursuing an advanced degree overseas.

Brown emphasized that his station and other country and western format stations find it difficult to hire blacks because few apply for the jobs.

"At this station we have to try a little harder," he said.

At another of the stations under fire, WLOE-FM in Eden, NC, President Mike Whalen said his staff is cooperating with the local NAACP with regard to the complaint. The station has two full-time black employees among its 18 person work force.

"The source of our problem is that we haven't had enough minorities apply at our station," Whalen said.

According to NAACP and National Black Media Coalition (NBMC) attorney David Honig, the stations' licenses were challenged because an NBMC study revealed that the stations have hired a "token" number of minorities based on the population of the broadcast area—or none at all.

"The FCC has an EEO rule that says you can't discriminate and you must have an EEO written plan," Honig said.

The FCC's EEO guideline urges stations to have their work forces staffed with 50% of the minority ratio living in the station's broadcast area, Honig explained.

Flexibility there

Honig said the formula is not a hard and fast rule if a station makes an effort to hire minorities.

With regard to the complaints, Honig said some stations had not filed an EEO plan, and of those that did, several had "actual pieces of paper" on file, "but they didn't say anything."

Other stations in North Carolina named in complaints are: WKRR-FM, Asheboro; WBTB-AM, Beaufort; WNNC-AM, Newton; WTRG-FM, Rocky Mount; WLVK-FM, Statesville; WRRF-AM, Washington; WZZU-FM, Burlington; WCHL-AM, Chapel Hill and WGBR-AM, Goldsboro.

Other stations in South Carolina named in the complaint are: WTMA-AM/WSSX-FM, Charleston; WNOK-AM, Columbia; WELP-AM/WLWZ-FM, Easley; WEAC-AM/WAGI-FM, Gaffney; WESC-FM/AM, Greenville; WAVF-FM, Hanahan; WKJQ-FM/AM, Myrtle Beach; WGSN-AM/WNMB-FM, North Myrtle Beach; WSPA-AM/FM, Spartanburg; WDYY-AM, Sumter and WSCQ-FM, West Columbia.

Several stations are working with local NAACP chapters and some of the complaints may be dropped, said Dennis Schatzman, executive director of

(continued on page 30)

RTNDA Offers Basic Radio Fare

by Charles Taylor

Las Vegas NV While radio had its place at the Radio-Television News Directors Association's (RTNDA) 43rd Annual International Conference and Convention, those attending for extensive new equipment displays were likely disappointed by sparse pickings.

The conference, held here 30 November to 3 December, offered a roundtable discussion on radio news equipment, which attracted close to 50 news directors, college journalism professors and manufacturers.

The roundtable, in essence, became a wish session primarily regarding portable cassette recorders. Most station representatives grumbled that no product currently exists that combines reliability, features and affordability.

Cellular interface is the future at Comrex.

Art Gonzales, Sony professional audio product manager, noted that the company "is looking heavily into the radio market," though it currently has no products targeted specifically for the industry.

Shure Brothers also has its eye on the market, according to Chris Lyons, professional product marketing coordinator. But he added, "Radio is a small market and we'd like to find a way to do it with other markets besides radio news to make it equitable for us." The company currently does not manufacture any cassette recorders.

Chuck Wolf, the roundtable moderator, cited that in an RTNDA survey, the average price most in radio are willing to pay for such equipment is $293.

Discussion also focused on effective methods of feeding information from a pay phone. Suggestions ranged from some shady tamperings with Bell pay phone connections to the more simplistic cracking open of a Radio Shack pillow speaker, plugging it into the player's output and holding it up to the phone's mouthpiece. The device costs $4.99.

It also was suggested that with today's high-quality headphones, it works well to cup one earpiece around the phone's mouthpiece.

There also is Shure's 50 AC acoustic coupler, designed specifically for the task, though attendees said results with the product are inconsistent. Suggestions for improvement were made to Lyons.

Ideas were discussed as well about interface to cellular, which Comrex VP Lynn Distler called "the wave of the future."

One of the products that Comrex displayed at RTNDA accomplishes just that: the PLX one-line micro frequency extender, which is packaged with a Mitsubishi 800 3W cellular phone.


A radio news equipment roundtable drew 50 attendees.

Together, the products clarify and boost telephone signals, while allowing broadcasters to complete remote broadcasts from most anywhere without the burden of securing phone lines.

Broadcasters can expect to save between $150 and $250 per broadcast by avoiding phone line hook-ups, said James Miller, president of Access Communications, a Bell mobile communications agent.

Distler added that the system, which is a third the size of the company's other frequency extenders, offers "the equivalent of satellite uplink quality as far as audio."

Also on the exhibit floor, Gentner Electronics Corp. highlighted its new three-line EFT-3000 frequency extender, which features auto dialing, automatic answer, automatic encode/decode, group delay adjustment, phase correction and equalization. It also includes a built-in microphone, headset amplifiers and a front-panel touch tone pad.

Shure Brothers was among the exhibitors displaying their wares. The company featured its Automatic Microphone System (AMS).

The company also offered a look at its Combination Remote Mixer (CRM), a four-channel microphone mixer and four-channel headset amplifier built into one product. Each input channel features its own automatic limiter, according to Gary Crowder, Gentner's director of marketing and sales for broadcast audio.

Also on display from Gentner were its portable telephone interface, which allows use of a telephone set for feeding or recording information; and two models of two-way telephone couplers.

Shure Brothers featured its Automatic Microphone System (AMS), which uses two unidirectional capsules to allow the microphone to turn on automatically when it reads a desirable signal from within a 120° "window of acceptance."

The voice-activation turns on in 4 milliseconds without clicks or missed signals, according to John Phelan, marketing manager for professional products at Shure. Ideal locations include talk shows, conference rooms, churches and courtrooms, he said.

Shure also showed the FP51 Gated Compressor-Mixer, a four-input, one-output microphone mixer.

"Users can save on rack space, setup time and adjustment problems with the FP51," said Phelan. "It brings a great many professional features together in a package small enough for location use."

In all, 1481 registered attendees gathered for RTNDA.

Ethnic Balance Sought

(continued from page 1)

the newsroom. Help cultivate their skills too."

He also urged minorities to pledge themselves first to the profession, however, "whether we like it or not, as members of ethnic minorities, we serve as role models that we can make it in the business."

Evelyn Hernandez, president of the National Association of Hispanic Journalists, echoed LaCuesta's doubts of the profession's active interest in the issue. "I'm not fully convinced that having a multicultural newsroom is a priority in broadcast journalism."

An ethnic blend is essential, she said, because "America is a multicultural, multi-ethnic nation. This should be reflected by people at stations."

Bill Lord, a white news director of WKRN-TV in Nashville, presented a different perspective. The hiring of minorities, he said, now is done "as a matter of course" at stations owned by Knight-Ridder, his station's owner.

"The work remains in getting minorities in management positions," he said, adding that Knight-Ridder, for one, is committed to the task with a developed minority training program.

Pam Moore, VP for the National Association of Black Journalists and the panel moderator, stressed that such individual attention is a must to integrate minority employees into predominately white newsrooms.

"What we want is a chance and a chance of support," she said. "Confront comfort levels with us. Some of us are intimidated when we walk into your newsrooms."

Some attendees, however, reacted unfavorably to the sentiment that minorities merit special attention.

Norm Fein, senior executive producer at News 12 in Woodbury, NY, told of his ex-wife's determination to succeed in the business world as a minority based on qualifications and drive, not by being earmarked as a minority.

Another attendee said that minority hiring in broadcasting is by no means an issue that news managers have overlooked. In fact, she said, aiming for a multicultural newsroom has prompted a backlash from white job candidates.

"If you don't think progress is being made, talk to female white anchors or white male reporters who can't get jobs," she said.

Amid the sometimes antagonistic exchanges between panelists and audience, a softer-toned message was offered by the final panelist, Gary Wordlaw, the black news director of WMAR-TV in Baltimore.

"I didn't come here to beat up on people who took the time to come here," he said. "When I first started coming to RTNDA in 1979 or 1980, you could have had a meeting like this in a phone booth."

Wordlaw then told of his history and attitudes as a minority working his way up the industry ladder. When bypassed for a number of promotions at one station, he contemplated suing under an Equal Employment Opportunity violation. A superior, however, explained that his being held back had nothing to do with color.

"He told me I wasn't very good," Wordlaw said. The station then offered to help him improve his skills with aid from a speech pathologist and a writing specialist. It also let him try anchor work.

"We all need to grow and color has nothing to do with it," he said.

Still, in many cases, minorities continue to struggle for the opportunities they deserve, according to Wordlaw.

For more information, contact RTNDA at 202-659-6510.

Duopoly

(continued from page 3)

As long as the signal strength doesn't exceed contour limits, the idea is a possibility. But he added, "It's not like you can put boxes together. It's hard to build something out of circles."

The limitation would be the "pockets of coverage" a group might put together, but it could have a common sales staff or programming department.

NewCity VP of Engineering John Marino said the change gives groups new opportunities. "It's certainly something that we will be looking into."

Capital Cities/ABC radio engineering VP Al Resnick said the change would have more effect on regional broadcasters than networks such as ABC with big signal stations.

For further information on duopoly, contact Michele Farquhar or Andrew Rhodes at the FCC, 202-632-7792.

First Phase Complete In VOA Renovation

by Charles Taylor

Washington DC Finally.

Seven months after its original projected completion date, the first phase of Voice of America's (VOA) broadcast studio renovation project is finished.

Completing nine studios in the first phase, which VOA said carried a $6.5 million price tag, marked a bittersweet victory for the agency that struggled with delays and alleged cost overruns.

The scope of the full project includes complete renovation of 19 studios, many of which have not been updated since 1954. The new studios contain custom audio consoles from Harrison Systems; CD, cart and reel-to-reel players; sophisticated phone and intercom systems and installation of new electronics and associated wiring. An updated heating/air conditioning and electrical power system are included.

Contractor wanted out

One of the major delays came about as a result of the need to remove asbestos and PCBs from the old studios.

Just prior to the beginning of work on the nine studios, in February 1987, a contractor working on another part of the renovation project, Multiphase Consulting of Falls Church, VA, asked to be released from its contract. The company said PCBs were leaking from wires in one of the studios.

VOA, however, refused to oblige, saying the claim was unsubstantiated and that the firm would receive payment only after all the work in its contract was completed.

Ten months later, after a series of letters between Multiphase and VOA, the company was released from the contract and paid $1800 for the portion of work completed.

Delays in the first phase of the 19 studio renovation came primarily from equipment suppliers who weren't able to deliver on schedule, according to the VOA.

One problem involved modifications to the custom-designed consoles.

What remains on the studio renovation project is a parallel rejuvenation of 10 broadcast studios that constitutes Phase 2. When the contract was signed 18 May, 1987, both phases were to have been finished this month.

Grunley-Walsh says that Phase 2 will be finished by mid 1989, and according to what VOA Deputy Director Robert Barry has been told, no snags are anticipated.

"He (the contractor believes that the second phase will go much faster because the bugs will be ironed out of the equipment and now the crew working on this have greater familiarity with the problems," Barry said.

Part of $365 million effort

The construction of new studios is part of a comprehensive modernization effort launched in 1983. So far, the agency has spent $365 million to upgrade broadcast equipment and relay stations worldwide. Of the figure, less than $10 million remains unobligated, according to VOA.

Part of the money was invested in establishing a relay station in Morocco, set to be on the air by 1992. The station, according to a VOA spokesperson, will improve VOA broadcasts to areas of the Middle East, North Africa and Eastern Europe.

A $56 million contract was awarded in May to a joint venture of Marconi Electronics and Cincinatti Electronics for the design, testing and construction of 10, 500 kW transmitters for the station. A $23 million contract for construction of the station was awarded to J.A. Jones Construction Co. of Charlotte, NC.

The six million dollar contract for the 19 studio renovation went outside of the broadcast industry to general contractor Grunley-Walsh, who subcontracted with Dynalectric and Jullien Enterprises for the $3.2 million studio work.

For more information on VOA activities, contact public affairs at 202-485-8238.

Ham Rules to Change?

(continued from page 9)

conditions.

Amateur radio could be broadcast if the information is "critical to protecting the immediate safety of life of individuals or the immediate protection of property" or if the information is directly related to the events.

Amateur radio could also be rebroadcast in the event of something unforseen and only if the information can't be transmitted "by any means other than an amateur radio station because normal communication systems have been disrupted or because there are no other communication systems available from the place where the information originated."

The groups asked the FCC to drop the "unforeseen" event and "immediate safety" of persons/property conditions, but to keep the other conditions with some additional wording to satisfy the FCC's intent.

Comments asked for language to be inserted any amateur radio news broadcast qualify as "an important news event" which would ensure that amateur radio is not overused to broadcast everyday events.

In criticizing the FCC proposed conditions, the organizations said the "immediate danger to personal and property" condition is "overly restrictive."

They argued against the "unforeseen" news event condition because "there would be problems of interpretation as to whether and how early an event, such as a hurricane, was foreseen and whether it had been pin-pointed to a specific location."

There also was a concern that the proposal violates the First Amendment right to freedom of the press.

If the FCC does not adopt the groups' proposed wording, those filing offered a minimum alternative; they requested the FCC change language in the conditions so the rules could be interpreted more broadly and fairly for broadcasters without abuse to amateur radio operators.

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PCs Break Into Studio Audio

by Frank Beacham

Los Angeles CA Desktop audio—the fusion of the personal computer with audio post-production—exploded into the professional marketplace in 1988 and promises radical change in the way all audio is produced, from the simplest radio spot to the most complex motion picture soundtrack.

Inexpensive personal computers, most commonly the Apple Macintosh now are being turned in powerful digital audio post-production workstations that can record, store, edit, equalize, mix, crossfade—even time compress/expand—audio of compact disc quality.

A radio station already owning a properly-configured Macintosh computer can add a digital stereo post-production system to produce spots for less than $3500. More sophisticated systems, which can cost in excess of $200,000, are capable of producing an entire film soundtrack with music.

This next generation of audio post-production equipment is made possible by a new, audio digital sound processing chip, developed in US military research and commercially released last year by Motorola.

Called the Motorola 56001, the chip has a 24-bit architecture that allows 16-bit audio processing in real time. In quantity, the tiny semiconductor can be purchased for a little more than $30. A Motorola spokesman said dozens of companies are currently developing new audio products for the 56001.

The first wave of new professional audio workstations developed for the chip—many shown for the first time at the recent convention of Audio Engineering Society here—are now hitting the market.

Radio production

An inexpensive, audio editing system suitable for simple radio spot production is offered by Digidesign, a Menlo Park, CA, company that five years ago began making chips with sounds for drum synthesizers.

The company's new Desktop Audio Production System consists of a Sound Accelerator™ card for Macintosh II or SE computers, an AD IN™ analog-to-digital converter and Sound Designer II™ editing software.

Together, these products form a complete direct-to-disk recording system with 16-bit, 44.1 kHz audio of a quality equal to compact disc players.

Sound is stored on the computer's standard Winchester hard disk drive. The Digidesign system requires five megabytes of disk storage per channel of sound per minute. Therefore, a standard 40 megabyte hard disk drive will store four minutes of stereo sound or eight minutes of mono, enough for radio spot production.

Analog audio enters the computer through the AD IN™ box. Levels are set utilizing icons of audio meters and fader pots on the computer screen. To change levels, the operator uses the Macintosh mouse to move the fader icon.

To begin recording, the operator simply pushes the record button icon on the computer screen. When the audio is recorded onto the computer's hard disk, a visual representation of the sound is available on the screen.

Editing on screen

The entire sound recording then can be edited and manipulated through simple cut and paste functions similar to those used in a word processor.

Editing accuracy is up to 1/50,000 of a second with no pops or clicks at edit points. Crossfades, merge and mixing are accomplished with the software's digital mixer. A seven-band digital parametric equalizer is available to process each channel.

Audio also may be time compressed or expanded without affecting pitch and timbre. The system is designed to make virtually limitless edits without running of disk space.

The Digidesign system, which ships in early 1989, lists for $3,295 without computer. The recommended radio station system, with Macintosh SE, two megabytes of system RAM and at least 40 megabytes of hard disk space, costs under $8000. For an extra $2000, a 100 megabyte hard disk could be added, which would allow the digital recording of 10 minutes of digital stereo audio.

Digidesign's Sound Accelerator™ card allows an Apple Macintosh II to be used as an audio workstation.

Digidesign CEO Paul Lego called the desktop audio movement a revolutionary development.

New frontier

"The thing that will change the industry is you are going to put high quality audio equipment into the hands of more and more people," Lego said.

"When a person can now afford ... for under $10,000 ... to do CD- quality recording, editing and playback at home, two things are going to happen: number one, you are going to bring more creative people into the fold; and, number two, even at high quality recording studios, people will begin taking their work home at night to do on personal systems."

Another desktop audio system, more sophisticated than Digidesign's entry level package, is available from Sonic Solutions of San Francisco. The Sonic System also utilizes a Macintosh computer and the Motorola chip but offers editing features advanced enough for compact disc mastering.

The system records and plays back four channels of digital audio and features an editing desktop with random access editing, variable crossfades, automatic editing marking and "rock and roll."

The mixing desktop has up to four EQ sections per input channel, one dynamic section per output channel and four-channel to two-channel mixing.

A job control program creates logs for source, archive and final master tapes. The system has playback and insert editing control of up to two Sony digital mastering recorders.

The Sonic System comes with high density, large capacity Winchester disk drives that can store about an hour of stereo audio.

Audio data is stored in 16-bit linear PCM digital audio format. Processing and data paths are 24 bits while mixdown busses are 56 bits. The system utilizes four of the Motorola signal processing chips that are assigned independently.

Sonic Solutions' NoNOISE™ system, signal processing software that removes unwanted noise without affecting original program material, also can be added to the system.

The Sonic System, complete with Macintosh II and other needed computer hardware, costs $44,100 and is available now. The NoNOISE™ option, expected to ship early next year, costs an additional $60,000.

More to come

Mary Sauer, director of marketing at Sonic Solutions, and Digidesign's Lego both said their companies first received the Motorola sound processing chip in 1988. "The rush is on to write software for this chip," Lego said. "There are a ton of algorithms that have yet to be written."

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Tracking High Voltage Safely

by John "Q" Shepler

Rockford IL It's a gloomy Monday morning. You snooze peacefully, unaware of the gentle rain and the rumble of thunder in the distance.

It would take a lot to pull you to right now. Tracking down that studio hum last night was a one hour job turned six.

Brrrrrrrriiiiinnnnnnggg. You grab for the phone as a reflex action.

"Yeah, this is John. What's wrong? ... Totally dead, huh? ... Filaments but no plate? ... Oh, the breader blows when you turn on the plates ... happened right after the lightning ... Wonderful! ... I don't know, either. Be there in about half an hour. Bye."

So, you bump into walls getting dressed, grab the tool kit and whatever parts and equipment seem appropriate and head off, still groggy, to fix your client's ailing transmitter.

I recently had the pleasure of an early morning transmitter call and would like to share with you some thoughts on the subject. Specifically, problems in the high voltage section.

What to expect

High voltage problems are mean and dangerous. They try your patience. But ... don't lose your cool or you may lose your life!

A typical HV problem doesn't completely disable the transmitter. Perhaps the fuses are blown or the main circuit breaker is tripped.

You reset the breaker. It stays. OK, you turn on the blower. No problem. The blower comes to life and a second or so later the interlock lamp illuminates. Just like a normal start-up, you think.

Feeling confident that this is just a transient problem, you turn on the filaments. The blower purrs for another sixty seconds as the filaments warm up.

Pretty soon you hear the time delay relay click in and the filament light is on bright green. Everything looks good.

Severe damage

Only one step left. You put your forefinger under the plate toggle switch and give it a quick flip up.

Q-TIPS

Instead of the normal *clunk* of the plate contactor, you can feel the whole transmitter shake as the front panel circuit breader nearly explodes to the tripped position.

You're not sure if you saw the red plate lamp come on or not.

The transmitter crashed in an instant, leaving only the rattle of the blower bearings as they coast to a stop. What happened?

Nothing unusual about this scenario. It is one of the most common you'll find with transmitter problems.

This is especially true following thunderstorms, when the complaint is that the transmitter shut down and now there is no way to get it back on the air. That's a true statement.

Most likely, there's serious damage inside the cabinet and nothing the studio crew can do to find or fix it.

First steps

The highest priority is not to get back on the air. The highest priority is to make sure nobody, including you, gets hurt.

So, if there's a thunderstorm raging outside, forget it. Lay out your tools and test equipment and study the schematics for an hour.

Consider it an opportunity to develop a troubleshooting plan to quickly isolate the problem.

Divide and conquer is a good strategy. You want to find out what's working as well as what's not.

The first step is to turn off the main breaker on the wall and disconnect the secondary leads from the high voltage transformer. These are the leads that go to the rectifiers.

You can leave the disconnected ends dangle. They won't short anything as long as the transformer stud connections are clear. Just make sure you know which wire goes back where.

Getting it back on

Now, restart the transmitter. You should be able to get a normal response until you turn on the plates.

This time, however, the breader should hold and the transmitter should *clunk* closed. However, you won't hear a transformer hum and there will be no high voltage or power output.

Bad news, right? No, wonderful news.

This means that your power transformer, the most expensive part and the part you probably don't have a spare for, is not shorted.

The high voltage stacks

One of the most common causes of a transmitter blowing breakers is a shorted rectifier stack.

You can get a quick idea if this is the problem by reconnecting the leads to the HV transformer, but this time disconnect the output lead from the rectifier stack.

Try powering up the transmitter again. If it trips off on high voltage again you probably have a shorted stack.

The rectifier stack is a high voltage diode. It works just like any other diode with a couple of exceptions.

First, this diode has to withstand a peak reverse voltage of several thousand or more volts. Forward current is probably an amp or more.

Older transmitters had tubes that could take this abuse but semiconductor diodes won't.

The black plastic diode blocks in your transmitter contain maybe five or ten silicon diodes in series to increase the peak reverse voltage (PRV).

In addition, there may be equalizing resistors and capacitors across each individual diode to make sure they share the voltage stress equally.

The encapsulated package keeps out dirt and moisture and provides insulation from electrical ground.

Several kinds of failure

These diodes stacks can fail in several ways. They can open so that there is no conduction forward or reverse.

This causes low voltage, but the transmitter will run quite awhile before the transmitter or filter caps overheat. Not recommended operation, but not a likely cause for a tripped breaker.

The diode stack can short internally so that it conducts in both directions, effectively shorting the power transformer and immediately tripping the circuit breaker.

Another short circuit path is from the diodes to ground. The last case I saw had this type of failure, where the diode circuit arced to the transmitter chassis through at least half an inch of encapsulation.

Perhaps a lightning transient on the power line set up the arc and cracked the case. The case, incidentally, was damaged on the bottom so the diode appeared to be OK upon inspection.

Testing rectifier stacks is not as straightforward as it would seem. Forget using your VOM.

With 10 diodes in series within the stack, you need as much as 7 to 10 volts to overcome the forward drop. A multimeter will show even a new stack as failed open.

Check the diodes

Figure 1 shows a quick setup I've used to check high voltage diodes. The power supply is a bench type.

Voltage isn't important as long as you

(continued on next page)

(continued from previous page)

can get at least 15 or 20.

This particular supply has a meter that can be switched between voltage and current. Otherwise use a VOM 50 or 100 milli-amp range.

The resistor is only to limit the current to protect the diode and power supply. Use any other appropriate value. Careful: some diode stacks are rated for less than an amp.

Some of the short and open problems won't show up unless high voltage is applied.

Worst case, you'll have to disconnect the diode stacks one by one until the power breaker stays on.

This is hard on the transformer and breaker, but may be the only way to find a fault that stays hidden under low voltage tests.

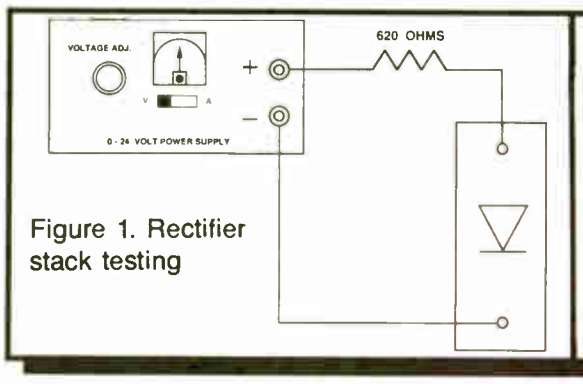
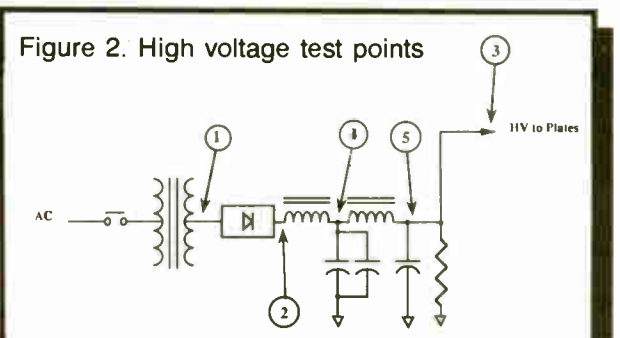


Figure 1. Rectifier stack testing



Other supply problems

Figure 2 shows some test points in addition to #3, before it heads off to the amplifiers.

If the breaker still trips, the likely culprits are the filtering components.

Either the chokes or the HV capacitors (#4, #5) could be shorted to chassis ground. You'll have to disconnect them one by one to find out.

More caution: when you disconnect parts in this area of the circuit, the bleeder resistor will not be able to do its job.

I wouldn't put much trust in bleeders anyway; but knowing this, be doubly sure to discharge all caps with the shorting stick before any poking around.

If one of the filter components is faulty, all is not lost. You can probably limp along with a cap or choke missing.

I've seen glass tumblers used to insulate chokes that developed a short to case. Worked fine.

Beyond the supply

Any short on the high voltage bus will have the same effect as a bad power supply: the breaker trips.

A shorted tube, especially a final amp, will act just like a bad rectifier.

Fortunately, this condition is easy to test for. Simply remove the plate caps and see if the supply will hold.

The doorknob bypass capacitors for the modulators, IPA, or Final also have a nasty habit of shorting at inopportune times.

Many of these are in a PI network arrangement and you can live without one section if an extra cap is not immediately available.

Sometimes the main supply is not at fault. Bias power is often derived from the same transformer and may share other components of the HV supply. It's another place to go looking.

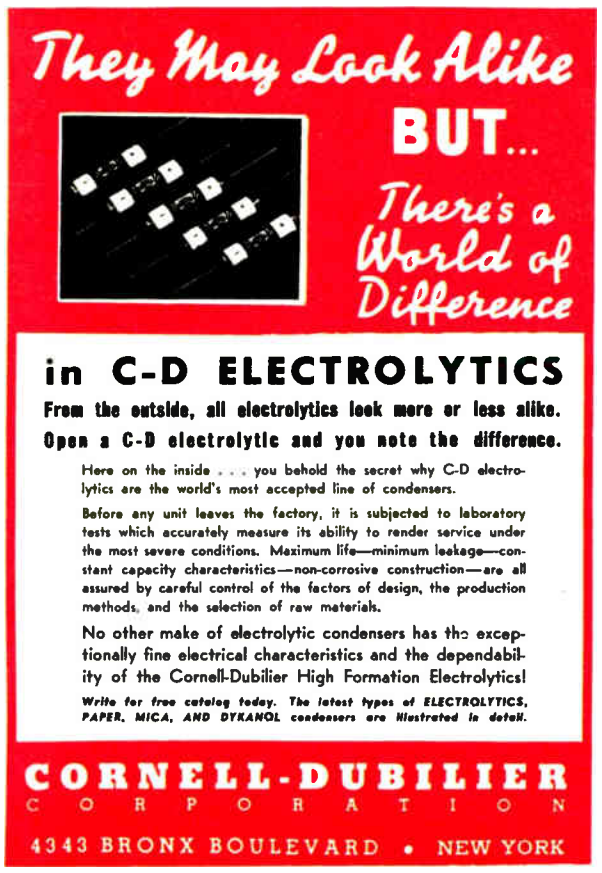
High voltage problems are never a treat but they are often easier to troubleshoot than neutralization or FM cavity problems.

Just take it slowly, one step at a time, and remember: "divide and conquer."

■ ■ ■

John Shepler is an engineering manager, broadcast consultant, writer and regular **RW** *columnist. He can be reached at 818-654-0415.*

53 YEARS AGO



Editor's note: The ***RW*** of today and the ***RW*** of old, printed for a period of time in the 1920s and 1930s fortuitously share the same name. In the '30s the ***RW*** of old changed its look and since the ***RW*** of today has done likewise with this issue this ad seemed especially appropriate.

Reprinted from Radio World, April 1936.

Processing, Formats And Early-Day Calls

by George Riggins

Long Beach CA A cup of coffee and the cassette player in the background playing *Readers Digest* re-releases of music recorded in the period of 1935 to 1940 makes for a relaxing Sunday morning.

General Telephone has goofed up the business line again for the fifth time in the past two weeks, so not all is in perfect order.

Which brings me to a favorite subject: processing. Recently we drove to Salt Lake City for some special calls. Yes, I took the tapes along.

After listening to an hour of taped music across the desert south of Las Vegas, I tuned in the local "good music" stations of Las Vegas.

The difference in the sound quality was quite apparent. Started me to thinking why there should be such a noticeable difference.

The audio portion of the receiver was the same, the speakers the same. The RF section of the receiver should not make that much difference. The difference had to be in the local processing.

It sounded as though the local stations were playing the music from tapes put together by a syndicate, so the audio should have been clean.

In fact I did not hear any record scratches or other noise that indicated local origination of the music. No dynamic range to the program. Local voice sounded fair, but was still "muddy."

In fact, both stations had about the same quality. So much for competition taking care of the local marketplace.

Programming competition

We hear the questions "What is wrong with AM? Why are listeners going to FM? Why are listeners buying and playing tapes/CD players in the automobile?"

The questions are as many as the facets on a good diamond and there are just as many answers.

In fact the further we dig into the problems of radio the more complicated the questions and answers become. There are no magic answers.

A start might be programming. In my humble opinion, programming is what gets a listener. I will stand for quite a bit of technical degradation before I switch if the alternate choices are no better.

Old Timer

Yes, I know of stations that buy audiences or are always having a "giveaway" promotion of some sort going.

In one case, I was told that the cash "giveaway" during a three or four week period was so successful that the listener quantity was high enough for the station to have taken about nine-to-one in additional revenue for each dollar spent on the "giveaway."

Not a bad return on investment! But what happened to the audience after the promotion, which was done during a rating period? We do not discuss such matters in public. (Nothing new here, hype the ratings.)

Book on old calls

In response to comments regarding old time station calls. a book was received from Charles W. Ingersoll titled *Minnesota Airwaves, 1912 Through 1939 and Ratio Trivia*.

Mr. Ingersoll has done a tremendous amount of research to gather call signs, names and other pertinent data such as how many studios, the size of the studio and descriptions of some of the equipment.

There is a listing of the active AM sta-

(continued on page 31)

Winter CES Taps Latest Trends

by Charles Taylor

Las Vegas NV Organizers of the 1989 International Consumer Electronics Show (CES) promise to dazzle attendees with the latest innovations and technology with remote control, DAT players, digital audio and surround sound, among others.

The conference will be held here 7 to 10 January, 1989 at various locations, including the Las Vegas Convention Center and Las Vegas Hilton hotel. Included will be 1350 exhibitors and various discussion groups.

The show is sponsored and produced by the Electronic Industries Association (EIA).

One-hand control

One highlight of the show will be the first exhibition of EIA's Consumer Electronics Bus, which contains various electronic products, all using what is now being referred to as the home automation standard.

The standard allows any number of products to be controlled by a single remote control from most anywhere in an individual's home.

Included on the bus will be electronic devices from between 12 and 15 manufacturers, according to Tom Mock, EIA's director of engineering.

Discussion groups of interest to radio include a meeting of the R-DAT Player Subcommittee on Monday, 9 January from 9 AM to noon. Bart Locanthi, an independent consultant, will serve as chairman.

The group will look at the development of test and measurement procedures for DAT players, Mock said.

The Mobile Electronics Subcommittee will meet on Monday from 9 AM to noon. The meeting will be chaired by Pat Hart with Yamaha Electronics and will study implications of the current Interim Standard 25.

Also Monday, the National Radio Systems Committee (NRSC) will gather from 9 AM to 11:30 AM. Charles Morgan with Susquehanna Broadcasting will lead the discussion.

One topic to be covered at the NRSC meeting will be recommendations that came out of an initial meeting of the NRSC's FM subgroup 16 November in Washington, according to EIA President Eb Tingley.

AM discussion

Finally, a workshop on "Improved AM Broadcasting: Tomorrow's Radio," will convene from 11:30 AM to 12:30 PM on Monday.

One highlight of the show will be the first exhibition of the EIA's Consumer Electronics Bus . . .

One element of the discussion will be the NAB's proposed certification mark, according to NAB engineer Michael Rau, a member of the panel. The certification mark is being pushed by the NAB and supported by EIA as a way for manufacturers to identify tuners that contain the industry's up-to-date innovations.

"I've got to get some support for it in the receiver manufacturer community or else it won't fly," Rau said. "You can't force them to use it or to agree to it. It needs to be sold as a good thing."

Technical meetings will be held at the Las Vegas Hilton meeting rooms on the second floor. The workshop will be held in the Las Vegas Hilton ballroom on the first level.

For more information on the conference, contact EIA at 202-457-4900.

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KOLR Television / *RS-12*
WCRH Radio / *RS-18*
WNCO Radio / *RS-12*
WIS TV / *RS-12*
Rhode Island College / *RS-12*
KSQY Radio / *RS-6*
WILD Radio / *RS-12*
AEI Music Network Inc. / *RS-6*
Elon College / *RS-6*
Manhattan College / *RS-12*
Roger Williams College / *RS-12*
WXXK Radio / *RS-12*
Bryant College / *RS-12*
Univ. of Notre Dame / *RS-12*
College of Staten Island / *RS-6*
George Mason University / *RS-12*
KAJX Radio / *RS-12*
WXXK Radio / *RS-18*
Lafayette College / *RS-12*
WLIX Radio / *RS-12*
WRGN FM Radio / *RS-12*
Columbia School of Broadcasting / *RS-12*
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Haverford College / *RS-6*
Southern Illinois University / *RS-12*
Hobart & William Smith College / *RS-12*
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McManus Engineering / *RS-12*
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WMRQ Radio / *RS-18*
East Texas State University / *RS-6*
KECH Radio / *RS-12*
3M France / *RS-12*
KRST & KRZY Radio / *RS-18*
KROW Radio / *RS-12*
Retex International / *RS-12*
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KYRE & KSYC Radio / *RS-12*
Oakwood Audio/Video / *RS-18*
WBIZ & WJJK Radio / *RS-18*
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KLYT Radio / *RS-12*
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Columbia Union College / *RS-18*
WKGB Radio / *RS-12*
WSSV Radio / *RS-12*
Radioactive Group / *RS-12*
Beach House Studios / *RS-12*
KYGL Radio / *RS-18*
WILD Radio / *RS-12*
Vincennes University / *RS-12*
Yeshiva University / *RS-12*
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WVAY Radio / *RS-12*
WSSV Radio / *RS-12*
WFJY Radio / *RS-18*
Kirkwood Community College / *RS-12*
Vincennes University / *RS-6*
WVAY Radio / *RS-12*
WSGY & WWGS Radio / *RS-12*
George Washington University / *RS-18*
KYGL Radio / *RS-18*
WCBA Radio / *RS-12*
KNUS & KZIA Radio / *RS-18*
Ozarks Public Television / *RS-18*
Radioactive Group / *RS-12*
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WTSL Radio / *RS-12*
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Circle 28 On Reader Service Card

Leaving Paper Trails for the FCC

by Harold Hallikainen

San Luis Obispo CA This month we'll take a look at some of the paperwork the FCC expects you to have on file and available during an inspection.

The Commission requires the station to be available for inspection during business hours or any time the station is in operation [73.1225(a)]. The FCC may require special tests during an inspection (such as operation with day, night, presunrise or postsunset facilities).

Let's look at both the technical paperwork requirements [73.1250] and the non-technical requirements (such as the public file).

Rule 73.1238 requires the station and operator licenses to be posted at the principal control point.

Operators employed by more than one station must post the license at one of the stations and a photocopy at each additional station. Make sure all your operators are licensed and have the licenses posted.

You should have equipment performance measurements required by 73.1590 and 73.1690. These measurements are to demonstrate compliance

INSIGHT ON RULES

with the spurious radiation requirements (bandwidth, harmonics and spurious radiation) of 73.44 (AM) and 73.317 (FM).

Specific requirements

For an AM station, these measurements are to be completed each year with not more than 14 months between successive measurements.

Also, a set of measurements is required on the installation of a new or replacement main transmitter.

It is also required upon modification of the transmitter as permitted by 73.1690 (installation of RF filters or diplexers of a different type and other permitted changes) or installation of AM stereo equipment.

These measurements are to be kept on file at the control point or transmitter for two years, so you should normally have two such reports on file.

FM stations are required to run equipment performance measurements on installation of a new or replacement transmitter, on modifications of the transmitter system permitted under 73.1690, or the installation of stereo qenerators or subcarrier equipment.

The Commission has not specified a required schedule for FM stations to make such measurements, so it is possible that any required report may be older than two years and no longer needs to be retained.

Note that the lack of a specified measurement frequency does not relieve the station of complying with the equipment performance requirements.

Chief operator

All stations must have a written designation of chief operator [73.1870(a)]. The chief operator for directional AM stations or AM stations operating with more than 10 kW must be employees of the station.

The chief operator of other stations may serve on a contract basis. The written designation of the chief operator and any agreement with a chief operator serving on a contract basis must be in the station files and available for FCC inspection [73.d1870(b)(3) and 73.1225(c)(2)].

Rule 73.1690(e) and 73.1225(c)(3) require a statement including diagrams showing any permitted modification to the transmitter to be retained at the tramsmitter site for as long as the equipment is in use.

This statement must be available to the FCC during an inspection. Note that such modifications also require the completion of equipment performance measurements, which must also be retained for two years.

Rule 73.1225(c)(5) requires that the station log specified in 73.1820 must be available for inspection by the FCC. These logs are to be maintained for a minimum of two years [73.1840].

Several possible circumstances increase the log retention period. A review of 73.1840 will help define those circumstances.

AM stations must maintain a copy of the most recent antenna (nondirectional) or common point (directional) impedance measurement (directional) measurements as specified in 73.54.

The exception is when a direct reading power meter (determining power based on measured voltage, current and phase angle as specified in 73.51(a)(1)) is used. This report is to be available to the FCC during an inspection [73.1225(d)(1)].

Rule 73.1225(d)(2) requires a copy of the most recent "proof of performance" demonstrating the proper operation of the directional array (required by 73.151) to be available during an inspection.

For many stations, this report was prepared when the current directional array was built.

Rule 73.1225(d)(3) requires the most recent DA "partial proof" to be available for inspection. A partial proof (as specified in 73.154) is required on modification of any portion of the DA sampling system above the base of the towers (such as sampling loops) by 73.68(d)(3).

(continued on page 30)

Recording Basics For Engineers

by Bruce Bartlett

Elkhart IN With the proper training and equipment a broadcast production person should be able to create spots or do remote recordings and broadcasts of live concerts, with quality rivaling that of professional recording studios.

These days making a good recording involves more than plugging a microphone into a tape deck and hitting the record button. Let's face it, modern recording equipment and techniques are more complicated than that.

Before you can achieve a quality recording or remote broadcast there's a lot of equipment and terminology to understand and many techniques to learn.

Musical sound starts with musicians and their instruments and goes through a series of changes and manipulations, ending with the musical experience in the ears and mind of the listener.

There are three basic ways to record. The first is with two microphones directly into a two-track tape recorder.

The second involves several microphones into a mixer, then into a two-track tape recorder.

The third is with several microphones into a multichannel mixer, then into a multitrack tape recorder.

It's probably helpful to review what's happening along each step of the recording process.

Live stereo recording

Figure 1 is a diagram of the elements in the recording and reproduction chain for live stereo recording. Let's look at each element from left to right.

Each musical instrument converts the player's motion into sound waves which travel outward from the instrument and reflect off the walls, ceiling and floor.

The reflected sound is delayed, and spectrally modified, relative to the direct sound from the instrument.

At the microphone, the direct and reflected sound waves are converted into the signal. Some musical instruments—synthesizer, drum machine, electric bass—produce an electronic signal rather than sound waves, so you can record them directly through a cable rather than with a microphone.

The tone quality and sense of distance picked up by the microphone are affected by mic selection and placement.

During recording, the mic signal enters the two-track recorder and is converted into a magnetic signal on magnetic tape. The recorder can be open-reel, R-DAT, VHS Hi-Fi, etc.

And during playback the magnetic signal on tape is converted back into an electric signal.

Figure 1. The recording/reproduction chain for recording with a microphone and a tape recorder.

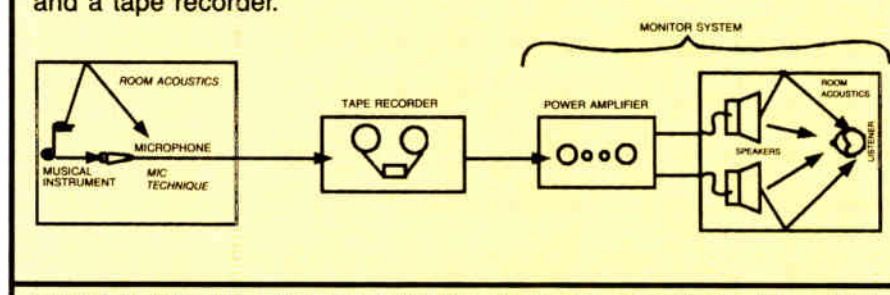
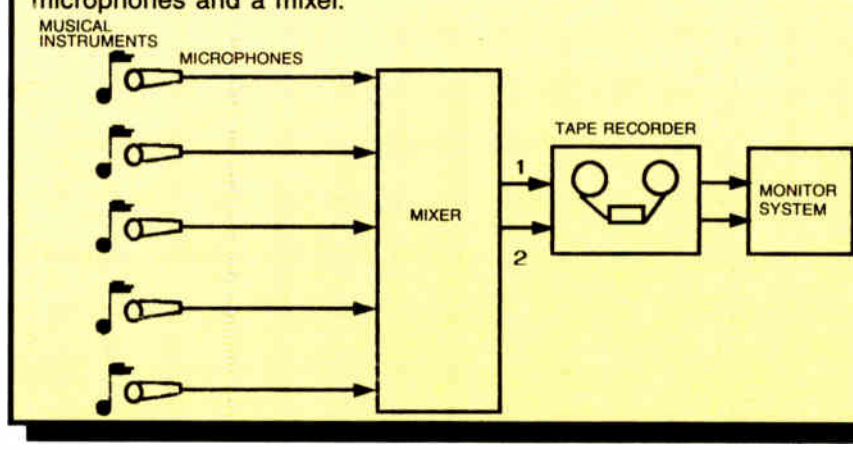


Figure 2. The recording/reproduction chain for recording with multiple microphones and a mixer.



The electric signal from the tape recorder is amplified and changed back into sound waves by the monitor amplifier and speakers. The monitor system lets you hear what you're recording on tape and allows you to judge audio quality.

The loudspeaker sound is modified by sound reflections from the listening room. Finally, the sound strikes the listener's ears and is heard as music.

Mixing live to two-track

This recording process shown in Figure 2 is the same, except that you combine multiple microphone signals with a mixer and record the mix onto a two-track recorder.

The mixer amplifies the microphone signals, controls their relative volumes and routes each signal to track 1, 2 or both (with a pan pot).

The pan pot divides the signal between tracks 1 and 2 and controls the relative level going to each track.

This affects the position of each instrument's phantom image between the speakers: left, center, right or anywhere in between.

In multitrack recording, shown in Figure 3, the process can be divided into three stages: recording, overdubbing and mixdown.

All the microphone signals are controlled and modified by the mixing console or mixer during the recording stage.

The console or mixer amplifies the microphone signals, controls their relative volumes and routes or sends them to various tracks in the multitrack tape recorder.

In the multitrack recorder, there are anywhere from four to 24 tracks recorded side-by-side on a single tape. Each track contains the signal of a different instrument or a different group of instruments so the tracks can be mixed any way desired after the recording session.

Often, the recorder and mixer are combined in a single portable package

(continued on next page)

Remote and On Tape

(continued from previous page)

called a recorder/mixer or "portable studio." Noise reduction circuits (such as Dolby or dbx) are usually built into the recorder to reduce tape hiss.

Overdubbing

After your basic tracks are recorded you can listen to them and simultaneously record more instruments or voices on unused tracks—a process called overdubbing.

In this way, you can record one instrument or voice at a time, adding them track by track, until you fill up all the tracks.

The mixdown chain is shown in Figure 4, which should be read left to right.

First, the recorded magnetic signals on the multitrack recorder are played back—changed into an electronic signal.

Next, the mixer blends or mixes all the track signals down to just two channels (for stereo). You control the loudness of each track to achieve a pleasing balance.

Also, you can add special effects—reverb, echo, chorus, compression—to provide spaciousness or sonic interest. You can also adjust the equalization (tone control) for each track, and pan the tracks left, right, center or anywhere between the stereo pair of speakers.

The two stereo signals from the mixer go to a two-track recorder and become the final product.

Live stereo recording is a low-cost way to record classical-music ensembles such as symphony orchestras and bands, pipe organs, soloists, quartets, etc. It's also effective for recording sound effects.

Mixing live to two-track allows you more flexibility in creating a mix. It's a low-cost way to record or broadcast pop-music groups or classical-music groups that can't be adequately covered with just two microphones. However, you must mix live as the music is performed.

Multitrack recording offers the most control of the mix, because you can do the mix after the recording session. Also, you can do overdubs. This procedure, however, adds cost and complexity.

Multitrack recording offers the most control of the mix, because you can do the mix after the recording session. Also, you can do overdubs.

Figure 3. Multitrack recording

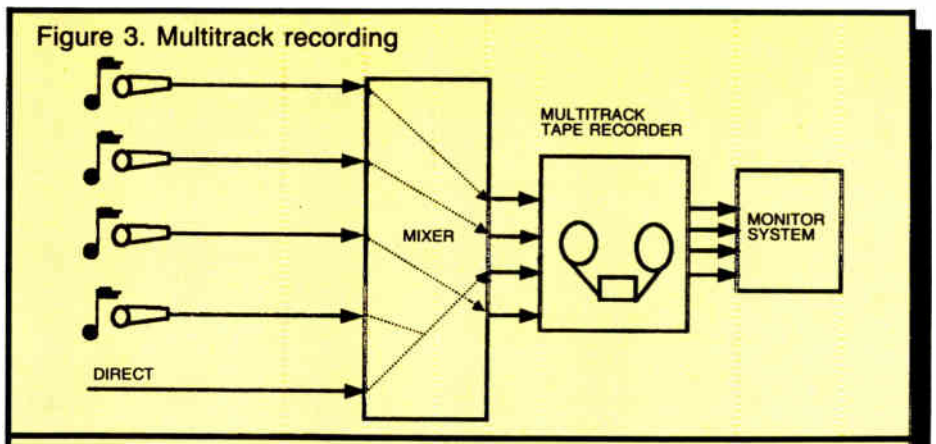
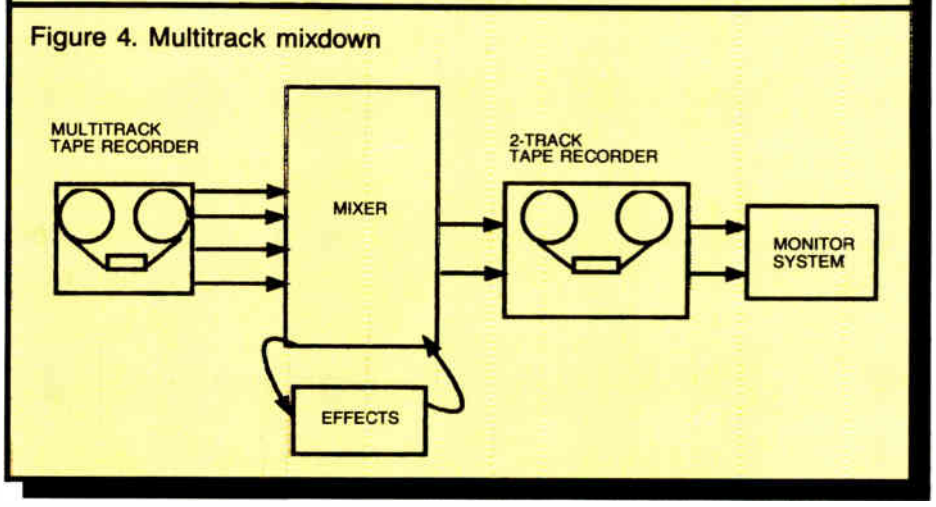


Figure 4. Multitrack mixdown



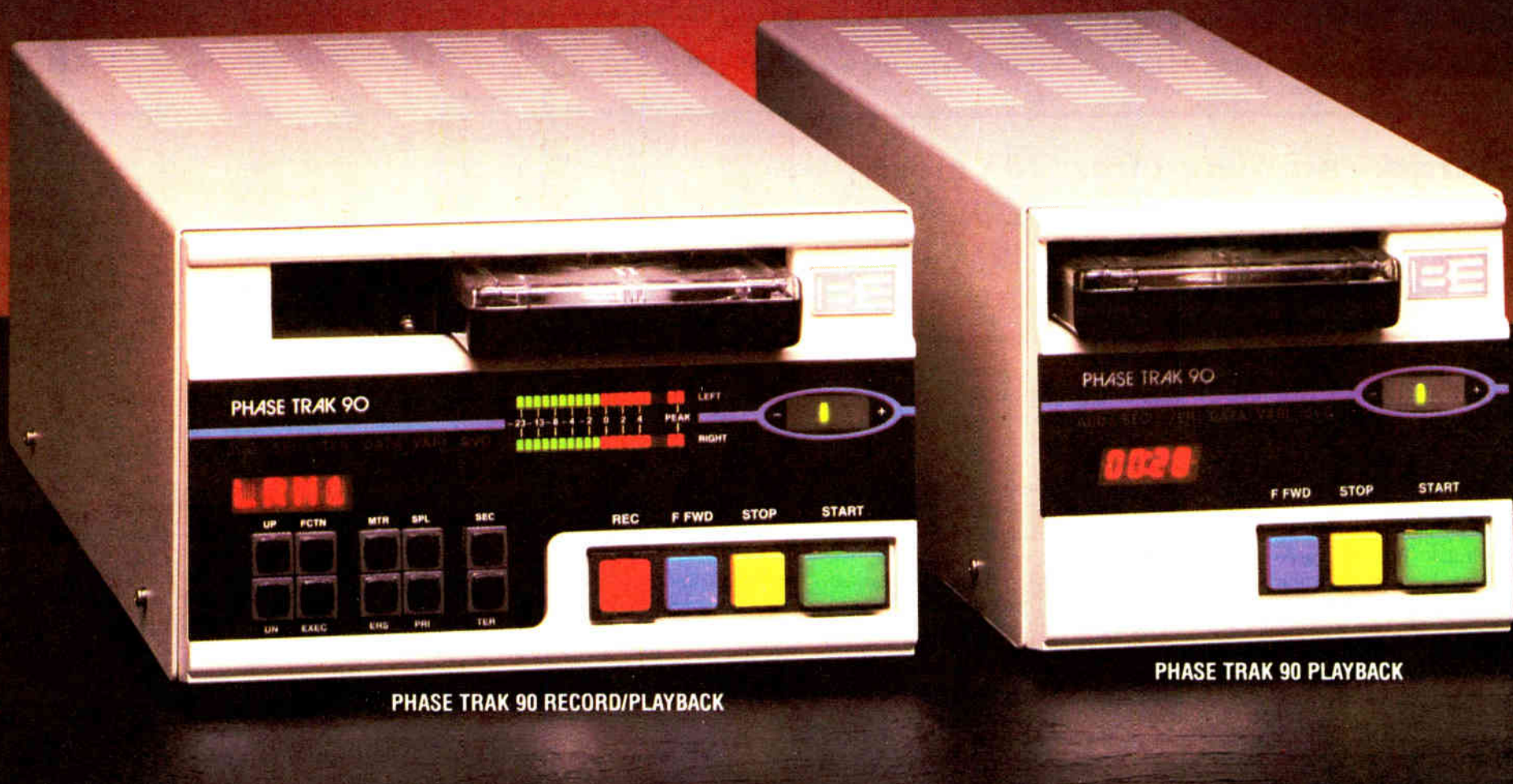
Each link of the recording-reproduction chain contributes to the sound quality of the finished recording.

A bad-sounding master tape can be caused by any weak link: low-quality microphones, bad mic placement, improperly set mixer controls, etc. A good-sounding tape results when you optimize every part of the chain. Future columns will tell how to reach that goal.

■ ■ ■

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

Don't Blame The Tape!



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Circle 25 On Reader Service Card

A Clean Break From Processing

by Tom McGinley

Greenbelt MD Last month we opened a Pandora's box and pondered the impact of CDs and digital quality on the audio processing setup and how it might relate to our listeners.

Does aggressive processing and the resulting loud and dense air sound actually attract listeners and improve ratings?

I recently conducted a brief informal telephone survey of about 25 markets (all sizes) to find out how stations go about deciding what the air sound should be.

I asked the person who was directly responsible for the station's processing which of the following was the dominant influence in the decision to set it up the way it was running:

1. The suggested settings in the processor manual.
2. My own listening tastes.
3. The listening tastes of the boss.
4. My response to what competing stations sound like.
5. What is generally accepted to be the listening tastes of the majority of the station's intended listeners.

By the book or by taste?

This is a tough question to answer honestly. The majority said they started out with #1 but then fine-tuned according to #2 or #3.

After further reflection, most of this same group admitted that #4 actually played a key role. Less than half of our respondents identified #5 as probably the "right" answer.

After 24 years of waging the wars of loudness and processing in many markets, I keep coming back to the same fundamental realization about audio processing.

To help maximize its chances for success, any radio station should set up its air sound to be the most appealing and listenable for the majority of the target audience as possible.

People all have different hearing capabilities and sensitivities. They also have varying listening tastes and preferences.

A substantial amount of research has been conducted in recent years to determine what sonic qualities are pleasing or displeasing to selected groups of all ages and sexes while listening to samples of recorded music and voices over the multitude of reproduction devices available.

Audio equipment and receiver manufacturers have been responsible for most of this research, the results of which are vitally important to broadcasters.

Unfortunately, most of it does not get published and has had to trickle through to our industry via word of mouth from CES tradeshows and the like.

A recent exception to this is the B. Angell study on radio listening and interference acceptability threshholds commissioned by the NAB. If you do your own in-house research, you can confirm the following results by asking your own listeners what sounds best to them.

Virtually all groups mention several fundamental prerequisites to pleasurable listening.

First and foremost it must be "clear and clean." Obviously that means the absence of noise and distortion. No wonder the CD has gained such widespread popularity.

A second necessary attribute is a "full sound," meaning a good balance of bass and treble, and the enhancement of good separation in stereo.

A final requirement for all groups is that the sound be consistent. Inconsistency makes any product unpredictable and unreliable.

Radio's special needs

For radio listening a preferred station should be easy to find on the dial and tune in, although digital radios are minimizing this problem.

Hopefully your signal covers the service area well enough to achieve full quieting in most radios.

While a strong signal is certainly a plus, don't confuse that with loudness. Loudness is hardly ever mentioned as an appealing attribute for enjoyable listening.

It is easy to forget that the listener has the ultimate loudness control at his fingertips: the volume knob on the radio. Unfortunately, few radios have effective noise reduction controls and none have distortion cancelling controls.

Beyond these basic qualities which appeal to all listeners in general, manipulating or coloring the on-air sound via processing adjustments in an attempt to create more appeal may actually be counter-productive and offend important groups within the target audience you are trying to attract.

The best guideline for equalization has always been to honor the integrity of the original program material.

The research has confirmed that hearing characteristics of various sex and age groups have a direct bearing on radio listening habits and preferences.

For example, females in general have more sensitive hearing than males, especially in the higher frequency ranges. As a result, women often turn the treble down and the bass up. This is largely a psycho-acoustic response which reduces the harsh or piercing qualities of too much treble.

Men on the other hand, will usually turn the treble up because of less sensitive high frequency hearing capability. The same is true for the 50-plus demo groups because of the natural aging process. The 12-24 age group typically likes bass and treble enhancement.

Many radios do not have tone controls and many listeners do not pay much attention to them even if they are available.

Consequently if a given format is targeted to a specific group, any significant tonal colorations or equalization deviations from flat response must be very carefully considered.

Formats serving the 25-54 demos generally do not need such coloration. The best guideline for equalization has always been to honor the integrity of the original program material.

Afterall, very critical professional studio engineers spent a very careful effort getting the EQ and mix balances just right on the master recording.

Many older recordings may be deficient in good equalization balance but the multiband processors being used by most stations will tend to smooth out such imbalances.

Processing EQ should be set up to make the air sound comparable to the original program material when reproduction by the typical radio (tone controls in neutral) most widely used by members of the target audience.

Not by ear

Probably the most typical example of inappropriate audio processing I've recently encountered was a medium market "light hits" FM station.

The processing was set up to deliver a very loud, very compressed, very bright air sound. The high end had a brittle "cutting-edge" quality which would instantly cause the typical 35 year old female (usually the core demo for this format) to turn the treble off or more likely turn to a more bearable station.

I later learned that this air sound was set up by the PD who was an ex-CHR jock who had reportedly burned away much of his high frequency hearing with many years of wearing loud headphones.

Many CHR stations have traditionally favored that macho type of processing and have been getting away with it for years. The successful ones have been resting on the conclusion that it is best not to mess with success.

I've always felt that an eight share might have been a 10 share if the audio had a more natural and listenable air sound capable of attracting wider demos and better quarter-hour maintenance.

It is the feeling of many thoughtful observers of our industry that with the flood of other electronic media entertainment choices, people just don't use radio like they used to. It's just not as an

(continued on page 31)

Resolution In Digital Recording

by Mel Lambert

Studio City CA Last time we looked at sampling frequency and its relation to bandwidth in digital systems; now let's look at quantization, error correction and oversampling.

The "resolution" of a digital recording system is determined by its *quantization rate*, expressed in bits. During the A/D conversion process, the resultant number or digital word can be of any bit size, although current ICs usually limit this to 14, 16 or 18 bits.

Mathematically, a 16-bit number of binary off/on sequences will provide a maximum of 65,536 discrete levels.

Or, put another way, between the softest and loudest levels recorded on tape a 16-bit system will provide over 65,000 unique sound levels. A 14-bit system, on the other hand, provided only a quarter of the levels provide by a 16-bit system.

Expressed in terms of *dynamic range*—the difference in level between the softest and loudest sounds that a system can handle without causing distortion—a 16-bit system will produce a recording with a dynamic range of just over 96 dB.

A 14-bit system on the other hand offers a dynamic range of around 84 dB while analog systems, in contrast, are limited to dynamic ranges of between 55 dB and 80 dB, depending upon tape speed, track format and the use of noise reduction.

As mentioned above, the bandwidth of a recording system based on a sampling frequency of, let's say, 48 kHz, will offer a bandwidth of just under 24 kHz.

The reason for this 2:1 relationship results from the well-known Nyquist Sampling Theorem, which states that to unambiguously represent an audio waveform in digital form, the incoming audio signal must be filtered to remove every frequency above half the chosen sampling frequency.

DIGITAL DOMAIN

Anti-aliasing

To prevent unwanted frequencies from upsetting the digital sampling process, *anti-aliasing filters* are used in conjunction with a system's A/D and D/A converters. These lowpass filters (so called because they only allow low-frequency signals to pass through) are difficult to design.

All filters produce a certain amount of audio and phase degradation; those found in digital systems have to be engineered to remove the upper frequencies, but without adding unnecessary distortion.

CD players also contain anti-aliasing filters. Again, the reconstructed analog signal produced by the D/A converter has to be lowpass-filtered to remove unwanted signal components.

The use of digital filters offers many advantages over analog designs, mainly because they can be designed to tighter tolerances and their operation is more linear and controlled.

The phenomenon of *oversampling* is related to filtering, in that the digitized signal from a digital tape machine or CD player is processed at many times the original 48 kHz or 44.1 kHz sampling frequency.

. . . digital filters offer many advantages over analog designs, mainly because they can be designed to tighter tolerances and their operation is more linear and controlled.

This action, in itself, cannot produce higher quality sound; the audio fidelity of a recording is determined solely by the sampling frequency, quantization rate, error detection schemes and encoding/recording techniques.

Error correction

Once the audio signals have been digitized there are various ways they can be recorded onto tape or coded onto a CD.

Because of the possibilities of dropouts caused by dirt on the digital tape or CD surface, error correction bits are added to the data being recorded or encoded. Upon playback, these additional bits are used to reconstruct any lost data.

The way in which the error detection bits are calculated, and how they are incorporated into the data stream, has been standardized for the DASH-Format, PD-Format, DAT, CD and other recording media so that a tape recorded on one machine will play back on another and that CDs from any record label will replay on any player.

The difference between error "correction" and error "concealment" is a subtle but important one.

Correction implies that the damaged data has been detected and that all of the lost or missing data has been recovered from the additional error correction bits; in other words the playback would be indistinguishable from the original, undamaged recording.

Concealment, on the other hand, implies that massive data loss has been sustained (possibly from a flaw on the CD surface, or a bad crease in the digital tape) and that the error correction bits were insufficient to recover the lost data.

Instead, the recorder or CD player has been forced to interpolate what the data might have been, given recent trends in the signal's level and frequency content and intelligent guess work.

There is a good chance that the user won't be able to hear the difference, although subjective results will depend on the amount of data that has been lost and the kind of audio material in which the loss has occurred.

Next time: An overview of the primary operational features of the new Digital Audio Tape recorders finding their way into broadcast facilities and how to make best use of their unique capabilities.

■ ■ ■

Mel Lambert has been intimately involved with the production industries on both sides of the Atlantic for the past decade, and for seven years served as editor of Recording Engineer/Producer magazine. He is currently president of Media & Marketing, a consultancy service for the professional audio industry. He can be reached at 818-753-9510.

Licensing

(continued from page 1)

these very broad statutes and regulate telecommunications engineers under legislation that's been on the books forever that doesn't mention telecommunications at all."

Discipline didn't exist

"The statute is insufficient to regulate telecommunications engineers because telecommunications engineering wasn't even an existing discipline when the statute was created 50 years ago," Thompson said. "But more importantly, the way they're administering the licensing scheme today, telecommunications isn't recognized as a separate discipline and there are no questions on the exam that deal with telecommunications. They're overreaching."

Opponents of the licensing fear that if federal legislation is not passed, each state can raise the issue.

"We can't fight 50 different wars in 50 states," Thompson said.

The primary supporter of the issue, the Society of Professional Engineers, maintains that the licensing standard will place broadcast engineers under the same scrutiny as their counterparts in other engineering disciplines and will set a necessary and overdue standard for minimum competence within the broadcast engineering industry.

For more information on state licensing, contact Ray Thrower at NARTE, 817-799-9661; Robert Thompson at 202-223-6611; or Arthur Schwartz, general counsel for the Society of Professional Engineers, 703-684-2800.

A Historical View of Licensing

by David Hebert

Pasco WA A very hot topic within engineering circles these days is the trend of state licensing of broadcast "engineers," "technicians" or "operators."

A recent forum at the annual Society of Broadcast Engineers regional convention in Seattle specifically addressed this issue.

CONTRACT ENGINEER

The proper treatment of this subject will require much considered debate and reflection by all of us who are involved in the technical world of broadcasting.

It is inevitable that moves to provide state licensing of "engineers" were bound to begin after the FCC eliminated the First Class Radiotelephone License.

Any understanding or discussion of the subject at hand must be built on the history of communication law and events that started the wheels turning.

Looking to history

The Communications Act charges the FCC with determining the technical qualifications for personnel involved in operation of transmitting stations.

Further, the Commission is empowered with classifying these people with licenses according to their functions along with issuing licenses to meet these requirements and needs.

Section 318 requires only an FCC licensed operator to perform technical duties at stations which are licensed by the Commission.

In Docket 20817, the station licensees were charged by the FCC to determine the competence of personnel performing technical activities at their stations.

This was done in the same context of the rule which proposed that licenses would no longer be required to perform technical duties at these stations.

This action was adopted despite the hue and cry of broadcasters and engineers from far and near.

But the seeds for this docket were planted in the early 1970s when debate was being conducted concerning the introduction of minorities into the broadcast field.

Early thought in this area was that existing examination requirements were unnecessarily prohibitive towards minorities and were being used to keep them out of the field.

The reasoning was that there should be a separate tier of examinations to be more suitable to such groups.

Arguments were then advanced that the examination for these licenses did not reflect day-to-day broadcast operation and were therefore not relevant.

The next step in this process was that all applicants should be required to take the same examination and it should reflect necessary skills and knowledge required for routine broadcast operation and engineering.

It seems the debate concluded that a test was a poor indicator of the actual skills of a broadcast engineer and did not carry any assurance to the station or general public that even after successfully taking such an exam the applicant was, indeed, qualified to discharge his responsibilities.

Since federal law supercedes conflicting state law, it is the law of the land that the FCC has sole authority to regulate technical qualifications of broadcast engineers.

The courts have consistently supported the authority of the FCC to act in matters of a technical nature regarding radio stations.

A matter of safety

There can be no doubt that it is in the interest of public health, safety and welfare that some areas of our national life

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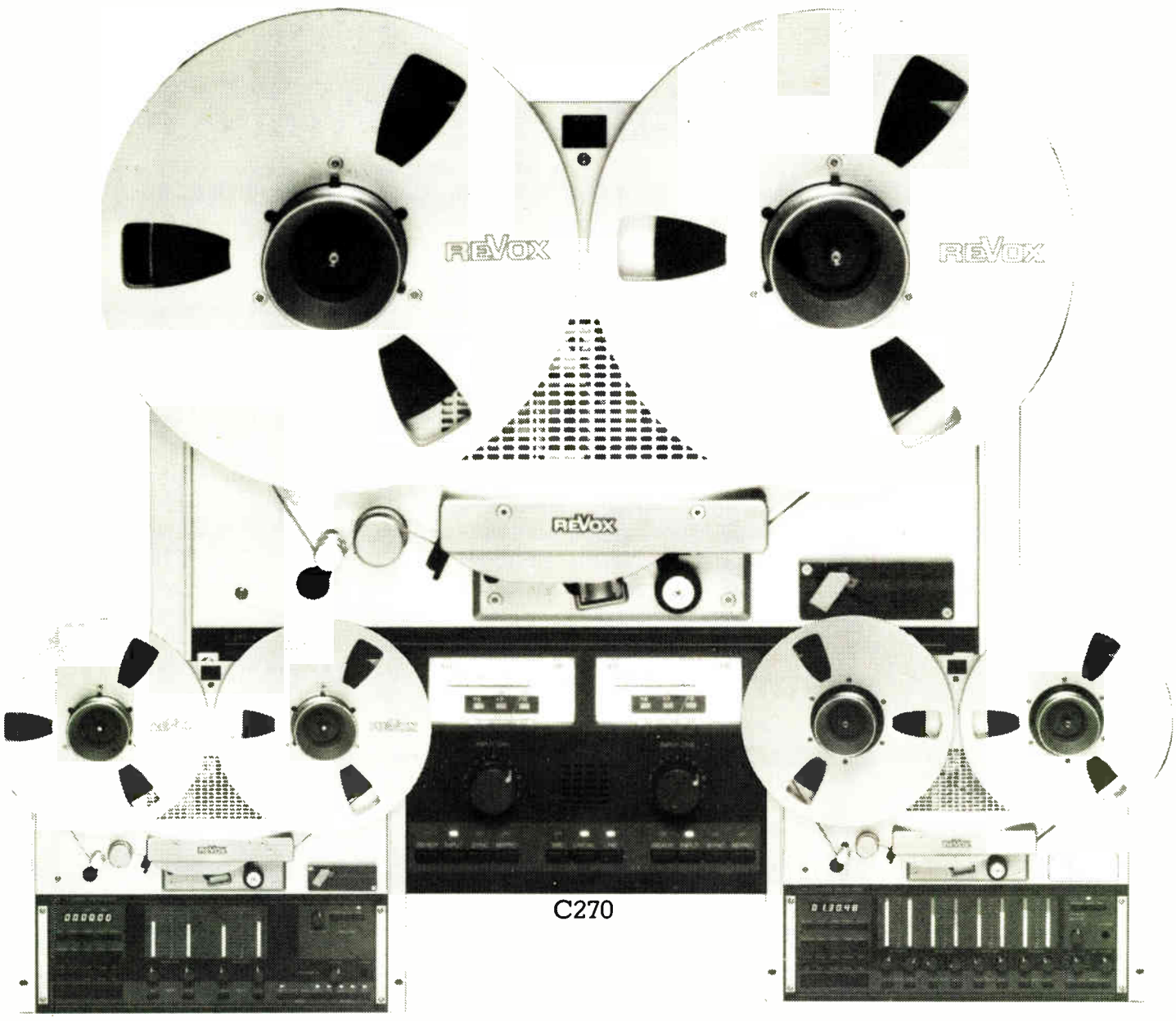

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ALLIED Broadcast Equipment

Analyzing the Licensing Issue

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be regulated and those performing technical activities should be examined and registered.

However, nationally there are proposals to register those engaged in such diverse activities as auctioneeering, watchmaking, manicuring, tree surgery, fence installing, librarians, landscape architecture and milk and cream separation.

Architects and interior designers in Oklahoma, Minnesota and Florida, as well as other states, are fighting state regulation.

It is generally agreed that New Mexico deals with broadcast personnel most severely, while many states are watching the direction that Washington state takes in dealing with this issue.

On April 12 and 13, the National Society of Professional Engineers and the National Council of Engineering Examiners, at their meeting in Atlanta, Georgia, decided to push for the state licensing of all engineers in all disciplines.

Eventually, this move will also result in the state licensing of technicians (otherwise known as technologists). In the meantime, we should be careful with the use of the word "engineer."

Semantics

When one uses this word, or engages in the practice of "engineering" of any kind, or even "consulting engineer," then state statute becomes effective.

Application of suitable law can result in criminal and financial sanction. This situation that is developing over state regulation elevates the advantage that one achieves by participation in the SBE's Certification program.

One can only hope that the FCC can be persuaded to reinstitute a form of licensing for those who perform broadcast station maintenance.

At the very least, a so-called "grandfathering" of those who have already been recognized for their technical competence is appropriate.

Many questions are raised about this trend and how it relates to the interests of the broadcast industry.

It is the general consensus that engineers are leaving the profession in droves and little is being done to replace them.

One can only wonder how this situation can be corrected by requiring a state license and the difficulty that passing a strenuous exam can create.

Accessible expertise

Many computer programs are becoming available that can allow a lesser trained engineer to perform such holy acts as tune a directional antenna array, run a frequency search, design RF networks and other duties previously reserved for PEs.

In fact, in some cases, these are the same programs used by PEs and are even written by them.

Requirements vary from state to state as to the amount of academic training which should be required to qualify one to take an examination or if formal education is even required at all.

A non-standard exists as to the suitability of prior experience as a substitute for technical training.

Those who already have state registration will encourage others by saying that, like SBE Certification, state licensing can be a most rewarding goal to obtain.

There can be no disagreement that certain areas of engineering should be left to those with uncommon background. The science of prediction does not fall into the day to day world of the broadcast engineer.

Preparing FCC applications, prediction of coverage, compliance of a pattern to FCC standards and international treaties are activities which are appropriately and customarily discharged by professional engineers.

Even the examination for the First or Second class license did not begin to address these issues.

Through our professional societies, we can provide our input to the legislative bodies which are now noticing the opportunities to further regulate the broadcast industry. They need our support as never before.

■ ■ ■

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

Audio on PC

(continued from page 15)

Both executives predicted two major developments that will further reduce the cost of desktop audio systems: The rapid advancement and falling cost of magnetic mass storage media, and the arrival of inexpensive 500 megabyte erasable optical disk drives with removable media cartridges costing in the $50 range.

"Because the audio tools are getting so much better there are going to be a lot more people to apply their own creativity," Lego predicted. "Because of the low cost of these tools it's like an artist without a paint brush finally having one."

For information from Digidesign call 415-327-8811. Call Sonic Solutions at 415-751-8666.

Next: companies target radio.

Class A Comments

(continued from page 5)

restrictions.

"If, for any reason, the Commission is unwilling to grant a blanket power increase, Barry urges the Commission to allow the use of directional antennas to achieve an increase for all stations to the maximum of 6 kW, except in the direction where protection is required," Barry stated.

Raises questions

Some Class A's, however, also expressed concern about an across-the-board hike, especially for those stations near the Mexican and Canadian borders that are restricted by international agreements.

Sanilac Broadcasting, licensee of WTGV-FM in Sandusky, MI, would benefit from an across-the-board increase by changing its transmitter. But Sanilac wanted coordination with Canada "prior" to the effective date.

"In the event stations within 400 km of the Canadian border were to be restrained from taking advantage of a universal upgrade, while, at the same time, other Class A stations were permitted to increase the practical level of interference, especially in the spring and fall when weather frontal passage creates unusual 'skip' interference to FM stations in the Great Lake region, the rural and small town service from WTGV-FM would be effectively destroyed," the group owner stated.

"Sanilac's aural service is such that it cannot tolerate such potential loss."

The Cromwell Group, which operates two Class A's, said it supported a power increase—but under the proposal from the NAB. However, the group added, "We do feel a 'blanket' upgrade should occur for all those that can meet the technical criteria of no additional interference."

Opposition to the New Jersey idea—but support for a controlled power increase—came from such groups as Gannett, Viacom, Scripps Howard and Greater Media.

Too much interference

Gannett, which operates Class B KIIS in Los Angeles and faces three, second-adjacent Class A's, said a power increase at each would increase the total interference area by 81% and boost the population affected by interference by more than 100%.

Greater Media, which owns two Class A's and five Class Bs, said it does not support a blanket increase because its engineering report showed the proposal would cause "massive new interference throughout the FM band." Class A's also would feel the new interference, it argued.

On a second part of the proposed rule making, commenters generally supported the creation of a new Class C3 in Zone 2, which includes all of the continental US except for the northeastern states and some of California. This proposal would not affect the majority of Class A's supporting the power hike, which are in Zone 1.

Paper Trails for the FCC

(continued from page 21)

A partial proof is also required on replacement of an antenna monitor if there is a change in system parameters other than the antenna monitor readings [73.69(c)(4)].

Finally, a partial proof is required by 73.61(b) whenever the licensee has reason to believe the radiated field may be exceeding that authorized, while 73.651(c) may require a partial proof whenever there is an indication that the antenna is not operating properly.

Nontechnical records

Besides the technical records discussed above, the FCC requires each station licensee to maintain a public inspection file. During an inspection, the FCC will often check the file to insure it is complete.

Although the file is nontechnical, the station chief operator is often most familiar with FCC requirements, so we'll review the requirement for this file next month.

I'd be interested in discussing Official Notices of Violations and Advisory Notices involving technical operation of radio broadcast stations in future articles.

By looking closely at how the Rules are being enforced, we can better determine FCC interpretation and take appropriate action to insure compliance.

I'd appreciate a copy of any of the FCC Notices that your station has received, along withy any correspondence regarding the Notice, and any additional comments.

If we use them, stations will not have to be identified by name and we can discuss the situation which led to the notice in general terms.

Send them to me at Hallikainen & Friends, 101 Suburban Road, San Luis Obispo, CA 93401 and they may become the basis of future columns.

■ ■ ■

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

Complaints

(continued from page 10)

the North Carolina NAACP.

The TV and radio stations had until 1 December to file any opposing comments to the complaints. The NAACP has 20 days after the firing to reply.

In a related matter, the FCC fined KYFC-TV in Kansas City, MO, in November for failure to recruit minority and women employees. The station also received a short-term two year license instead of the standard five year license and must file detailed reports to the Commission about its hiring efforts.

The FCC investigated the station's hiring practices based on a National Black Media Coalition complaint.

For more information concerning minority hiring complaints, contact David Honig at 301-641-8060.

Advertiser Index

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017	037	057	077	097
018	038	058	078	098
019	039	059	079	099
020	040	060	080	100

NRSC-1 Supported Before Mask

(continued from page 9)

Opposition also came from Greater Media, Capital Cities/ABC, Bonneville and the Association for Broadcast Engineering Standards (ABES)

"While it may be argued that compromise of this sort must be made if the Commission is to squeeze the last drop of potential service from the AM band, interference is interference whether it be received or caused," ABES stated.

Greater Media argued that facility changes which can be made within the scope of existing overlap rules should be permitted because they provide additional service with a minimum of new interference. "But the Commission's current proposal in fact relaxes interference protection and thereby exacerbates the already intolerable interference environment," the group owner stated.

Some support

Three broadcasters, however, backed the FCC's proposal.

GSM Media Corp., licensee of WRGM, Ontario, OH, suggested the power increase would enable stations to penetrate buildings better and overcome atmospheric and man-made noise. The proposal also would allow stations to alter radiation patterns to be more stable and provide better service, GM continued.

The licensee disagreed with suggestions that there would be a loss in service to interference. "This interference would occur in areas not previously served; thus, listeners in those areas would lose no service which they previously had."

John Bomer, part owner of KXKW, a 10 kW daytimer and 500 W nighttimer in Lafayette, LA, and WAKK, a 1000 W daytimer in McComb, MS, said the proposal would allow his stations to operate at full power during drive time. He said neither station covers its marketplace during these times most of the year, due to operating restrictions involved in the local sunrise/sunset regulations.

Any interference caused would be primarily in fringe areas and in low or no population areas that also are served by FM, TV or cable, Bomer said.

A final commenter in support of the move, 4-K Radio Inc., with stations in the Pacific Northwest, pointed to benefits its KOZE in Lewiston, ID, would achieve.

It maintained that passage of the duopoly rule will allow the station to drop a portion of the AM directional antenna system, but the passage of this item would permit the station to fully utilize its AM 950 spectrum into the immediate marketplace.

Capital Cities/ABC recommended the Commission adopt NRSC-1 by January 1990 . . .

NRSC

On the NRSC portion of the docket, commenters supported implementation in a variety of ways.

While a majority supported implementation of the NRSC-1 audio standard first with the NRSC-2 RF emission standard later—a move significantly different from the one proposed by the FCC—one called for joint usage. (See 15 December RW for initial comment article.)

National Public Radio (NPR) called for joint implementation and questioned the idea that stations could be assumed to be in compliance with NRSC-2 if they institute NRSC-1.

Presumptive compliance was noted in the FCC proposal and supported by such commenters as the NAB, the Society of Broadcast Engineers (SBE), Greater Media and Group W.

In other filings, Capital Cities/ABC recommended the Commission adopt NRSC-1 by 1 January 1990 then NRSC-2 later, as originally proposed by the NAB. Bonneville supported mandatory adoption of NRSC-1 and if the FCC endorsed NRSC-2, said exemptions should be made for older equipment.

Art Suberbielle, president and GM of KANE-AM, New Iberia, LA, also supported NRSC-1 because he said it would, among several ideas, be an incentive for manufacturers to produce higher quality AM receivers.

NAB staff engineer Stan Salek said he was encouraged by what commenters said because they "pretty much followed" the Radio Advisory Committee recommendation of NRSC-1 first or presumptive compliance for NRSC-2.

He said he expected the FCC to act quickly on the docket. "They got a very nice compromise," he said, "and I think they should take advantage of it."

For information on Docket MM 88-376 from the FCC, contact Hank VanDeursen, 202-632-9660. For information from the NAB, contact Stan Salek, 202-429-5346.

Tidbits and Early Calls

(continued from page 18)

tions in Minnesota as of December, 1985.

A reminder of how some of the early stations picked call signs was given by Jim Hathaway who called from Nebraska.

Some of the early calls mentioned were: WKDU—Cincinnati Police; WIND—Gary, Indiana; WCFL—Chicago Federation of Labor; WTMJ—The Milwaukee Journal; WMBI—Moody Bible Institute and WHT—owned or operated by "Big Bill" the then mayor of Chicago.

Another call, still active, mentioned to me was WEEI—Edison Electric Institute, Boston. First on the air 29 September, 1924, and still operating with the same call today.

We have all heard that WLW in Cincinnati was the 500 kW powerhouse. Not so, says a friend of mine. The 500 kW was only an experimental license, used the call of W8XO and was used only during the experimental hours after midnight.

If there is factual data to contradict this statement, let it come.

South of the border

One of the real powerhouse stations of the '30s was XER/XERA, operated by Dr. Brinkley across the border from Del Rio Texas.

The builder of the powerhouses was Jim Weldon, retired head of Continental. Seems that Jim was the chief engineer for Dr. Brinkley.

A couple of other interesting calls from the mid section of the country are WOC and WHO. Both calls are still active in Davenport and Des Moines, Iowa.

WOC went on the air in January of 1922 and WHO went on in April of 1924. Both stations were reported to have been owned by Mr. Palmer, a chiropractor. The calls stood for "World of Chiropractic" and "With Hands Only."

If any one is interested in the publication by Charles Ingersoll on *Minnesota Radio*, send a note to me c/o **RW** and the request will be forwarded to Mr. Ingersoll.

■ ■ ■

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 twenty years. He can be reached at 213-598-7007.

Processing

(continued from page 25)

important part of their lives.

Try to sell a media buyer who still uses radio anything other than drivetime and he or she is usually not interested. The car radio is now king and radio listening in the home doesn't happen much anymore unless you're under 18 or over 60.

Audio pecking order

A recent TV commercial for a large home stereo component system showcases the CD as the highest quality reproduction medium, followed by the cassette tape, followed by FM radio and finally AM.

Anybody who knows anything about technical performance specifications knows that with just a little bit of care and attention FM stereo can easily blow cassettes right off the field.

Yet we as broadcasters have lost that race in the mind's ear of our listeners.

While multipath certainly has something to do with that, I submit that inconsistent source quality plus inappropriate and overaggressive audio processing also play a significant role.

It may be a factor that is difficult to measure in the ratings but it is one we can easily control and improve.

Management certainly realizes that we need to do all we can to turn around radio's shrinking share of the total consumer entertainment marketplace.

If you really feel the need to "kill your competition" with audio processing, maybe you should kill 'em with clean.

■ ■ ■

Tom McGinley is DE of Cook Inlet Radio stations and also serves as **Radio World**'s technical advisor. He can be reached at 301-441-3500.

Radio World

BROADCAST EQUIPMENT EXCHANGE

"Broadcast Equipment Exchange" accepts no responsibility for the condition of the equipment listed or for the specifics of transactions made between buyers and sellers.

AMPLIFIERS

Want to Sell

Crown DC300Allamp, very few hours, excellent condition, Best Offer. B Harris, 2950 South Birch Street, Denver CO 80222. 303-757-3683.

Peavey CS-400, vgc w/crossover module, $350. G Ingram, KIXC, POB 29, Quanah TX 79252. 817-663-6363.

BGW 75, gd cond, $200/BO. P Wolf, WCOO, 106 New Market Rd, Immokalee FL 33934. 813-574-5548.

Stanton 310B stereo phono preamp, like new, $190; Radio Systems dist amp, 8 stereo out, 16 mono out, like new, $300. D Clarke, 3682 N Sierra Way, San Bernardino CA 92405. 714-882-8103.

Crown IC150 stereo preamp, rack mtng, rugged, gd cond, $100; Phase Linear 400, 200 plus 200, stereo, excel, $325. B Laughlin, 816-361-0548.

Crown D-75 power amp, great cond, barely used, rack mountable XLR & 1/4 connectors, banana plugouts, 1 RU high, great monitor amp, $350. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Crest 1001 power amp, 1 RU high, 100 with chan, excellent condition, XLR and 1/4 input connections, banana plug and 1/4" out connections. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

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

PR&E SDA-8 2x16 stereo audio DA, rack mt, XLR connectors & metering, new, BO. B Royster, KQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Want to Buy

Altec-Lansing 1569-A 600 ohm audio xfmrs, need pair #15095. A Bobidosh, Bobidosh A/V, 1197 High Ave Ste 7, Oshkosh WI 54901.

Gates M-5576. B Bartoli, New World Bdctg, POB 5607, Montecito CA 93108. 916-926-3273.

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 South Robertson Blvd, Los Angeles CA 90035. 213-274-1921.

ANTENNAS & TOWERS

Want to Sell

RCA BFC-7B 7 bay antenna, vgc, tuned to 95.5 MHz. J Boxler, WKYC, 109 Plaza Drive, Johnstown PA 15905. 814-255-4186.

Reconditioned
American 50-B Two Drum Hoists. Specially set up for tower erection . . . $8500 each, FOB: Suffolk, VA. We buy, sell and lease erection equipment.
Call Southern Tower Service Co., Inc. 804-539-8365.

Dielectric DCRH2 2 bay on 98.3, 7 yrs old, $1100; Altronic 5715 15 kW dummy load, water cooled, 1-5/8" flange, $450. JA Bowab, WDLT, 2402 Wolf Ridge, Mobile AL 36618. 205-344-3698.

Guyed Utility type tower, 200', 3 sided, tubular legs, galvanized, 18" face, painted, on the ground. H Greenberg, KMAS, POB 760, Shelton WA 98584. 206-426-1030.

ERI FM-L, gd cond, w/hardware & mounts on 98.3, $4000/BO; Andrew 7/8" air line, 565', gd cond, on reel, w/connectors, $1000. P Wolf, WCOO, 106 New Market Rd, Immokalee FL 33934. 813-574-5548.

ERI 1-3 bay antenna on 92.1, good condition, hardware, brackets, $2000/BO; Shively 6 bay on 88.7, 1 yr old. P Wolf, WCOO, 106 New Market Rd, Immokalee FL 33934. 813-574-5548.

JOHN NIX CO.
4273 SYLVIA CT. S.E.
Salem, OR
97301
503-581-4056

LNR 210' Starpoint on ground, galv & painted, BO. J Schloss, KICD, 2600 Hiway Blvd, Spencer IA 51301. 712-262-1240.

Heavy duty 150' self-supporting microwave tower; will support 10 foot dish, $6000. Call Southern Tower Service at 804-539-8365.

Vector 2 conductor lighting choke, new condition, $125. J Almon, WYOR. P.O. Box 2085, Brentwood TN 37027. 615-794-9859.

AM antenna tuning unit, all new components, ready to use, gd to 5 kW, $300 plus you ship. J Cunningham, KEOR, Rt 2 Box 113B, Stonewall OK 74871. 405-265-4496.

Phelps Dodge CFM LP-2 tuned to 103.9 MHz, 2 bay, $1000. D Nixon, WOCA, POB 1850, Ocean City MD 21842. 301-641-0001.

Phelps Dodge CFM LP-3 tuned to 92.1 MHz, $800. S McCloskey, WBHH, POB B, Beaufort SC 29903. 803-524-9210.

Gates ERI FMC-4A 4 bay CP FM at 88.5, gd cond, $2000. J Sims, KLJC, 15800 Calvery Rd, Kansas City MO 54147. 816-331-8700.

RCA TFU-24DM UHF TV antenna on chnl 41, prefer to donate to non-profit organization. C Haynes, POB 31235, Jackson MS 39206. 601-948-1515.

Mark P21A72F-2 2.1 GHz antenna w/radome, almost new, BO; Andrew GP8F-890 8' diameter STL antenna, almost new, BO. K Schipper, KQKS, 9191 Sheridan Blvd, Westminster CO 80030. 303-427-7700.

S-A 8005, 4.6 m sat antenna, $2500; broadcast quality receivers, S-A 414, $1975. Megastar, 702-386-2844.

Shively 4-bay FM antenna w/radomes tuned to 103.1, 2 yrs old, $3500/BO. P Martin, 414-482-2638.

Self supporting 180' tower, $3500. G Gunter, KMAB, 650 N Bolton, Jacksonville TX 75766. 214-586-2162.

Harris (ERI) FM antenna, 10 bay FM HA series, excel cond, $13,000; Phelps Dodge 3-1/8" rigid transmission line, 21 sections, 20' long, w/spring hangers hardware, excel cond. B Umberger, WNLT, 51 S Main Ave, Clearwater FL 34625. 813-446-0957.

RCA BFA-8A 8 bay HP medium power FM antenna, gd cond, tuned to 102.5 w/heaters, $1500/BO. D Woodcock, WNWC, 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, WGTF, 308 Westgate Pkwy, Dothan AL 36303. 205-794-4770.

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

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.

Want to Buy

Scala FM HDCA-5 or equiv antenna, tuned near mid-band, closer to 100.3 the better, buy or trade. B Harris, KMJI, 5350 S Roslyn #210, Englewood CO 80111. 303-741-5654.

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.

AUDIO PRODUCTION

Want to Sell

DYNASET DUAL/STEREO LIMITER-COMPRESSOR-EXPANDER-GATE
Manufactured in West Germany by BARTH KG. This unit is the standard of the German, Dutch and other European broadcast organizations. Priced at $1950.00. Demo units available.
REDWOOD MARKETING
820 Redwood Drive
Nashville, TN 37220
(615) 331-4743

ATI 575 osc, BO. P Cibley, Cibley Music, 138 E 38th, NY NY 10016. 212-986-2219.

Moseley DCS-2 digital control system; (2) FSM-1 fail safe units; Mdl Plu-1 parameter hogging unit for TV or radio, sold as one system, $2500; CBS Lab FM automatic peak controller, studio & xmtr units, $500. J Brown, Brown Comm, 314 Hwy 78 West, Jasper AL 35501. 205-221-6635.

CBS Audimax 440 mono, pair Volumax 410, working when removed from service, $300. H Kneller, WKII, 3151 Cooper Ste 58, Punta Gorda FL 33950. 813-639-1112.

Harris (Auditronics) M-90 stereo/audition/mono mixing console, $3000; Harris/ITC 3 deck cart player, mono, $600; ITC RP cart recorder, mono, $400; MCI/Sony JH-110B R-R, $3000; Gentner SP-4 telephone interface, $375; in custom formica covered cabinetry, sold seperately or as package for $6000. J McNally, KXBS, 9400 N Broadway, Oklahoma City OK 73113. 405-478-4499.

Symetrix 528 mic processor, like new, $600. D Clarke, 3682 N Sierra Way, San Bernardino CA 92405. 714-882-8103.

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Audi-Cord 100 Mono w/tones	$495.00
BE 2000 Mono R/P w/150 Hz tone	425.00
BE 303C Stereo 3 Deck play	895.00
BE 505D Mono R/P	395.00
BE Cartwinder w/timer	175.00
ITC Encore mono R/P	395.00

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Send for Free Flyer
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Charlottesville, VA 22901
PHONE: (804) 997-1100

ATI compact disc patcher, brand new, $120; ATI Match Maker, like new, $120. D Clarke, 3682 N Sierra Way, San Bernardino CA 92405. 714-882-8103.

Telex CS-90 Sportscaster headsets, 3 work, 1 for parts, all need new ear pads, all do work, $100/all plus shpg. M Rockwell, WNBI, Box 309, Park Falls WI 54552. 715-762-3221.

Mod Sciences composite clipper, like new, $350; late model 8000A Optimod, $2000 firm. John 315-488-1269.

SELF POWERED STUDIO MONITOR SPEAKER SYSTEMS
Manufactured by GENELEC in Finland. Five models priced from $820 to $8020 each. Used by many of Europe's broadcast organizations, Minnesota Public Radio and many other top broadcast and production studios.
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820 Redwood Drive
Nashville, TN 37220
(615) 331-4743

Howe Phase Chaser, $700. R Rogers, KPOF, 3455 W 83rd Ave, Westminster CO 80030. 303-428-0910.

Orban 245F stereo synthesizers (2), brand new, unused, current model, $250 ea. Steve, 303-499-5533 aft 6PM MST.

Sescom SM-1A, SM-3 deluxe direct boxes, two passive, one active, BO. D Johnson, KAWL, POB 544, York NE 68467. 402-362-4433.

Henry Matchbox, $100; Opamp A45 dist amp, 4 chnl, $150. J Wesley, Diversified Software, 1800 N Highland Ste 700, LA CA 20028 213-465-0787.

Allison Kepex 500 w/LX100 power supply. $150/BO. K Smith, RR3 Box 483A Carl Rd, Gorham ME 04038. 207-929-6129.

Orban 516EC 3 ch de-esser, vgc, $395; Orban 106C 4-spring reverb, $145; Allison RM-160 rack w/2 Kepex, 2 Gain Brain, $495 pkg. R Miller, Filmaker Inc, 606 W Broad, Bethlehem PA 18018. 215-691-0900.

KLH Burwen TNE-7000A transient noise eliminator, 3.5" rack mount, EC, $295. S Hofmann, Cameron Univ Theatre, 2800 W Gore Lawton OK 73505. 405-581-2428.

Burwen DNF-1201A dynamic NR, $200; Altec 1650 1/3 octave mono EQ, $150. B Laughlin, 816-361-0548.

dbx 222 NR, excel cond, RCA inputs & outputs, perfect for cassette or R-R recording. rackmountable, $100. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619 813-621-6200.

SAE 1800 parametric EQ, stereo rack mount w/cue 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.

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.

Big Band & Easy Listening format prod music library, custom made, all on 7" reels, 25 Hz stop tones & cue sheets, $5000/BO. S Coston, 2109 Stalham, Chesapeake VA 23324. 804-397-9206.

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, KQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

dbx 903 Comp-Limit compressor limiter module, for dbx 900 Series rack, $230. E O'Brien, Imperial Snd Stds, RR31 Box 405, Terre Haute IN 47803. 812-877-2663.

KSTT/WXLP has loads of equip to dispose of, call for list. L Timmons/M Loos, WXLP, 1229 Brady, Davenport IA 52803. 319-326-2541.

Want to Buy

WANTED:
PULTEC EQ's
We will pay $1,000 for almost any Pultec program EQ models EQP1/EQP1A/EQP1A3. Also wanted: EQH2/EQH3/MEQ5/MAVEC/MB1/ITI & SONTEC EQ's/ any tube or ribbon mics and limiting amps.
Call or write to:
Dan Alexander Audio
2944 San Pablo Ave
Berkely, CA 94702
(415) 644-2363
FAX: 415-644-1848

Booklet for Fairchild 658 reverb. ETS Record, POB 932, Honolulu HI 96808. 808-847-4300.

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

AUTOMATION EQUIPMENT

Want to Sell

SMC DPI, (2) Revox decks, (2) Otari decks, (9) Carousels, (3) single play time announce, switcher, brain, sell all or by piece. B Hicks, KBAT, 3306 Andrews Hwy, Midland TX 79705. 915-697-7300.

IGM Basic III automation system w/logging, w/(4) IGM GoKart 24 Carousels, (5) Revox PR-99 PB decks, Audicord network delay cart recorder, (3) Audicord mono cart decks, complete & presently in use, BO; also (2) Otari ARS-1000 PB decks, $700 ea/BO. C Gustafson, WKZO, 590 W Maple, Kalamazoo MI 49008. 616-345-2101.

SMC ESP1 fully equipped, (4) Carousels, Instacart 24 tray, (4) R-R Revox, (2) dual cart players, delay recorder for neetwork, excel cond. R Monroe, KKTX, Kilgore St, Kilgore TX. 214-984-2001.

Gates SC-48 programmer (parts); (2) Gates motor driven faders; Gates time pulse gen. R McDaniel, KJRG, 209 Meridian, Newton KS 67114. 316-283-5150.

SMC 250 random select Carousels (2); (6) Schafer equip racks; (3) Scully 270 R-R PB units. D Jackson, WPRN, POB 566, Butler AL 36904. 205-459-3222.

SMC TS-25 dual 25 Hz tone detectors w/spare cards, $300 ea; SMC 250 Carousel, completely refurbished, working well when removed, will sell as pkg or separately, $1200 ea. D Purscell, Payne Prescott Bdctg, Box 151, Prescott AZ 86302. 602-445-6880.

BROADCASTERS
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AUTO . . . WTS

IGM 48 PBM, mono Instacart, just out of service, $4000; IGM 740 System, 12 chnls, DEC computor, just out of service, excel for parts, $300/BO. W Nystrom, KRDU, 597 N Alta, Dinuba CA 93618. 209-591-1130.

Cetec 7000GLS, (4) ITC 770 R-R, (2) Schafer 24 tray Carousel, 48-tray Instacart, Hazeltine controller w/clock, vgc, in use, $13,500. T Hite, WAUC, Box 908, Wauchula FL 33873. 813-773-5008.

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.

Harris 90 Brain & cart Carousel, $800/BO. L Wilkins, Montgomery Ed Radio, 381 Mendel Pkwy, Mtgy AL 36117. 205-271-8900.

SMC 250 (4) monaural Carousels w/Harris SC-90 type interface, interrface 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.

IGM dual chnl 25 Hz rack mount tone detectors (2), excel cond, $65 ea; SMC plug-in cards for 250 Series Carousels & Revox A-77, 350 Carousel spare parts, BO. B Royster, WQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

CAMERAS (VIDEO)

Want to Sell

Philips 3 tube plumbicon camera w/10-100 Schneider zoom lens; also Sony VO 3800 portable VCR, excel, $3250/BO; Ikegami HL 79D camera, $13,500/BO. Steve, Box 10673, Denver CO 80210. 303-399-6444.

CEI 280 complete functional color camera, w/camera head w/replacement cards, CCU w/replacement cards, lens (10-1 zoom; f2), spare yokes, remote control panel, 100' camera cable, range extender for lens, zoom & focus controls; spare view finder, power supply, lens, sell or trade for character gen suitable for television use. S Chism, Moody Bible Institute, 820 N LaSalle, Chicago IL 60610. 312-329-4068.

Panasonic HV3500 color camera, $995; Sony HVC200. $250; Sony HVC220, $300. W Carnes, KIIRT, POB 8234, Jacksonville TX 75766. 214-586-2162.

JVC KY200 w/full studio pkg, incl viewfinder, remote zoom & focus controls, com choke control unit, 100' camera cable & more, $2700. R Peterson, Pacific Comm, 1801 E 4th Ave, Olympia WA 98506. 206-754-7081.

Panasonic WJ4600B special FX gen/switcher, $1095. G Gunter, KMAB, 650 N Bolton, Jacksonville TX 75766. 214-586-2162.

Fujinon A14X9B 14×1 zoom, removed from Sharp XC-800, excel 2/3" tubes, $1000 or trade. W Ellis, KOZK, MPO Box 21, Springfield MO 65801. 417-865-2100.

Ikegami 730-A & 730-AP video cameras, gd cond, $6,000 & $7,000 respectively. D Gerisch, WMTV, 615 Forward Dr, Madison WI 53711. 608-274-1515.

Norelco PC70, (11) need some work, $1750/all. Technichrome, 702-386-2844.

Ikegami 630AP studio plumbicon cameras (3) w/CCU, 15 m cable, 5" viewfinder, finder info CG, Canon 15:1 lens, lens rear controls, extender, manual, case, as new, BO over $10,000 ea; (2) Sachtler 14 head, ped/pod & dolly, $1,250 ea; Ike 730 ENG pkg: 1.5" finder, 2 charger, 2 batt, AC PS, VTR cable, rain cover, $1395; (2) Ike 25 m camera/CCU cable, $350 ea. R Miller, Filmaker Inc, 606 W Broad, Bethlehem PA 18018. 215-691-0900.

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, MII, 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, POB 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.

Want to Buy

RCA TK31, TK41 w/remote CCU/PG/cables. J Panza, PAVS, Box 9847, Kansas City MO 64134. 816-966-1587.

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

CART MACHINES

Want to Sell

ITC 3 pack w/tones & ITC splice finder, excel cond. J Kiefer, 904-787-6404.

Gates Criterion mono PB & Tapecaster 600RP, mono RP, gd cond, both working, $225/both. M Meyer, WWCK, 3217 Lapeer, Flint MI 48503. 313-744-1570.

UMC Beaucart R/P w/motorized head azimuth-stereo w/spare heads, $1600. E Kain, WNOE, 529 Bienville, New Orleans LA 70130. 504-529-1212.

ATC/Gates Criterion I modules, power supplies, PGM amps, 1 kHz cue, $25 ea. H Kneller, WKII, 3151 Cooper Ste 56, Punta Gorda FL 33950. 813-639-1112.

ITC 3D mono cart deck (2), 1 w/record amp, 3-tone; Nidec 3D motor gd/used; Spotmaster 505B mono cart PB. M Sequin, WVMT, POB 6200, Colchester VT 05446. 802-655-1820.

ITC PDQ Series, (4) mono. C Mandel, KAMP, Box 1018, El Centro CA 92244. 619-352-2277.

Collins 642A (2), vgc, w/manuals, $100 ea; Tapecaster, gd cond, $250. J Schloss, KICD, 2600 Hiway Blvd, Spencer IA 51301. 712-262-1240.

BE 3200P mono PB, very low hrs, used in limited prod environment, $500. R Hardy, Richardy Prod, 3239 S 90th E Ave, Tulsa OK 74145. 918-627-2937.

BE 2100 stereo R/P, mint cond, $2000. D Clarke, 3682 N Sierra Way, San Bernardino CA 92405. 714-882-8103.

BE 3200 & 3100 R/P stereo units, ultra-mint cond, original heads, w/manuals, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

Audi-Cord Moducart model 100 R/P; (2) A series PB, all in gd shape, $100 ea. W Nystrom, KRDU, 597 N Alta, Dinuba CA 93618. 209-591-1130.

ITC RP Series stereo, tones, excel heads & motors, $1400. R Thomson, KDKB, 1167 W Javelina, Mesa AZ 85202. 602-897-9300.

Ramko automatic cart winder w/cassette wind adapter, $150. B Umberger, WNLT, 51 S Main Ave, Clearwater FL 34625. 813-446-0957.

Tapecaster 700-P, $50; Spotmaster 505-B (2), $50. D Gerisch, WMTV, 615 Forward Dr, Madison WI 53711. 608-274-1515.

Tapecaster 700 RP w/extra motor, $375; Atus AM 500 8 chnl console, $175, brand new. J Klauck, 118 Bay St, Glens Falls NY 12801. 518-792-9290.

Tapecaster 700P mono play only cart machines (2), gd cond, $200 ea. C Zalenski, Eds Comm Srvs, 9 River Terr, Johnson City NY 13790. 607-798-7111.

ATC mono R/P; Gates Criterions, mono PB only, clean. M Phelps, WLTT, 20300 Civic Ctr Dr, Southfield MI 48076. 313-354-9300.

ITC R/P stereo in rack mount case or desk top, Q-tones, manual, $1100. S Cilurzo, Infovideo, POB 879, Cardiff CA 92007. 619-268-3000.

Mastercart II (875), loaded w/Dynamax tape, vgc, new or reloaded, can send samples 3-5 min, must buy entire quantity, BO. M Bowman, KFMM, 301 E Hwy 70, Safford AZ 85546. 602-428-0916.

Sparta Sparta Matic mono R-P, record amp bad, fair cond w/manual, BO; Sparta 4515 Century Series (3), one needs motor, fair cond w/manuals, BO; Tapecaster 700-P (2), one needs motor, fair cond, BO. B Stuart, KSUE, 3015 Johnstonville, Susanville CA 96130. 916-257-2121.

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.

SMC 250 & 252, 3 Carousels, operating when removed from service, $550 ea. K Bagdasar, KCMN, 2880 E Fountain #200, Colorado Springs CO 80910. 719-636-5266.

Audi-Cord Modi-Cart 100 stereo R/P, good condition, with manual—three, $700. M Taylor, WXRC, 357 First Avenue NW, Hickory NC 28601. 704-322-1713.

BE 5500 5 play cart machine, manual, $2000. S Karwin, KCMJ, 490 S Ferrell, Palm Springs CA 92262. 619-320-6818.

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

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

Harris Criterion 80 mono R/P, fair condition, no manual, $350. B Henry, KLLK, P.O. Box 1520, Willits CA 95490. 707-459-1250.

Tapecaster 600RP R/P unit, mono, works; (2) Spotmaster 3/70 mono players, desk mount, one works, one doesn't, Best Offer. P Craddock, KWBC, 116 Railroad, Navasota TX 77868. 409-825-6707.

Tapecaster RP-700 stereo R/P, $150 or best offer. 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 a pound plus shipping. M Ring, WTNY, 134 Mullin Street, Watertown NY 13601. 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, semiconductors, pinch rollers, extender cards, switches, rack ears for 3D, SP, WP, RD, Series 99 and 750 Series R-R, Best Offer. B Royster, WQM Broadcasting, 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, 631 North First Avenue, Phoenix AZ 85003. 802-258-6161.

ITC Series 99 mono R/P, excellent condition, meets full factory specifications, 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/inst manual, BO. R Colaner, WRCW, 4601 Hills & Dales Rd NW, Canton OH 44708. 216-477-8585.

Sparta 600 stereo R/P & stereo PB, both excel cond, w/manuals, $450/both. B Henry, KLLK, POB 1520, Willits 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 Mountjoy, WIDD, POB 1240, Elizabethton TN 37644. 615-543-5849.

ITC SW Series play, mono, all 3 tones, $795; Harris Stereo R/P CCII, $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.

PR&E Tomcat, R/P, Maxtrax format, top of the line, $3850. M Bailey, Word Bdctg, 3565 Timberglen Ste 1607, Dallas TX 75287. 214-306-7716.

Want to Buy

ITC Premium SP (mono) or Delta SP (mono) in gd working cond, also mono record amp for ITC Premium 3D w/all tones. D Voss, KADR, POB 123, Farmersburg IA 52047. 319-536-2227.

BE motor for mdl 1070. H Kneller, WKII, 3151 Cooper Ste 56, Punta Gorda FL 33950. 813-639-1112.

Any stereo R/P unit under $175. M Meyer, WWCU, 3217 Kapeer, Flint MI 48503. 313-744-1570.

ITC cart machines, cash paid, working or not. M Brown, Radio Bdct Tech Cons, 3740 SW Comus St, Portland OR 97219. 503-245-4889.

Trade (2) Ampex AG440's in fair shape for cart machine. B Simmons, KTSB, POB D, Austin TX 78713. 512-471-5106.

Rack mount adapter for Gates Criterion 33C triple deck; also audio card & 8 kHz cue tone detector & stereo audio cards for Gates Criterion. F Morton, KEYB, POB 1077, Altus OK 73522. 405-482-1555.

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.

CASSETTES & REEL-TO-REEL RECORDERS

Want to Sell

MCI JH110-B 4-tk, great cond, w/remote control, 4 memory set, etc, $4500. E Kain, WNOE, 529 Bienville, New Orleans LA 70130. 504-529-1212.

Nagra-E tape recorder. Virtually unused. Excellent condition. Includes power pack and carrying case, $2,250. Contact, Gary Edwards, 5016 N 24th St, Arlington VA 22207. 703-534-7429.

Teac A-3440 4 trk, like new cond; Teac 2A mixer, 6 chnl w/MB-20 meters, like new cond; Teac RX-9 dbx unit, like new cond, $1650/all. J Benger, JB Ent, POB 133, Ansted WV 25812. 304-658-5534 (8-10AM).

Scully 270 reproducers (6), 2 trk stereo, various states of assembly, for parts or could make 1 or 2 complete units, $100 ea/$500 for all/BO plus ship. J Mathis, WKKG, POB 709, Columbus IN 47201. 812-372-4448.

Ampex AG600 (2) work (2) for parts & box of spare parts, all for $500. J Heck, Gallup Bdctg, 401 E Coal, Gallup NM 87301. 505-863-4444.

Ampex 351 miniature tube R/P elect, excel cond, $150. J Martin Newman, Box 7703, Atlanta GA 30357. 404-876-8623.

Pioneer RAU-11/TAU-11, 3 motor, 3 head, 2 trk, 2 chnl R-R, w/separate TAU-11 record amp, synchronized monitor jack, remote control jack & provisions for 4 trk heads, $495 + shpg. C Pringle, Trinity Enterprise Co. POB 631, Webster City IA 50595. 515-296-9911.

Otari ARS1000DC w/25 tone detect, BO. T Storck, KTRF, Thief River Falls MN. 800-426-1003.

Tascam 122, gd cond, very low hrs, used in ltd prod environ, $250. R Hardy, Richardy Prod, 3239 S 90th E Ave, Tulsa OK 74145. 918-627-2937.

Otari MX5050 MkIII 2 trk, mint cond, $2700. D Clarke, 3682 N Sierra Way, San Bernardino CA 92405. 714-882-8103.

Ampex 351 (2) R/P elect, tube type, cosmetically vgc, $250/both; Ampex R/P elect, dual chan, tube type, $175. R McDaniel, KJRG, 209 Meridian, Newton KS 67114. 316-283-5150.

Scully 4 trk 1/2" 15-30 ips converts to 2 trk 1/4", first 2 trks have xfmrless mods; Scully 2 trk 15-75 ips, 2 trk; Scully deck w/PS, mono heads, no elect. R Robinson, 203-269-4465.

Teac 80-8 w/rack mt, DX8 NR, PB64 patchbay, YTT1184 align tape, vgc, $1700. B Busetti, Lizard Studios, 1124 W 2nd St, Florence CO 81226. 719-784-3540.

Magnecord 1028, gd cond, $150. J Schloss, KICD, 2600 Hiway Blvd, Spencer IA 51301. 712-262-1240.

Ampex 350 tube elect, most converted. M Phelps, WLTT, 20300 Civic Ctr Dr, Southfield MI 48076. 313-354-9300.

Revox A77, runs gd, BO; Teac 32-2B, gd shape except for switch problem, $100/BO; Ampex ATR-700, excel shape except for one PB switch, $500. W Nystrom, KRDU, 597 N Alta, Dinuba CA 93618. 209-591-1130.

Studer A80/A810/B67; Technics SP10 MK II TT; Auditronics 342-17/224-11 consoles; Aphex Compellor & exciter, call for details & price. K Harrison, WRAL, Box 10100, Raleigh NC 27605. 919-890-6101.

CASSETTES . . . WTS

Ampro/Scully 280B-FT series, 1/4", 7.5 & 15 ips, mono w/FT heads, w/Ruslang roll around cabinet, gd cond, $750. J Wilk, 312-237-2283.

Ampex 350 (4), mono, cheap. T Hill, WBJC, 2901 Liberty Hgts, Baltimore MD 21215. 301-396-0404.

Teac EM-1542 reel motor, for Tascam 30 series tape decks (32, 34, 38), brand new, $50. J Roper, Imperial Snd Stds, RR 31 Box 405, Terre Haute IN 47803. 812-877-2663.

Otari ARS1000DC stereo reproducer, vgc, $975 incl shpg. J Shephard, Globe Prod, POB 20465, Roanoke VA 24018. 703-344-3283.

Ampex 351 w/Inovonics 380 elect, mono, w/rack mount, NAB hubs, $450/BO. K Smith, RR3 Box 483A Carl Rd, Gorham ME 04038. 207-929-6129.

Pentagon 1100 high speed duplicator, RR & cassette, (2) cassette master units, model CM 1140; (2) dual position slave units, model CS 1140; RR master unit, model RM 1140; RR slave unit, model RS 1140, manuals & spare parts, $2500/BO. M Gellos, Pensacola Christian College, 904-478-8480 X5041.

Revox 77A, gd cond, $200. B Howard, KOFO, Box 16, Ottawa KS 66047. 913-242-1220.

Ampex AG-440B, 1" 8 trk, multitrack, test tape, manual, gd cond, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

Tandberg TCD320 cassette deck, immaculate, mic inputs, headphone inputs, one touch recording RCA inputs & outputs, $350. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Roberts 192, works, needs help, $35; Wollensak 1500, needs work, $25. D Stebbins, KZZN, Box 192, Littlefield TX 79339. 806-385-4474.

Scully 280B, 1/2" 4 trk, $500. V Friedberg, Synesthetics, 58 Walker St, NY NY 10013. 212-431-4112.

ITC 750 PB only, excel cond, BO. R Thomson, KDKB, 1167 W Javelina, Mesa AZ 85202. 602-897-9300.

Metrotech 500A reproducers (7), $200 ea/BO. M Gellos, Pensacola Christian College, 904-478-8480 X5041.

Teac X-10R 1/2 trk (2), dual capstan drive, $175 ea. K Bagdasar, KCMN, POB 17444, Colorado Springs CO 80935. 719-636-5266.

Ampex AG500 stereo, case, gd heads, new belt & idler, vg working, $595/BO; Ampex 602 FT, case, gd working cond, $195; Ampex 351 elect, pair in case, gd cond, $295 pr. R Miller, Filmaker Inc, 606 W Broad, Bethlehem PA 18018. 215-691-0900.

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/Schafer elect, excel cond; Scully 270-2, new stereo reproduce 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.

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, Rortoal 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 Mountjoy, 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, xtra 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, WNRR, 108-1/2 E Main, Bellevue OH 44811. 419-483-2511.

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; Dokorder 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 recond, 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.

Want to Buy

Otari MX5050's, working or not, cash paid. M Brown, Radio Bdct Tech Cons, 3740 SW Comus St, Portland OR 97219. 503-245-4889.

Rack mount kit & cage for Revox A-77. M Ofsonka, POB 374, Springfield VA 22150. 703-643-2775.

MCI/Sony capstan & reel motors, any cond., recording heads, most mfgs, machines, new, used. Relapped then sold. Amp Services, 224 Datura Street, No 614, W Palm Beach FL 33401. 800-826-0601, in FL 305-659-4805.

Tascam RC-71 remote controls (2). R Rouse, KZMO, Country Club Rd, California MO 65018. 314-796-3139.

Ampex 1/2" gate 300/351 series; Ampex 300 console Dog House. ETS Record, PO Box 932, Honolulu HI 96808. 808-847-4300.

Ampex PR-10 or AG-500, must be FT mono & 7.5 & 15 ips speeds. B Leslie, Pro Recording Srv, 13709 Mapleleaf, Cleveland OH 44125. 216-662-1435.

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 Srvs, 4551 Flag Ave N, Minneapolis MN 554288. 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.

CATV-MATV EQUIPMENT

Want to Sell

Catel stereo FM modulator for cable system, tuned to 94.1, $1000/BO. J Corcoran, KWWW, POB 638, Wenatchee WA 98807. 509-662-7135.

Various cable equip: dist outlets; dist amps; dist chnl processor; cable modulator; dist splitter/directional couplers; mobile editing console; cart machines; teleprinter; antenna; audio console & mixers; compressor/limiter; turntable; processors & stereo gen, call for details & prices. D Christian, Pacific Lutheran Univ, Tacoma WA 98447. 206-535-7265.

CONSOLES

Want to Sell

Ramko DC-8M not in use, complete except couple boards, $500. J Almon, WYOR, POB 2085, Brentwood TN 37027. 615-794-9859.

RCA BC-308S, 8 input stereo board w/spare cards, gd cond, w/manuals, $2000. Aldon Video, 424 Commerce Ln, Berlin NJ 08009. 609-768-2439.

Arrakis 100-RS gd cond, spare cards, $400/BO; Consolidated 450' 4 cord w/shield, new, heavy shield, $20; Belden 8412 mike cable, 400', new, $20. P Wolf, WCOO, 106 New Market Rd, Immokalee FL 33934. 813-574-5548.

Tascam M-308 mixer, 8 in 4 out, like new, $1600. D Clarke, 3682 N Sierra Way, San Bernardino CA 92405. 714-882-8103.

Gates MO377B remote mixer, tube type, 3 chnl, cosmetically vgc, $325. R McDaniel, KJRG, 209 Meridian, Newton KS 67114. 316-283-5150.

Ramsa WR 8118 compact 18 input by 2 master output, almost new, hardly used, $2000. B Ranes, DIR, 32 E 57th, NY NY 10022. 212-371-6850.

Gates Dualux II, gd cond, w/manual, $900. J Schloss, KICD, 2600 Hiway Blvd, Spencer IA 51301. 712-262-1240.

Studio Master 16x8x2 w/Anvil case, vgc, $1600. B Busetti, Lizard Studios, 1124 W 2nd St, Florence CO 81226. 719-784-3540.

Micro-Trak Sport III portable remote console, 4 inputs, 2 mic, 1 spotter, 1 aux, $295. E Kain, WNOE, 529 Bienville, New Orleans LA 70003. 504-529-1212.

DOD R855 mike mixer, 4 chnl w/effects buss, 1 RU high, perf for talk shows or submixer for instruments, $250. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Shure SE-30 gated compressor/mixer, excel, $250. B Laughlin, 816-361-0548.

RCA mono 8 input, 2 ch, very clean; GE mono, 11 input 2 ch, very clean. M Phelps, WLTT, 20300 Civic Ctr Dr, Southfield MI 48076. 313-354-9300.

Auditronics 110 prod console, EQ on all 8 mic/line inputs, 5534 ICs, cue/solo, CR & studio monitoring, 4/2 assigns, multi-track mon, reverb return, studio TB, osc/slate, 8 VUs, 48 V mic power, excel, BO over $4000. R Miller, Filmaker Inc, 606 W Broad, Bethlehem PA 18018. 215-691-0900.

Harris Micromack, BO. B VanProoyen, WWJQ, 5658 143rd, Holland MI 49423. 616-243-2026.

Fostex 3060 meter bridge for Fostex 350 8 chnl mixer, $50. J Roper, Imperial Snd Stds, RR 31 Box 405, Terre Haute IN 47803. 812-877-2663.

Harris M-5133B Gatesway 8 chnl mono tube type, met specs when removed, BO. D Johnson, KAWL, POB 544, York NE 68467. 402-362-4433.

RCA BC-18AD dual chan, monaural, gd cond, $500 plus shpg or trade. W Ellis, KOZK, MPO Box 21, Springfield MO 65801. 417-865-2100.

Altec 1592A 5 chnl mic mixer, $100. D Sis, St John's Univ, Collegeville MN 56321. 612-363-3378.

RCA BC-7A in excel cond, $1500. P Martin, 414-482-2638.

Gates M-5236A only, works, $100. B Howard, KOFO, Box 16, Ottawa KS 66047. 913-242-1220.

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 77868. 409-825-6484.

Sparta remote prod console w/(2) TTs, 5 chan mono board, $300. B Spitzer, KKLS, Rapid City SD 57701. 605-343-6161.

Altec 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, $800. 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 Timberglen Ste 1607, Dallas TX 75287. 214-306-7716.

Numark MX3000, excel cond, 6 mic input mixer, $125. R Branske, 5347 S Sapaulding, Chicago IL 60632. 312-737-3303.

Shure SE-30 gated compressor/mixer, excel cond, $300. E Reihl, 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.

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.

Want to Buy

Collins 212T1 or 212T2 rack mount console in reasonable cond. S Brown, WLTE, 1111 3rd Ave S, Minneapolis MN 55404. 612-339-1029.

Gates Stereo Yard; Gates Studioette M-5381A. B Bartoli, New World Bdctg, POB 5607, Montecito CA 93108. 916-926-3273.

PR&E BMX line modules, any cond, need at least 3 immed, will need more in future. P Mitchell, KPOI, 741 Bishop, Honoiulu HI 96813. 808-524-7100.

DISCO & SOUND EQUIPMENT

Want to Sell

Soundworkshop 242C stereo spring reverb unit, 19" rack mount, peak LEDs, excel cond, carton & manuals, $100. R Cannata, Cantrax Recorders, 2119 Fidler Ave, Long Beach CA 90815. 213-498-6492.

JBL 4311-B monitor speakers, excel cond, $500. J Martin Newman, Box 7703, Atlanta GA 30357. 404-876-8623.

Peavey 311B (2), excel cond, $525/pr. G Ingram, KIXC, POB 29, Quanah TX 79252. 817-663-6363.

E-V S-1202 8 ohm, 300 W, 2 way high efficiency constant directivity stage system, almost new, great cond, $500; Wireworks LB-15-50, MT-15-4, MT-15-8, MBT-15-1, 15 input stage box w/50', 4' fan out cable, 8' fan out cable, mic splitter. B Ranes, DIR, 32 E 57th, NY NY 10022. 212-371-6850.

Linndrum w/MIDI retrofit & extra chips, $600. P Cibley, Cibley Music, 138 E 38th, NY NY 10016. 212-986-2219.

Auratone 5C, near field mixing monitors, 1 blown, $50/pr. B Laughlin, 816-361-0548.

Pultec EQP 1-A & EQP 1-R (2), gd cond, w/manuals, BO. M Tait, Tait Recdg, 1347 S Capitol SW, Wash DC 20003. 202-488-3905.

JBL 4311 control monitors, no grills, excel cond, must unload, handle's lots of raw power, 3 way pro studio monitors, $500 plus shpg. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Klipsch La Scala, 2 horns, road case, exterior horn, speakers, excel cond, BO. B Kaufman, Pams Prod, POB 462247, Garland TX 75046. 214-271-7625.

AKG R-25 remote control for AKG BX-25 reverb, $50. J Roper, Imperial Snd Stds, RR 31 Box 405, Terre Haute IN 47803. 812-877-2663.

Altec Voice of the Theater speaker, 511B horn, 808-8A driver, 15" bass w/cabinet, BO. D Sis, St John's Univ, Collegeville MN 56321. 612-363-3378.

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.

Want to Buy

KLH TNE 7000A transient noise filter; Burwin Research DNF-1100A dynamic noise filter; Burwin Research DNF 1201A dynamic noise filter. R Nelson, LGH Recording Std, Box 1, Flaxton ND 58737. 701-596-3565.

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.

LIMITERS

Want to Sell

Orban 111B dual spring reverb; CRL APP-400; CRL SEP-400A. M Sequin, WVMT, POB 620, Colchester VT 05446. 802-655-1620.

Thomson-CSF 4450-A Audimax, never used, $1295; Thomson-CSF 4500 Presence EQ, never used, $595; CBS-Labs 400 Volumax, good buy, $100. H.M. Dyer Electronics, 2982 Wixom Rd, Milford MI 48042. 313-685-2560.

Harris Solid Statesman, black faced, gd cond, (2) AGC, (2) limiters, $500/all. P Wolf, WCOO, 106 New Market Rd, Immokalee FL 33934. 813-574-5548.

Harris MSP90, excel cond. J Kiefer, 904-787-6404.

Orban 424A comp/limiter/de-esser, stereo, new, w/manuals, $575; Orban 418A, new w/manuals, $450. S Lawson, KAK Prod, 928 Hyland Dr, Santa Rosa CA 95404. 707-528-4055.

Gates Sta-Level, BO plus shpg; Gates Yard console, mono, worked when removed, BO plus shpg. M Rockwell, WNBI, Box 309, Park Falls WI 54552. 715-762-3221.

Orban Optimod 8100A/1 with 0 card, SCA/overshoot filter, upgrade, excel cond, $3500. H Ginsberg, WXXX, 45 Roosevelt Hwy, Colchester VT 05446. 802-878-8796.

Burwen Research DNF-1201A dynamic noise filter useful for reducing tape hiss, $175 plus shpg. L Dupree, Cenla Bdctg, 1115 Texas Ave, Alexandria LA 71301. 318-445-1234.

CBS 4110 Volumax, gd cond, BO. K Schipper, KQKS, 9191 Sheridan Blvd, Westminster CO 80030. 303-427-7700.

UREI LA-3A (2) compressor/limiters, mint cond, rack mounted, new T4B's, manual, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

Marti CLA-40A (2), gd cond w/manuals, BO. B Stuart, KSUE, 3015 Johnstonville, Susanville CA 96130. 916-257-2121.

Orban Optimod 9000A (2), both in operation & in excel cond, $1900 ea or both for $3600. J Kimel, WWSR, St Albans VT 05478. 802-524-2133.

Spectra-Sonics 610 compressor/limiter system (2), checked out & clean, $75 ea; Shure M62V level-loc audio level controller, $65. D Johnson, KAWL, POB 544, York NE 68467. 402-362-4433.

Orban Optimod 8000A stereo gen, recently factory aligned & proofed, $1925. D Kelly, KWPN, Box 84, W Point NE 68788. 402-372-5423.

CBS Labs FM Volumax 410, needs work, $50; CBS Labs Audiomax level controller, needs work, $50. B Howard, KOFO, Box 16, Ottawa KS 66047. 913-242-1220.

Orban 8100ST for 8100 Optimod, excel cond, $500; Orban XT2 upgraded chassis for Optimod 8100A/1, excel cond, $1100; CRL SPP-800 stereo AGC, excel cond, $1200. H Ginsberg, WXXX, 45 Roosevelt Hwy, Colchester VT 05446. 802-878-8795.

CBS 4110 stereo Volumax w/manual, excel cond, BO; CBS 4550A stereo Audimax w/manual, excel cond, BO. B Stuart, KSUE, 3015 Johnstonville, Susanville CA 96130. 916-257-2121.

Modulation Science composite clipper, $350; Optimod 8000A, excel, $2000 firm. J Cramden, 315-487-2393.

PR&E ML-FM, MX-FM (5) matched pairs, Multilimiters, one matched pair 3 band Multimax compressors, all new, $900/ea pr of Multilimiters, $1100/pr for Multimaxes; Dorrough 310; several AM & FM limiter boards, pink noise gen cards, many spare parts; UREI BL-40 AM comp/limiter; new Harris ME-1 mod enhancer. B Royster, WQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Dorrough DAP 310, $350. K Bagdasar, KCMN, 2880 E Fountain #200, Colorado Springs CO 80910. 719-636-5266.

CBS Labs 4450A, 4110, 4111, 410, 411, 4500, BO. B Royster, KQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Gates FM Top Level comp/limiter, gd cond, $125. G McCoy, KZEN, 1608 16th St, Central City NE 68826. 308-946-3816.

Moseley PFL280 audio limiter, excel cond, (2), $200 ea. S Fox, KKIQ, 1603 Barcelona St, Livermore CA 94550. 415-838-3063.

Orban 8000A just back from factory, all updates, like new, $1800. R Lark, WXCE, Box 1260, Amery WI 54001. 715-268-7185.

Dorrough 310 DAP, FM single chan w/FM limiter card, gd cond, manual, $250 firm. C Lewis, WMFD, POB 5307, Wilmington NC 28403. 919-763-6363.

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LIMITERS . . . WTS

CRL SPP-800, SEP-800, SMP-900 w/NRSC filter, manuals & original perf measurements, $4500. C Hahn, WNNZ, 249 Union St, Westfield MA 01086. 413-562-7666.

Orban Optimod 9000A/1 AM audio processor, factory recond & updated, vgc, w/manual, $2200/BO. D Willey, Life Bdctg, POB 96, John Day OR 97845. 503-575-1840.

Want to Buy

Orban 8000 Series, Belar FMM-1 & FMS-1 or comparable RCA models. JA Rew Jr, C&R Comm, 4499 Sir Johns Ln, Virginia Beach VA 23455. 804-499-0551.

MICROPHONES

Want to Sell

E-V 666 BO/trade for lavalier. P Cibley, Cibley Music, 138 E 38th, NY NY 10016. 212-986-2219.

E-V RE-15 (3) & RCA 77DX (needs ribbon), gd cond. H Kneller, WKII, 3151 Cooper Ste 56, Punta Gorda FL 33950. 813-639-1112.

Sennheiser MD211U, gd cond, $175. P Wolf, WCOO, 106 New Market Rd, Immokalee FL 33934. 813-574-5548.

Luxo mic stand, black, brand new, $20; EV RE20, great mic, rarely used, mint cond, $225. D Clarke, 3682 N Sierra Way, San Bernardino CA 92405. 714-882-8103.

Audio-Technica ATM-63 cardioid, solid brass bodies, mint, $100; EV RE-20, as new, $250. J Martin Newman, Box 7703, Atlanta GA 30357. 404-876-8623.

E-V 666, BO or will trade for lavalier. P Cibley, Cibley Music, 138 E 38th, NY NY 10016. 212-986-2219.

E-V 644 shotgun mic w/cable, vgc, $75 ea or 3/$195. S Hofmann, Cameron Univ Theatre, 2800 W Gore, Lawton OK 73505. 405-581-2428.

E-V PL20, $250/BO. Cary, KSQY, POB D, Deadwood SD 57732. 605-578-3533.

E-V RE37, electret mic/line level mic, great for telco remotes, used once, 2 yr warranty, $150. T Mac Donald, WWDB, 3930 Conshohocken Ave, Phila PA 19134. 215-686-3687.

Sony ECM-30, BO; EV 513A, BO; Sennheiser MZW-421, BO. B Royster, KQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

E-V RE45N/D dynamic shotgun, like new, in box complete, $225. J Ellingson, 913 Warwick Dr, Cedar Falls IA 50613. 319-277-8535.

Want to Buy

AKG D202, D200, or D222; EV RE20, PL20, or RE15. B Goldes, Balalaika Orch of Detroit, 1937 Byrd, Dearborn MI 48124. 313-271-3261.

RCA 30-A lapel ribbon; RCA SK-39 aerodynamic; RCA BK-6A dynamic; RCA BK-10 uniaxial. J Steele, Philocom, 160 W 77th St, NY NY 10024. 212-496-6054.

Altec M-20, M11, 21B, 21D mic capsules, etc. D Bisbee, 685 S Roys Ave, Columbus OH 43204. 614-279-6163.

Atlas DS-10 desk mic holder. ETS Record, Box 932, Honolulu HI 96808. 808-847-4300.

RCA 44, 77DX original, gd cond. W Cox, WCGA, Rt 9 Box 280E, St Simons Is GA 31522. 912-638-1176.

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 Street, Van Nuys CA 91411. 818-769-6738.

MISCELLANEOUS

Want to Sell

Jerrold PBF-5 channel 5 pass band filter for receive antenna systems, $50. R Hardy, Richardy Products, 3239 South 90th East Avenue, Tulsa OK 74145. 918-627-2937.

Rotary dial 5 line telephones, beige, w/intercom buzzer & hold, shielded multi port connectors, $15 ea. M Rockwell, WNBI, Box 309, Park Falls WI 54552. 715-762-3221.

Cannon, chassis-mount, 5-pin female XLR connectors, $1 ea. J Martin Newman, Box 7703. Atlanta GA 30357. 404-876-8623

Superior Electric voltage stabilizer, 2.5 KVA, mdl EMT41028, $350; General Signal isolation transformers, 120/120, 3 KVA, $100 ea. Aldon Video, 424 Commerce Ln, Berlin NJ 08009. 609-768-2439.

Enterprise Elect 7900 color weather radar system for use w/data from Natl Weather Srvs, BO. L Dupree, Cenla Bdctg, 1115 Texas Ave, Alexandria LA 71301. 318-445-1234.

Radio Shack TRS-80 Model 3 computer, 2 disk drive, keyboard & monitor, complete unit, excel cond, $325 incl shpg. J Shephard, Globe Prod, POB 20465, Roanoke VA 24018. 703-344-3283.

Tab Books & others, call for list/prices. D Fong, Fong Prod, POB 886, Franklin Pk IL 60131. 312-671-4615.

ITT ASR 33T send & receive teletype w/ribbons, punch rolls & printer rolls, BO; Record-A-Call Auto 560, no remote, $50/BO; Cobra AN-8300 telephone answering unit, no remote, $50/BO. J Emmel, WWAX, POB 750, Olyphant PA 18447. 717-489-0005.

Boxer WS2107F fans (2), $25 ea. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Custom studio furniture, several pieces, never used. M Phelps, WLTT, 20300 Civic Ctr Dr, Southfield MI 48076. 313-354-9300.

Sony DT3 Discman AM/FM discplayer, portable, lightweight, w/shoulder strap & Sennheiser HD410, $300. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Radio Shack 100 laptop computer, virtually unused, mint cond, 24K RAM, $300. B Umberger, WNLT, 51 S Main Ave, Clearwater FL 34625. 813-446-0957.

Andrew 1920A auto dehydratoor, gd cond, w/manuals, $1000/BO; Extel AH11R, 141R printers (2), dot matrix, gd cond, both work, w/24 ribbons, $500/BO. D Woodcock, WNWC, 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.

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.

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.

The World Transcription Library, 16" disc w/catalog, mint cond, $1500/BO. R Bellavia, WSBC, 4949 W Belmont, Chicago IL 60629. 312-282-WSBC.

Spantel 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.

Want to Buy

KMUD-FM seeks suppliers for NTIA-funded project. Studio, production, test equipment. To receive complete list for bids, write Box 135, Redway CA 95560, or call 707-923-2413.

Old trade mag from RCA & WE, 1930-50. N Allebaugh, WICE, 100 John, Cumberland RI 02864. 401-725-9000.

Instruction books for old AM & FM xmtrs, ITA or Westinghouse, GE, etc. J Glass, Northern IL Univ, De Kalb IL 60115. 815-784-2179.

New FM Class A radio station seeks tower, transmitter & studio equip. N Norris, 313-234-4335.

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.

MONITORS

Want to Sell

QEI stereo mod monitor, $1500; TFT 753 AM mod monitor, $850; Leader LDM170 dist analyzer LAG125 low dist osc. R Duncan, POB 426, Fairburn GA 30213. 404-964-3764.

Natl Electrolab AM RF amp, gd cond, $200; Sansui TU-577 AMX digital, gd cond, $25. P Wolf, WCOO, 106 New Market Rd, Immokalee FL 33934. 813-574-5548.

TFT 730A 92 kHz SCA monitor, $1700/BO. I Epstein, KJAZ, 1131 Harbor Bay Pkwy #200, Alameda CA 94501. 415-769-4800.

TFT 730A SCA mod monitor, new, in factory box, $2000. L Gochenour, WRIS, 219 Luckett St, Roanoke VA 24017. 703-342-3131.

B&H D 35mm printer, BO. G Gunter, KMAB, 650 N Bolton, Jacksonville TX 75766. 214-586-2162.

HP 335B FM mod monitor, gd cond, $100. G Gunter, KMAB, 650 N Boulton, Jacksonville TX 75766. 214-586-2162.

TFT 760 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.

Want to Buy

Any FM mod monitor. M Benson, 9872 Esquon, Durham GA 95998. 916-893-5531.

McMartin older type TBM-4500A, any cond, check your storage rooms. Goodrich Enterprises Inc. 402-493-1886.

QEI 690 mod monitor. John 315-488-1269.

MOVIE PRODUCTION EQUIPMENT

Want to Sell

Kodak Pageant high intensity 16mm arc movie projector, w/power supply, near mint cond, $1200. G Ormrod, GFO Prod, 432 E X St, Tumwater WA 98501. 206-352-8028.

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, 321 River Rd, Nutley NJ 07110. 201-667-2323.

RECEIVERS & TRANSCEIVERS

Want to Sell

TFT EBS rcvr system, 760-01, 03, & 04 units, new, $700. Aldon Video, 424 Commerce Ln, Berlin NJ 08009. 609-768-2439.

Motorola trunked 800 MHz system, (2) Traxars, (2) Mostars, (2) MX360 talkies & chargers, $2000/all. B King, KLBJ, 8309 N I-35, Austin TX 78753. 512-832-4061.

Motorola HT220 VHF handheld w/PL & charger (3), $75 ea; Decibel Products 6253 4 cavity duplexer for 440 to 470 MHz, new, $200. P Russell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

Microdyne 1100 CSR sat rcvr-C band, BO; Kenwood TH-41AT w/many acc, vgc, $175; Tokyo Hy-power HL-120U, 430-350 MHz, 100 W amp w/GaAs FET preamp, excel cond, $250. B Hoover, Box 39, Valier PA 15780. 814-938-7237.

Harris 6528 video receiver, rack mountable, analog tuning, fantastic cond, $300. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Sansui G-7700 receiver, digital analog tuning, 120 W/chan, perf for production room or on-air monitor, lots of inputs, can handle 4 speakers on outputs, mike direction & 2 TT inputs, 2 tape inputs, 2 aux inputs, excel shape, $300. W Feinberg, Totaltape Publ, 9417 Princess Palm, Tampa FL 33619. 813-621-6200.

Automation Techniques GLR500; GLR560 (3); GLR520 (2) sat receivers, all as is, $100 ea/BO; Drake 324 (2) sat receivers, as is, $100 ea/BO. Alan, Intl Bdctg Network, POB 36096, Denver CO 80236. 800-426-4272.

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.

Want to Buy

KLH 21 FM table radio from '60s; also old German table radios. M Ofsonka, POB 374, Springfield VA 22150. 703-643-2775.

McKay-Dymek AM-5 hi-fi AM tuner or equiv. G Liebisch, WPTF, POB 29521, Raleigh NC 27626. 919-790-6315.

REMOTE & MICROWAVE EQUIP.

Want to Sell

S-A DAT-32 w/crystals for 3, 15, 18 & 23, no audio cards, $7000; Marti RMC2AX dial up remote control converted to wire line, not working, 25 chnl w/book, $200. J Heck, Gallup Bdctg, 401 E Coal, Gallup NM 87301. 505-863-4444.

Moseley DRS-1 20 chnl expandable digital remote control system w/extra spare parts & boards, $1350. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

Micro-Controls DLC/DLT-9 9 chan digital remote control unit, 4 phone lines, $850. G Brown, WWGN, POB 1786, Washington NC 27889. 919-946-1016.

Marti 30/150 RPU rcvr, 161.73 w/LA-20 & LA-20E modules, also 10 dB preamp; Microdyne 1100 PCDR (5) SCPC rcvr; Harris 6550 satellite rcvr chassis w/power supply. M Sequin, WVMT, POB 6200, Colchester VT 05446. 802-655-1620.

ADDS VPT-A2 new keyboard & CRT for use w/Moseley MRC 1600 remote control, $795. E Kain, WNOE, 529 Bienville, New Orleans LA 70130. 504-529-1212.

Comrex single line PLX H transmit & RLX receive unit, $1490 for system. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

Marti stereo STL system, xmtrs mdl STL-10, rcvrs mdl R-10, 948.375 MHz & 948.625 MHz; also (2) Scala Paraflector STL antennas, all units approx 2 yrs old, $5000. C Hastings, WCSL, POB 370, Cherryville NC 28021. 704-435-3297.

WE KS-20159,L3 hardwire studio-to-xmtr EQ units, $50 ea. J Martin Newman, Box 7703, Atlanta GA 30357. 404-876-8623.

TFT 704E remote meter & peak flasher for TFT mod monitor, $100. E Kain, WNOE, 529 Bienville, New Orleans LA 70130. 504-529-1212.

WE 111-C repeat coils, excel cond, $50 ea. J Martin Newman, Box 7703, Atlanta GA 30357. 404-876-8623.

Comrex 2 line freq ext system, $6500. P Canlone, WINE, Federal Rd, Brookfield CT 06804. 203-775-1212.

Century Video ABC Talkradio decoders (3), $500 ea. G Jacques, KSUN, 714 N 3rd, Phoenix AZ 85004. 602-252-0030.

DISTRIBUTOR DIRECTORY

The following distributors serving the broadcast industry would be glad to help you with any of your requirements.

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CONSULTANTS

REMOTE . . . WTS

PBR-15 remote control, $1000; TCR15 remote w/subaudible subcarrier, $1500. John 315-488-1269.

Wegener 1601 vertical sat rcvr mainframe w/1601 power supply, 1645 & 1646 circuit cards, space for 9 circuit cards, mounted vertically, $400/BO. E Welch, WKCL, POB 809, Ladson SC 29456. 803-553-5420.

Pulse Dynamics 288 2 chnl remote bdct w/dial & two Telex headsets, $125. P Russell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

Moseley PBR-15 remote control, xmtr & rcvr, CCA SG-1D stereo gen, both for $500/BO. M Gellos, Pensacola Christian College, 904-478-8480 X5041.

Comrex RTLX, 4 mos old, excel cond, going to satellite, $3500; Comrex TCB 1A, 4 mos old, excel cond, going to satellite, $125. R Hatch Ministries, 71 McMurray Rd, Ste 109, Pittsburg PA 15241. 800-327-2550.

Fairchild/Comtech Dart, complete digital satellite audio receiving system, FOB Dallas, $5000. H Beavers, KFJZ, 2214 E 4th, Ft Worth TX 76101. 214-522-9898.

Home satellite TV rcvr, $125. K Bagdasar, KCMN, POB 17444, Colorado Springs CO 80935. 719-636-5266.

Moseley PCL-303/C composite STL rcvr, 951.5 MHz, $850/BO; TFT 7700 composite STL xmtr, 2 yrs old, $1900; Mod Sciences CDL-2500 composite line driver & rcvr, excel cond, $800; Moseley SCM-1 subcarrier gen, perf condition, $400. I Epstein, KJAZ, 1131 Harbor Bay Pkwy, Alameda CA 94501. 415-769-4800.

Anixter Mark P9A 180GN-2 15' aluminum grid parabolics (3), 890-960 MHz, $5000 ea. D Schmidt, WSCD, 224 Holiday Ctr, Duluth MN 55802. 218-722-9411.

Dart-Fairchild 384 digital sat receiver, like new, 15 kHz & 7.5 kHz, downconverter, $4695. D Ganske, WISM, 1819 Mitchell, Eau Claire CI 54701. 715-836-9476.

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 chan expandable digital remote control system w/extra spare parts & boards, $1950. G Wachter, KFYI, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

Satellite dishes, 8' fiberglass, 12' fiberglass, in sections, or 8' black mesh, w/mounts, $250 ea, you pick up in Arkansas. L Fuss, Contemporary Comm, POB 4010, Opelika AL 36803. 205-749-3340.

Comrex PTLX & RTLX two line freq extension system w/extra receiver & automatic level set unit, $10,000. J Stolz, WCVG, 813 Hwy 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, KQM Bdctg, 1019 Cordova, San Diego CA 92107. 819-223-3413.

Want to Buy

Subcarrier gen & demod for Marti STL-8A 950 MHz microwave STL. C Smith, KREK, POB 1280, Bristow OK 74010. 918-367-5501.

S-A 7325 DPU 7.5 kHz Pgm Unit for the 7325 dig proc unit. G Urbiel, WWJ/WJOI, 16550 W 9 Mile Rd, Southfield MI 48086. 313-423-3366.

Marti STL 8, must be in gd working cond; also need hybrid combiner to combine two STL xmtrs. D Willey, Life Bdctg, POB 96, John Day OR 97845. 503-575-1840.

Rusk RC1000 remote control unit in working cond. A Durham, WAKI, POB 31, Meminville TN 37110. 615-473-6575.

Microdyne 1100-PCDR (5) demod. B Rathman, KRVM, 200 N Monroe, Eugene OR 97402. 503-897-3370.

TFT 7700B or Moseley 505/C compos STL sys. R Hixon, Trans World Radio, 700 Shunpike Rd, Box 98, Chatham NJ 07928. 201-966-2700.

TRC15 rem ctrl unit. J Foley, KBOX, 110 W Laurel Ste H, Lompoc CA 93436. 805-541-2715.

STATIONS

Want to Sell

21% of our station avail to financially qual indiv(s), loc in Western WV. Write: Station, POB 2083, Ashland KY 41105. Attn: MD

Cal AM, class IV, 1 kW, non-directional, FT. 415-652-9373.

1KW Daytime Midwest AM, located on 12A, includes new 3000' studios, near major market, financing available, 4380,000. Goodrich Enterprises Inc 11435 Manderson St. Omaha NE 68164.

Want to Buy

FM CP wanted, any market, anywhere, exp broadcaster, total or partial buy-in, mgmt exp. C Shapiro, 413-584-2924.

Looking for AM, FM or CP in east for right price/terms. H Kozlowski, 703-631-0197.

STEREO GENERATORS

Want to Sell

Harris MS 15R, stereo gen, overshoot, baseband limiter, $400/BO. P Wolf, WCOO, 106 New Market Rd, Immokalee FL 33934. 813-574-5548.

Texar RCF-1 replacement card 5 for 8100A, $200/BO. W Shulz, WFYR, 130 E Randolph St, Chicago IL 60601. 312-861-8100.

Harris 992-5129-001, brand new output module of Harris MS-15R stereo gen, $200/Bo. R Fess, WLRB, 119 W Carroll, Macomb IL 61455. 309-833-5561.

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.

EMPLOYMENT

To place ads in this section, use the ActionGram form. To respond to box numbers, write Radio World, PO Box 1214, Falls Church, VA 22041, Attn:_____

HELP WANTED

CE wanted for Lebanon MO. Full Class C FM & 5 KW AM. Excellent salary plus benefits in good-living Ozark country. This is part of a group operation with the facility & understanding a chief needs. Contact J.A. Shepherd, POB 430, Moberly MO. 816-263-5800.

Radio Engineer. Applications & nominations are being accepted for Radio Engineer position. Will maintain Western Kentucky University's public radio station WKYU-FM (100 kW), repeater station WDCL-FM (100 kW), & student laboratory station WWHR (100 watts). Duties incl planning & construction of an additional repeater station. Repeater stations are routinely maintained by contract engineers. Equip modern & in excel cond. Includes excel vacation & benefits with a salary in low to mid 20s depending on qualifications. Applicants should have a minimum of 3 years experience in FM studio & transmitter maintenance & electronic training. FCC General Radiotelephone or SBE certification is desirable. Send letter of application, vita, & names of three references to Office of Academic Affairs, Radio Engineer Search, Western Kentucky University, Bowling Green, KY 42101. Women & minorities are encouraged to apply. An Affirmative Action, Equal Opportunity Employer.

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 beatiful new facility. Excellent opportunity for the right person. Must have own tools. Call Jim at 414-324-4441.

Chief Engineer. Top 50 market in beautiful Mountain West city. Good knowledge & maintenance skills required with studios, transmitters, directional AM Stereo, Class C FM. EOE. Send resume to: Radio World, POB 1214, Falls Church VA 22041. Attn: Box 1-1-89.

POSITIONS WANTED

Exper GM seeking work in FL/SE area, ambitious, willing to relocate, team-player. Write: GM, POB 1401, Elfers FL 34680.

DJ looking for work in LA, exper, Vietnam vet, any job in radio. R Nabor, 2342 Harwood St, LA CA 90031. 213-223-2799.

27 yr old with hands on experience seeks opportunity for more experience in AM, FM eng, have FCC general phone, SBE certified and NARTE. Mark, 304-525-3981.

CE, NBN, CE NJ state radio station, CE HBO MDS, seeks FT/PT employ, contracted work also welcome. M Rakoff, 114-41 Queens Blvd Ste 148, Forest Hills NY 11375. 718-591-0002.

Programmer: turnaround/startup. Mkt: 20,000+. Plan now, dominate by summer. Details: S Temoat, 211 Green, Pratt KS 67124-1604.

Former KFRC eng avail FT/PT in San Fran N Bay area, exp: dig, audio, RF. T Driggers, 818 Quail Ct, Healdsburg CA 95448. 707-433-9370.

DJ looking for work at med/small mkt station, 14 yrs exp. Write: D Tucker, 407 S New Madrid St, Sikeston MO 63801.

Can't Find It? Use The ActionGram for Immediate Action! Want To Sell It?

STEREO ... WTS

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.

SWITCHERS (VIDEO)

Want to Sell

Panasonic AS-6100, 10 input, effects bank, DSK, w/AS-1000 sync gen & AS-2000 chroma keyer, $1200. Aldon Video, 424 Commerce Ln, Berlin NJ 08009. 609-768-2439.

CDL VSP-860 switcher, 20 inputs, 2ME, BKGD, 24 patterns, joystick, cable, Cox Chromakeyer, $3500/BO. Steve, Box 10673, Denver CO 80210. 303-399-6444.

GVG 1600-7J, 24 input, 3 M/E & PGM, PST & PVW, 6 RGB & shadow C-keyers, quad split & geni mdles, excel cond, $34,000; Crosspoint Latch 6124 & 6403, 12 input, 2 M/E, DSK, ENC C-keyer, w/6403 programmable effects interface, $4900. D Munford, Angelesea Prod, 55 Russ, Hartford CT 06106. 203-241-8111.

Panasonic WJ4600B special effects gen, $1095. W Carnes, KIIRT, POB 8234, Jacksonville TX 75766. 214-586-2162.

Vital VIX 114 video switcher, 1 M/E, etc, gd cond, $2500/BO. B Yates, St Josephs College, Windham ME 04062. 207-892-6766.

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.

TAPES, CARTS & REELS

Want to Sell

Fidelipac Master Cart, approx 500 carts, various lengths, excel cond, $3.25 ea. P Tinkle, WCMT, POB 318, Martine TN 38237. 901-587-9526.

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 Srvs, 7914 Fegenbush Ln, Louisville KY 40228. 502-239-1010.

Carts (2000-2500), various lengths & makes, make offer. D Hartman, KLFE, 992 Inland Ctr Dr, San Bernardino CA 92408. 714-885-6555.

Records, 45s & 33s, mint cond, covering big band, swing, jazz, R&B, rock, blues, country, lge coll, from 1920s-present. S Lawson, KAK Prod, 928 Hyland Dr, Santa Rosa CA 95404. 707-528-4055.

Aristocarts, approx 1000 w/AC format music, for programming or refurbishing. M Forrester, KYGL, 500 L St Ste 200, Anchorage AK 99501. 907-272-5945.

Marathon carts (300+), 40s, 70s, 100s, etc, $250 for lot, plus shpg. C Osgood, WBNC, POB 2008, Conway NH 03818. 603-447-5988.

Complete 50-60 & 70-80 music library on cart, most in stereo. C Mandel, KAMP, Box 1018, El Centro CA 92244. 619-352-2277.

Fidelipak Mastercart II carts (500), gd cond, w/stereo music, $1 ea/BO. P Wolf, WCOO, 106 New Market Rd, Immokalee FL 33934. 813-574-5548.

Capitol HOLN (60) pancake 3600' hubs of HOLN A-3 cart recording tape, sold in any quantity, $15/hub or BO. J Emmel, WWAX, POB 750, Olyphant PA 18447. 717-489-0005.

Aristocarts (1200), various lengths w/50's, 60's & 70's music classics, carts are vintage 78-80 & dbx encoded, $1.50 ea or $1500 for the lot (preferred). T Minnard, KOFY, 415-442-1800.

Country Gold Library, 1300 titles on Capitol A2 carts, $2500; A/C Gold Library, 800 titles on Fidelipac carts, $1500. P Martin, 414-482-2638.

Audiopak carts, (1000 plus), various lengths, AA-3's, some AA-2's & 4's, all in gd working order, BO. B Files, WKPE, 508-255-3220.

Sony P6-120MP 8mm video cassette, 120 min in Sp, never opened, 240 min in Lp, $8/BO. D Fong, Fong Prod, POB 886, Franklin Pk IL 60131. 312-671-4615.

Used carts, various lengths, 50¢ ea. T Hunt, KILA, 2201 S 6th St, Las Vegas NV 89104. 702-731-5452.

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.

Want to Buy

Audio Devices tape boxes, 1950's, 10 & 7" in gd cond. ETS Record, Box 932, Honolulu HI 96808. 808-847-4300.

Records & tapes of music from '40s through '60s, music documentaries, etc. S Stevenson, POB 735, Blaine WA 98230. 604-531-4576.

TAX DEDUCTIBLE EQUIPMENT

Want to Sell

Non profit educ station start up seeks donation exciter (FM), cart machine, etc, will pay freight. S Dorsey, Radio Techwood, 711 Techwood Dr, Atlanta GA 20332. 404-676-1207.

Eng student desiring donation of old bdct equip (anything)in repairable cond, will pay all shipping charges, EE student at Purdue. C Gill, POB 371, Indianapolis IN 46206. 317-923-2800.

Donation of cart machines, 200' self supporting tower & medium power CP FM antenna, attractive tax deduction. M Rigney, WMCN, 1600 Grand, St Paul MN 55105. 612-696-6082.

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.

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.

TEST EQUIPMENT

Want to Sell

HP 200CD, audio osc, as new, w/manual, $100. J Martin Newman, Box 7703, Atlanta GA 30357. 404-876-8623.

Potomac Instruments AG-51 & AA-51 audio generator & audio analyzer, brand new cond, $2495 or BO; HP 302A wave analyzer w/HP 297 sweep drive, $50; Tek RM-561A with 3A1 3B3, & 2A60 plugins, $75; GR 1304B audio osc w/motor drive, $25; RCA BW-7A VHF & FM RF test set, $25. Chris Payne, Bethesda MD. 301-656-5389.

RCA WX2D field strength meter w/book, $500. J Heck, Gallup Bdctg, 401 E Coal, Gallup NM 87301. 505-863-4444.

Telemet 4504A1, synchronous detector, gd cond, $300; Telemet 4501, TV demodulator, presently chnl 2, gd cond, $300; Telemet 3705 envelope measurement set, gd cond, $200. Aldon Video, 424 Commerce Ln, Berlin NJ 08009. 609-768-2439.

Yaesu YC-355D freq counter, $100. E Kain, WNOE, 529 Bienville, New Orlans LA 70130. 504-529-1212.

Tek 520A vector & 1480R wfm test equip, $1500 ea. Steve, Box 10673, Denver CO 80210. 303-399-6444.

Potomac AT-51 audio test set, audio analyzer & audio gen, perf cond, $2500. S Cilurzo, Infovideo, POB 879, Cardiff CA 92007. 619-268-3000.

Tek IL30 spectrum analyzer plug-in, $700. B Dickerson, WEAG, POB 520, Stanke FL 32091. 904-964-5001.

B&K 1260 NTSC video pattern/sync gen, 1 yrs old, mint cond, $1200. B Hoover, Box 39, Valier PA 15780. 814-938-7237.

Potomac Instruments AG-51 2 chnl low distortion balanced output oscillator, $1500; Leader Instruments LAV-190 AC millivolt meter & sinewave oscillator, $500. P Lancaster, Howard Schwartz Recdg, 420 Lexington Ave Ste 1934, NY NY 10170. 212-687-4180.

Dukane 99A600 audio spectrum analyzer, BO. D Sis, St John's Univ, Collegeville MN 56321. 612-363-3378.

RF ammeters 0-3 A, 0-8 A, $12 ea. D Stebbins, KZZN, Box 192, Littlefield TX 79339. 806-385-4474.

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.

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 Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Want to Buy

Telequipment D54, service manual. D Sis, St John's Univ, Collegeville MN 56321. 612-363-3378.

GR 1606A RF impedance bridge. J Glass, Northern IL Univ, De Kalb IL 60115. 815-784-2179.

GR 1606A or 1606B RF impedance bridge, must be in gd working cond w/manual & adapters to standard coaxial cable connectors. E Wilk, 312-237-2283.

TRANSMITTERS

Want to Sell

Parts for RCA BTF20E1, sold as package, $5000/BO. J Schloss, KICD, 2600 Hiway Blvd, Spencer IA 51301. 712-262-1240.

McMartin B-910 15 W FM solid state exciter tuned & tested on your frequency by the original designer, stereo available. Goodrich Enterprises Inc, 11435 Manderson St, Omaha NE 68164. 402-493-1886.

Marti RPT40 transmitter, BO. T Storck, KTRF, Thief River Falls MN. 800-426-1003.

Gates BC1F, excel cond, now in service, $2500. C Ratliffe, WADE, 1 Radro St, Wadesboro NC 28170. 704-694-2175.

Harris XTS-1 & XTM-1 AM stereo exciter & AM stereo mod monitor, $3500. E Kain, WNOE, 529 Bienville, New Orleans LA 70130. 504-529-1212.

Harris TE3 exciter, w/SCA, stereo & (2) matched parts, output xistors for RF amp, $700. W Clark, RR2 Box 151, Pittsfield IL 62363. 217-285-6234.

Continental 315F 5 kW AM, some spares, all docs, excel cond, clean & ready to ship, 1410 kHz, BO. R Sullivan, WPOP, 345 E Cedar, Newington CT 06111. 203-666-1411.

CSI T-25-F1 25 kW FM, tuned to 95.1 MHz, 1985 model, new final, relay panel & spare parts, gd cond, BO. J Clark, WRKU, 4531 Belmont Ave, Youngstown OH 44505. 216-759-0579.

Bauer 610 FM 5 kW, uses McMartin B-910 exciter & 4CX5000A final, tuned to 103.1, $5000/BO. P Martin, 414-482-2638.

Gates 10 W xmtr; Gates Yard, mono, 8 ch board, BO. B Yates, St Josephs College, Windham ME 04062. 207-892-6766.

Gates/Harris BC-5E, 5 kW AM & BC-1F, 1 kW AM, excel cond, many spare parts, remote conrollable, tested monthly since 5/85, $10,000/BO. T Laffan, WDEV, 9 Stowe St, Waterbury VT 05676. 802-244-7321.

Transmitters, 1 kW AM, 5 kW AM, 5 kW FM, 25 kW FM replaced w/new ones. John 315-488-1269.

RCA BTA-1R 1 kW on 1490 kHz w/250 cutback & spares, BO. E Monskie, Hall Comm, 24 S Queen, Lancaster PA 17603. 717-397-0333.

ITS 1615 ITFS xmtr & Andrew antenna, 10 W, $10,000 or trade. W Ellis, KOZK, MPO Box 21, Springfield MO 65801. 417-865-2100.

RCA TTU-12 UHF TV xmtr, 12 kW, no exciter, prefer to donate to non-profit organization. C Haynes, POB 31235, Jackson MS 39206. 601-948-1515.

TTC/Wilkinson FM 5000E 5 kW FM, 3 yrs old, like new. S Larson, KWOA, Box 730, Worthington MN 56187. 507-376-6165.

Elcom Bauer 690 exciter, tuned to 91.7, $500. M Rigney, WMCN, 1600 Grand, St Paul MN 55105. 612-696-6082.

TMC 6PT 4016 40 kW SSB xmtr, $6500. M Murphy, 11621 Valle Vista, Lakeside CA 92040. 619-561-2726.

Kahn Power Side, exciter, monitor & processor, 1310 kHz, $7500/BO. J Hoge, WYND, 316 E Taylor, Deland FL 32724, 904-734-1310.

Gates BC250G4, new tubes & plate transformer, $1500. R Ness, WCSJ, POB 270, Morris IL 60450. 815-942-0022.

LPB 20 W solid state AM, $500. K Bagdasar, KCMN, 2880 E Fountain #200, Colorado Springs CO 80910. 719-636-5266.

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.

RCA BTF1 parts, relays, caps, resistors, all new in original boxes. M Black, WEOS, Hogart William Smith College, Geneva NY 14456. 315-789-8970.

LPB carrier current transmitter, splitters & power interfaces, BO. M Black, WEOS, Hogart William Smith College, Geneva NY 14456. 315-789-8970.

Versa Count V-322 fully operational 10 W exciter, BO. J Grimes, WQNA, 2201 Toronto Rd, Springfield IL 62707. 217-529-5431.

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.

RCA BTF-5D FM at 94.9. M St Cyr, 517-487-5986.

Gates FM 1-C w/McMartin B-910 exciter, working cond, in use as standby. A Bowab, WDLT, 2402 Wolf Ridge Rd, Mobile AL 36618. 205-344-3698.

Harris TE-3, new rack mount, 15 W TE-3 FM exciter, new, BO; Harris FM01G/H parts, etc, BO. B Royster, KQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

ACTION-GRAM

EMPLOYMENT SECTION:

Help Wanted: Any company or station can run "Help Wanted" ads at the flat rate of $18 per listing per month (25 words max). Payment must accompany insert; **there will be no invoicing.** Blind box numbers will be provided at an extra charge of $2. Responses will be forwarded to listee, unopened, upon receipt. Call 800-336-3045 for display rates.

Positions Wanted: Any individual can run a "Position Wanted" ad, FREE of charge (25 words max.), and it will appear in the following 3 issues of Radio World. Contact information will be provided, but if a box number is required, there is a $2 fee which must be paid with the listing **(there will be no invoicing).** Responses will be forwarded to the listee, unopened.

Check as appropriate:

☐ Help Wanted ☐ With Box Number
☐ Positions Wanted ☐ Without Box Number

Text (25 words maximum): _____

_____

_____

_____

Name _____ Title _____

Company/Station _____

Address _____

City _____ State ____ Zip _____

Telephone _____

Mail to:
BROADCAST EQUIPMENT EXCHANGE
PO Box 1214, Falls Church, VA 22041

Can't Find It? Use The ActionGram for Immediate Action! Want To Sell It?

TRANSMITTERS . . . WTS

Emcee HTU/Adler UST 100 W UHF translators. S Hasskamp, KDLH, 425 W Superior, Duluth MN 55803. 218-727-8911.

Want to Buy

Exciter, any cond & freq, need now. M Benson, 9872 Esquon, Durham CA 95938. 916-893-5531.

Used xmitter, working or not, will remove. M Miller, Miller Tech, Box 3437, Chico CA 95927. 916-893-8737.

Tube type, older mdl exciter, low price range w/FM stereo gen if possible. S Dorsey, Radio Techwood, 711 Techwood Dr, Atlanta GA 20332. 404-676-1207.

FM 10 kW in gd shape, operate at 97.3 MHz, prefer Harris, Continental or other that is still factory supported. B Cole, KSHR, 1270 W 13th, Coquille OR 97423. 503-396-2141.

Late model 20-25-30 kW FM, must be perf operating cond. D Dovich, 314-721-1247.

FM exciter. J Panza, PAVS, Box 9847, Kansas City MO 64134. 816-966-1587.

3 kW FM, FM mod monitor & FM stereo monitor. R Hughes, 205-456-1362.

Any brand tuneable exciter, freq synthesized, like BE, Versa Count, etc. John 315-488-1269.

AEL AM5KD oscillator card 4A14 & Sanken audio ampl plug-in module. R Jenkins, WAVL, POB 277, Apollo PA 15613. 412-468-4020.

FM xmtr, 1 or 3.5 kW for new 80/90 FM station at 102.5. P Martin, 414-482-2638.

AM 10 kW, gd cond; 3 or 4 tower phasor w/tuning unit. T Gray, WSML, POB 900, Graham NC 27253. 919-227-4254.

FM xmtr, 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 transmission line; TV exciter on chnls 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 exciterr MI-560302-34; parts for BTE-10C/BTE-10C xmtr. 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 xmtr, 10-30 kW w/VSB filter, harmonic filters; also low-band VHF xmtr, 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.

TUBES

Want to Sell

Machlett 6166A/7007, new (3), excel cond, $2200 ea. M Murphy, 11621 Valle Vista, Lakeside CA 92040. 619-561-2726.

WHO SAYS Tubes don't sound great?? 10,000,000 tube-loving audiophiles can't be wrong! Our low cost resistors, capacitors, transformers, low-noise audio & small xmtg tubes make top-quality audio possible with your present tube equipment. Typical prices-807's, $5.95; low-noise 12AX7/ECC83S, $3.95; 833A-Call; 500 piece capacitor kit .001-1.0 uF up to 600V, 10-100 uF 50V, w/cab, $59.95; 300 pc precision low-noise resistor kit, typical tube values, $19.95. Dealers invited. Triode Electronics, 2010 W Roscoe, Chicago IL 60618. 312-871-7459.

LM-Ericson 6761 (30), used in RCA video tape equip, BO. R Rickly, WVAB, 8443 Day Dr, Parma OH 44129. 216-845-6043.

EIMAC 4CX300A transmitting tube, unknown cond. J Nickel, KJSK, Box 99, Columbus NE 68601. 402-564-2891.

EIMAC 4CX-10,000D & (2) sockets; also 4CX2503 socket & RCA DR-2000 numitron tubes for ESE timers, BO. B Royster, KQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Want to Buy

EF86 tubes (10-12), for Gates console, new or used. S Budd, WRPS, 34 Goddard, Rockland MA 02370. 817-871-0724.

TURNTABLES

Want to Sell

Technics SP-25, w/base, tonearm & 2 styli, $600. D Clarke, 3682 N Sierra Way, San Bernardino CA 92405. 714-882-8103.

Technics SL1200MKII, brand new, $375. G Ingram, KIXC, POB 29, Quanah TX 79252. 817-663-6363.

Empire TTs (5) & Sparta TT, $200 all/BO. R McDaniel, KJRG, 209 Meridian, Newton KS 67114. 316-283-5150.

Russco Cue Master (2) w/Micro-Trak tonearms, plus spare tonearm, $400/all. J Edman, 7732 Tampa Way, Shreveport LA 71105. 318-797-3211.

Russco Cue-Master, gd cond, w/arm & cartridge, $100. R Hardy, Richardy Prod, 3239 S 90th E Ave, Tulsa OK 74145. 918-627-2937.

McCurdy TT; RCA TT w/cabinet & preamp. M Phelps, WLTT, 20300 Civic Ctr Dr, Southfield MI 48076. 313-354-9300.

Presto 8GB disc cutting lathe, hot stylus, adjustable groove spacing 76-5001pi; Van Epps vacuum pump/chip collector; Ortofon stereo cutting amps, stereo cutting head needs replacing; CBS Audiomax III average level control; CBS FM Volumax 410 peak controller, mounted in metal rack cabinet w/rear door, all for $2000, you pick up. F Badeaux, The Musik Faktory, 1812 Procter, Pt Arthur TX 77640. 409-982-7121 aft 4 PM.

Stanton 500AL (2) on (2) Technics SLP-1200 MKII heads, one new, one used, 2-5 grams, great for back cueing, $35 ea/BO, will ship. D Fong, Fong Prod, POB 886, Franklin Pk IL 60131. 312-671-4615.

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, Rortoal IL 61866. 217-893-1460.

Technics SL-1100A, BO; Stanton 310 preamp, Grado G-1 plus & Shure V-15IIIG & more, BO; Discwasher Diskit, D-4, SC-2, BO; Technics SP-10MKII. B Royster, KQM Bdctg, 1019 Cordova, San Diego CA 92107. 619-223-3413.

Technics SP10MKII, w/base & power supply, $200. D Rowland, 7310 Corporate Dr #104, Houston TX 77036. 713-541-1596.

Want to Buy

Gray 303 12" tone arms (2) in gd cond, no junk. M Rockwell, WNBI, Box 309, Park Falls WI 54552. 715-762-3221.

Gray 212 12" tonearm or equiv. J Schloss, KICD, 2600 Hiway Blvd, Spencer IA 51301. 712-262-1240.

Shure Rek-O-Kut 16" tonearm. J Panza, PAVS, Box 9847, Kansas City MO 64134. 816-966-1587.

Record cutting machine, must be pro grade, such as old Rek-O-Kut or Presto to cut 45's & 78's, working or not, but must be intact. M Zuccaro, Voice & Video, 5038 Ruffner, San Diego CA 92111. 619-560-1166.

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.

TV FILM EQUIP.

Want to Sell

B&H 614 EVMS 16mm telecine projector w/pedestal magnetic & optical sound, w/manuals, excel cond, $1250; Telemation TM 203, full size multiplexer, w/manuals, gd cond, $425. G Ormrod, GFO Prod, 432 E X St, Tumwater WA 98501. 206-352-8028.

RCA TK27 film chain w/TP66 16mm-35mm simplex & slide projector; Buhl biplexer w/Elmo 16mm-8mm & super 8 w/sound, $2500; Vital 114-10X video switcher 1ME, RG chromakeyer & audio follow & DSX, $5,000/BO. T Judge, Tag Comm, 74 Weaver Rd, W Millford NJ 07480. 201-208-0180.

RCA TK-27 camera only, $500 plus shpg or trade. W Ellis, KOZK, MPO Box 21, Springfield MO 65801. 417-865-2100.

RCA film island, complete, online, $4000; RCA TP66 film proj, BO. R Rickly, WVAB, 8443 Day Dr, Parma OH 44129. 216-845-6043.

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.

Want to Buy

35mm telecine projector needed. W Carnes, K11RT, POB 823A, Jacksonville TX 75766. 214 586 2162.

Dumont TV camera chain, also need (2) Houston/Fearless TV tripods. A Weiner, Britton Rd, Montecillo ME 04760. 207-538-9538.

VIDEO PROD EQUIP

Want to Sell

JVC CP-5500U, CR8200U, Cezar edit ctr, 3/4" edit system, $3000; JVC CR-4700U 3/4" portable deck w/JVC TGP470 time code gen, $3000. C Weisehahan, 249 W 29th St, NY NY 10001. 212-563-6612.

Quanta Select 7 character gen, disc drive, 7 fonts, 250 pages, $2850/BO; 3M D5000 character gen, 100 pages, 8 fonts, 512 colors, $2850. Steve, Box 10673, Denver CO 80210. 303-399-6444.

Quanta Q7, character gen, $900; Tek 1470, sync gen, $1000; Conrac DZB-15, high res, B/W mon, $200; RCA TG-6 sync gen, $200; EECO MTG, time code gen, new, $600. Aldon Video, 424 Commerce Ln, Berlin NJ 08009. 609-768-2439.

Laird 7000 char gen w/extra fonts, $1500; JVC 1900 3 tube camera studio & ENG config, mint cond, low hrs, w/extras, $2000. J Jones, RBY Recording, 920 N Main, Southbury CT 06488. 203-264-3666.

Sony VO-2860A (2), $650 ea; Sony VO-4800 (2), $1200 ea; Precision Echo video compression unit, $2500; RCA TR-600 2" VTRs (2), $2500 ea; Sony BVE-500-A editor, $400; CVS-520 digital TBC, $1000; Microtime Image Plus, signal processor, $1500. D Gerisch, WMTV, 615 Forward Dr, Madison WI 53711. 608-274-1515.

JVC RM 86U edit controller, new, $900; For-A 440A TBC w/VEC-440, 8 mos old, $6200; Prime Image Plus TBC, 8 mos old, $2500. J Jones, RBY Recording, 920 N Main, Southbury CT 06488. 203-264-3666.

Conrac monitors (2), color 17" w/external sync & underscan 1 YCA 1 YCB, whole or parts; RCA tripod dolly & panhead for bdct studio, 250 lbs, $550. R Falkenstein, Tri God Ministries, 3447 Arbor St, Phila PA 19134. 215-739-6599.

Knox K-128/K-32 char gen w/acc, gd cond, $450. M Murphy, 11621 Valle Vista, Lakeside CA 92040. 619-561-2726.

3M DP100 proc amp, $500; Ampex 1085 proc amp, $250; Ampex VR1200 2" quad parts. J Krepol, RNDL, 6147 Walker St, Phila PA 19135. 215-624-1050.

Harris Video 6520 receiver, brand new, $400 firm. B Feinberg, Total Tape Publ, 9417 Princess Palm, Tampa FL 33619. 800-874-7599.

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; Ampex 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.

Mindset 3000 character generator and animation system, 20 meg hard drive, all software, $5000. H Larson, Matrix Mobile TV, PO Box 536, San Luis Obispo CA 93406. 805-544-5657.

Sony Betacam BVV1A with component adapter and Porta-Brace case, $3500 or best offer. M Glaser, MRG Productions, 516-489-1071.

Want to Buy

IVC 9000, 1 or 2 machines; standards conversion unit, must be in good working condition. H Henson, Henson Prod, 3796 Bethania Station Rd, Winston Salem NC 27106. 919-924-8717.

GVG 906A video AGC module. J Fuehrer, NTV Network, POB 220, Kearney NE 68848. 308-743-2494.

VIDEO TAPE RECORDERS

Want to Sell

JVC CR8500LU 3/4" editing system, (2) VCR machines with 850 controller, very good, $3750 or best offer; Ampex VR1200 2" quad VTR, $3500. Steve, Box 10673, Denver CO 80210. 303-399-6444.

JVC editing system, CR-850, 6650, RM-86, excellent condition, 250 hours, manual, Best Offer. R Hiett, WHSV, Rt 33 West, Harrisonburg VA 22801. 703-433-9191.

Hitachi HR-200 1" VTR, operational now, but needs repairs, w/TC-200 TBC in excel cond, $3500 plus shpg. A Denke, American Motion Pictures, 206-789-1011.

JVC CR6600U 3/4" VCR w/RM70U rem ctrl, $1295; Harris 690 frame sync TBC w/9 bit processing, corrects 1", ¾" & ½", $3295. D Brennan, Kustom Video, 3596 Lorna Ridge Dr, Birmingham AL 35216. 205-823-0088.

TCR-100 2" video cart machine, gd cond, $2500/BO. D Gerisch, WMTV, 615 Forward Dr, Madison WI 53711. 608-274-1515.

Sony VP2000, $200; VO2600, $250; VO2610, $275; VO2630, $350; VO2800, $375; VO2860, $500; VO2860A, $600. J Krepol, RNDL, 6147 Walker St, Phila PA 19135. 215-624-1050.

JVC CP5200, $175. J Krepol, RNDL, 6147 Walker St, Phila PA 19135. 215-624-1050.

Panasonic NV 9400 portable 3/4" VCR, gd cond, $995. W Carnes, K11RT, POB 8234, Jacksonville TX 75766. 214-586-2162.

JVC CR-4900U portable 3/4" U-matic VTR w/2 batt, charger/PS, case, excel cond, $1850; Leader port color mon/waveform scope uses NP-1 batt, vgc, $995. R Miller, Filmaker Inc, 606 W Broad, Bethlehem PA 18018. 215-691-0900.

Ampex VR1100 quad VTR with highband head, processing amp, Best Offer; Microtime 640 TBC, needs work, with manual, Best Offer. H Larson, Matrix Mobile TV, PO Box 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.

Panasonic NV9200A 3/4" VCRs (3), excel cond, $495/BO. A Chaney, Video Eng, 1415 Oak Knob Way, Sacramento CA 95833. 916-922-3456.

Want to Buy

1" deck in gd cond, under $7000. C Weisehahan, 249 W 29th St, NY NY 10001. 212-563-6612.

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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**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.

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Brief Description: _____
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Broadcast Equipment Exchange
PO Box 1214 Falls Church, VA 22041

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

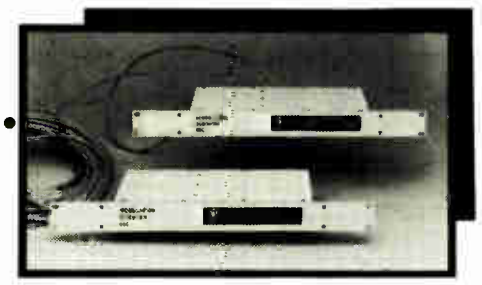
Problems

- Transmitter noise, heat, RF field interference and physical location make the transmitter room a poor place to locate the stereo generator and audio processing. Necessary and critical adjustments are inconvenient at best; nearly impossible at worst!
- Lossy, expensive, hard-to-install 950 mHz semi-rigid coax is often impractical to run from the studio to the STL antenna on the roof.
- Fire codes won't let you run PVC jacketed coax through the ceiling, except in very expensive metal conduits.
- Long composite runs at the transmitter or studio pick up ground loop hum.

- You need to drive multiple exciters without composite level changes and switching or relay hassles.
- The station has two stereo generators and two transmitters. You want a simple way to matrix-switch them without requiring complex backloading.
- It's a pain to use your spectrum analyzer and other test gear to make composite measurements because of the hassles of interrupting the air feed to connect them.

- The PD, the CE and the GM all want to monitor and measure the station's quality. But buying three modulation monitors is out of the question.
- Keeping tabs on the competition's signal quality is important, but it's inconvenient and expensive to do.
- Lots of boxes use composite baseband—the STL, stereo and SCA generators and more. You need an easy, economical way to test their performance, and directly measure composite baseband signals.
- The station has an old modulation monitor gathering dust. You don't trust the readings, but can't it still be useful?

Solutions



Modulation Sciences' CLD-2501/2 Composite Driver/Receiver

- Lets you put your stereo generators and audio processing where they belong—at the studio.
- Supports up to 3000 ft. (or two milese, on special order) of flexible, inexpensive, twinax cable – standard or PTFE-jacketed for plenum runs.
- Fully balanced against hum and noise pickup.
- 100 dB of immunity to ground-loop related noise and hum.
- Exceptional stereo separation and SNR performance.
- One driver can supply two independent receivers (each up to 3000 feet away in different directions) with composite stereo baseband audio and all SCA's.
- Works with 78 ohm twinax (Belden 9463) twinax for indoor service and 150 ohm twinax (Belden 9182) for outside or direct burial.

Modulation Sciences' CLD-2504 Composite Distribution Amplifier

- Makes distribution of composite baseband signals as easy as distributing audio.
- 1 composite input, 4 composite outputs.
- Unity gain with >50 dB isolation between outputs.
- High impedance 50Ω input, low impedance outputs.
- BNC connectors on input and all outputs.
- Basic performance specs similar to Composite Line Driver.

Modulation Sciences' FM ModMinder™

- Provides all essential measurement functions of a high-quality modulation monitor when fed by any composite baseband audio source.
- Works with any wideband source of demodulated FM—even consumer tuners or stereo receivers.
- Displays total modulation percentage, overmodulation peaks, stereo & SCA subcarrier status, subcarrier injection level, allowable increase in modulation—all for about half the cost of a modulation monitor.
- If you have an old modulation monitor—even one that reads unreliably—that oldie's demodulator section can drive ModMinder. You get unbeatable accuracy at a $3000 savings over the cost of a new modulation monitor.
- Plug-in cards adapt ModMinder to measure SCA subcarriers on non-standard frequencies.

Whether you have these audio distribution or measurement problems, or some unique puzzles of your own, Modulation Sciences has the convenient, cost-effective composite tools to help you solve them. Any further questions? Of course—so call 800-826-2603 Toll-Free for complete information and specifications on Modulation Sciences' Composite Problem Solvers.

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Circle 33 On Reader Service Card

A SUCCESS STORY

THE OBJECTIVE was no small task: design a radio console that would become the new standard.

THE METHOD involved listening to veteran broadcast engineers and installers. After all, they're the people who have seen and experienced all the ideas that came before. From this research we learned of the problems that had to be solved and the features that broadcasters required. We then added ten years of console building experience and innovation, and created the A-500α console.

THE RESULT: An unsurpassed console that exceeds prior broadcast standards. Its module/mainframe interface borrows from the computer industry, utilizing all-gold contact insulation displacement technology. The logic system is based on programming the module slot, allowing full module interchangeability. It also provides for separate programming of the module's "B" input selection, thus avoiding embarrassing false starts and mutes. Full console-to-machine control is supported without extensive use of interface boxes and cables. Three audio busses are provided to enhance talkshows and remote functions. There are separate processing loops for the speech and music paths, as well as individual channel insert points. A complete line of microphone and line inputs, remote selectors, and machine control modules is offered in virtually any combination, configuration or mainframe size you desire. The A-500α also features a full family of studio turret and turret components to ease facility design.

THE PERFORMANCE: Needless to say, it's a new age for audio, and the A-500α is a step ahead. While specifications don't say it all, ruler flat frequency response, .003% distortion, crisp square wave response and a noise spec that's unheard of deserve merit. Couple such performance, reliability and innovation together, and a new broadcast standard is set.

THE SUCCESS: WHEATSTONE broadcast consoles are installed in major markets all over the country, from frontline independents to national networks. They are in use right now at some of the world's largest institutions.

THE POSSIBILITIES: The possibilities are up to you.

Wheatstone Corporation

6720 V.I.P. Parkway, Syracuse, N.Y. 13211 (315-455-7740)

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