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February 1, 1988

Volume 12, Number 3

FCC Reaffirms Stereo Stand

by David Hughes

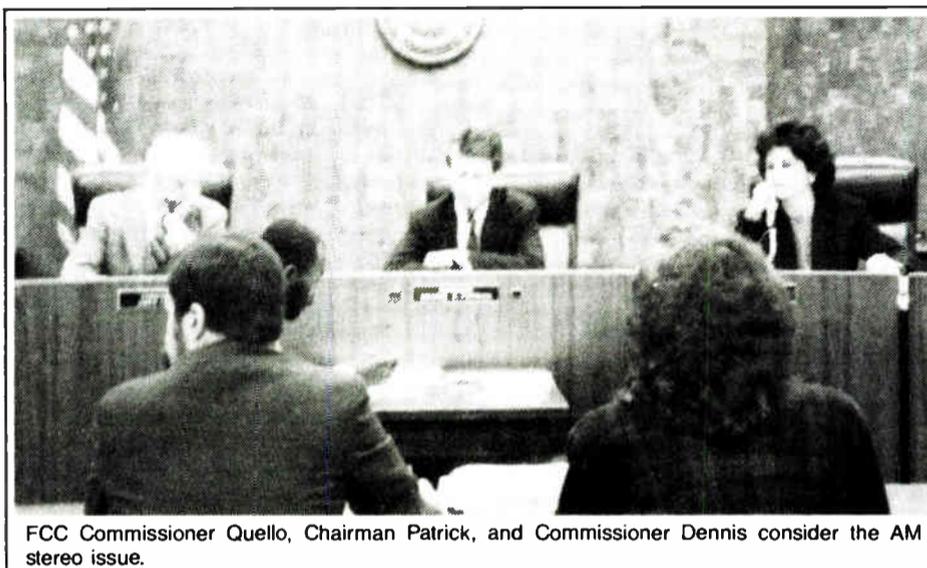
Washington DC ... The FCC has decided not to take any further action on an AM stereo standard, at the same time it refused to require the manufacture of multimode receivers or to protect the pilot tones of AM stereo systems.

But C-QUAM manufacturer Motorola is viewing the Commission's reaffirmation of the "marketplace" decision as an endorsement of C-QUAM as the nation's defacto standard.

Following a 3-0 vote by its commissioners during a meeting 14 January, the FCC indicated that it "has declined to revisit its 1982 decision to allow market forces to determine the development of AM stereo broadcasting."

"What might have been is not the issue before us," said Chairman Dennis Patrick just before the vote. He also acknowledged the existence of a "considerable convergence on a defacto standard."

Patrick stressed that the Commission wanted to avoid the "costly litigation" and "more dissension" that would result from the FCC's decision to reopen the



FCC Commissioner Quello, Chairman Patrick, and Commissioner Dennis consider the AM stereo issue.

AM stereo rulemaking process.

Motorola, which has a significant edge in the number of stations using its C-QUAM system over the Kahn Communications ISB system, said the Commission decision not to decide was a "blessing."

Chris Payne, Motorola's AM stereo

manager, said the FCC co. firmed that a defacto standard had been reached, and that it was C-QUAM. "We feel somewhat officially blessed," he said.

Leonard Kahn refused to discuss the issue with RW.

In its January action, the FCC dismissed three petitions it had before it.

Audio processing equipment manufacturer Texar Inc. had asked the FCC to select a single AM stereo system, but did not indicate a preference between the Kahn or Motorola's C-QUAM system.

In addition, Press Broadcasting and Washington DC Engineer Winifield Standiford asked the FCC to require that all receivers be equipped with multimode chips thereby allowing them to receive both the Kahn and C-QUAM system broadcasts.

The petitioners contended that the marketplace had failed to choose a standard in the five years since the FCC decided not to pick an AM stereo standard.

However, in the notice it released on its January action, the FCC said that "although it had taken longer than anticipated, the market appeared to be moving toward selecting a standard."

The Commission pointed to the National Telecommunications and Information Administration (NTIA) report released last year which indicated that of the approximately 10% of AM stations that have gone stereo, about 70% have gone with C-QUAM, with 100% of all receivers being C-QUAM compatible.

"Thus," the FCC statement added, "the market appears to be moving on its own toward selecting an industry standard. As a result, government intervention at this time ... would prove counterproductive and detrimental to the development of AM stereo broadcasting."

On the issue of requiring that receivers be able to offer both AM stereo standards, the FCC maintained that "this was neither appropriate nor necessary."

To require the manufacture of multimode radios would, as the FCC put it, "place unnecessary burdens on receiver manufacturers which could be costly for them and the public."

Likewise, the FCC said it would not take any action to establish interference protection for the pilot tones of AM stereo systems. This goes against the recommendation of the NTIA, which had asked that C-QUAM (or any other system which could meet acceptance criteria determined by the Commission) be afforded pilot tone protection.

It noted that while "a substantial amount of convergence has already occurred in the case of AM stereo ... the process of establishing protection for one or more pilots could cause further delay and uncertainty in the marketplace and hinder the establishment of AM stereo."

During the meeting, Commissioner James Quello, who called himself "a staunch advocate of a single system," said he would vote in support of the no action plan. Like Chairman Patrick and fellow Commissioner Patricia Dennis after him, Quello cited the potential for "litigation and delay."

(continued on page 3)

Class A's Alter Power Hike Plan

Washington DC ... A group of New Jersey Class A broadcasters has made modifications in its plan for an across-the-board power hike for Class A FMers.

In a filing with the FCC in late December, the New Jersey Class A Broadcasters Association submitted what it called "additional engineering information" to its original proposal, which was filed in September 1987. The plan calls for the 3 kW Class A power level to be raised to 6 kW.

The changes follow a failure of the NJ group last December to win firm backing of its proposal from the NAB. After several months worth of meetings during last fall, in December the NAB's FM Transmission Subcommittee failed to reach a final compromise with the Class A hike proponents.

Subcommittee Chairman John Marino, of NewCity Communications, said that the original Class A plan, as well as the revisions discussed during the meetings, did not do enough to guarantee that Class B's would not face additional interference.

However, Bob McAllan, president of Press Broadcasting, one of the Class A owners in the NJ group, stressed that the revisions were not made in order to ease the disagreements with the NAB regarding the Class B issue.

McAllan said that after examining the FCC rules, the NJ group determined that the protection ratios for Class B's and C's were not the same.

The rules call for Class B's to be pro-

tected to 54 dBu, "but upon closer scrutiny they are in fact protected only to 56.5 dBu, if they are protected to that," he contended, while Class C's are protected

to 60 dBu. He indicated that in reality, the Class B's are often protected to the 60 dBu level, too.

(continued on page 2)

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REGULATORY NEWS

Power Boost Plan Sees Changes

(continued from page 1)

McAllan maintained the original Class A hike plan proposed in September was revised to take into account the vagueness of FCC rules and the reality of the protection situation.

"We have a solid proposal that will pass the engineering muster at the FCC," said McAllan, who added that the fate of the plan does not rest with the NAB's decision to support it or not.

According to NAB Science and Technology head Michael Rau, the NAB Board of Directors was scheduled to examine the subcommittee's recommenda-



We think this issue is ripe for FCC action.

tions and make a final decision whether to support the plan in part or not to support it at a meeting scheduled, at press time, for 19 January in Hawaii.

Attempting to boost the maximum power level for Class A's from 3 kW at 100 meters (or the equivalent), to 6 kW at 100 meters (or the equivalent), the New Jersey group decided that it needed to make changes to its original filing.

The updated petition, written by Clear Channel Communications Technical Director John Furr, indicated that the group determined the "spacing of channels (that is) currently permissible under the Table of Allocations protects the more powerful Class B stations against Class A stations to a lesser extent than previously assumed."

"While Class B stations are protected

to the 54 dBu contour against other Class B's, they do not, as previously claimed, receive the same level of protection against Class A stations," the NJ group said.

The group maintained that its plan would "protect Class B's" in several ways, according to a statement the NJ group provided to describe the revisions. "Class A stations now sufficiently spaced to adjacent channel Class B's would protect the B's to approximately the 58 dBu contour."

The NJ group's revised plan also indicated that Class A's shortspaced by less than 10 km would protect the Class B 60 dBu contour. It also said that "Class A's shortspaced more than 10 km would protect either the Class B 64 dBu contour or the same contour to which the Class B protects the Class A."

"Class A stations are themselves currently protected only to, at best, the 60 dBu contour," the group said. "Short-spacing further reduced that protection."

The NJ group maintained that "the additional engineering allows the maximum number of stations and listeners to enjoy the benefits of increased Class A power and resultant local radio service, with minimal necessity for case-by-case review or additional paperwork."

It added that the FCC has deleted the rule allowing relocation of shortspaced Class A's as long as their 1 mV/m contour did not extend any further in the short-spaced direction than previously allowed.

Washington DC-based attorney Ken Keane, who represents the NJ Class A group, said that he has heard no comments from the industry in general on the revisions to the power hike plan. He added that he is still waiting for a response from the FCC, which could ask for comment on the plan, propose a formal rulemaking action, or dismiss it.

"We think this issue is ripe for FCC ac-

tion," Keane said.

While admitting that he had not yet read the revised petition, Marino said that there is a gap between the NAB's desire to protect Class B's and the NJ group's plans for a power hike for Class A's.

"From what I understand, (the NJ petition) won't guarantee protection for Class B's, who would face a minor reduction in coverage," Marino maintained.

For more information on the NJ group's activities, contact Ken Keane at 202-861-7800, or Bob McAllan at 201-774-7700. The NAB board's activities on this issue will be covered in RW's 15 February issue. Contact John Marino at 203-333-4800.

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FCC Clips

Engineering data available

The FCC's FM and AM Engineering Data Base is now available in several forms, according to a December announcement.

The data base contains stations' engineering parameters in the United States, Canada and Mexico, and non-engineering information such as call sign, station location and licensee names.

For FMs, the data base also gives parameters for translators, vacant channels and proposed amendments to the Table of Allotments.

The complete data base for both bands is available from the National Technical Information Service (NTIS) on magnetic tape or on 5 1/4" diskettes in IBM PC format. Geographic subsets of the data base are on diskette. The data base is supplied to NTIS on the Friday after the last Wednesday of each month.

Lists from the data base on microfiche, which are supplied to NTIS at the beginning of each month, include FM stations and translators in order by state or by frequency. Also available on microfiche are U.S. AM stations in order by state or by frequency.

In addition, various FM and AM data base lists are available from the Commission's duplicating contractor, International Transcription Services (ITS) at the end of each month.

For more information contact NTIS, 5285 Port Royal Road, Springfield, VA 22161, 703-487-4600. Contact ITS at 2100 M St., N.W., Washington, DC 20037, 202-857-3800.

For information about data in the data base, call Loretta Delaine at the FCC, 202-634-6311.

Former commissioner dies

Robert T. Bartley, 78, an FCC commissioner from 1952 to 1972, died 8 January in a Washington, DC, hospital of heart and lung ailments.

Prior to serving with the FCC, Bartley was executive assistant to then Speaker of the House Sam Rayburn. At the time, Bartley worked on the passage of the Communications Act of 1934.

Bartley was a staff member of the FCC upon its creation. He also served with the House Commerce Committee, the Interstate Commerce Commission, the Securities and Exchange Commission and the NAB.

His career included serving as vice president of the Yankee Network in Boston; he also worked with Edwin Armstrong on the development of FM radio.

Broadcast station totals

The Commission reported 10,244 radio licensed AM and FM broadcasting stations, as of 31 December, 1987.

Of this total, 4,902 were AM stations and 4,041 were commercial FM facilities. The remaining 1,301 were non-commercial FMs.

For more information, contact the FCC news media information office at 202-632-5050.

FCC Takes No Action On Stereo

(continued from page 1)

"I will go along with what seems to be a practical decision," Quello said. He added that "the marketplace is working" and that "C-QUAM is a defacto standard."

Commissioner Dennis said that had the clock been turned back five years, she might have voted for a single AM stereo standard. In saying that "we cannot Monday morning quarterback," she also voted in support of the FCC action.

In the staff presentation to the FCC just before the vote, Marcia Glauberman, of the Policy and Rules Division, downplayed the financial risk of stations converting to AM stereo. She said the cost would be less than making many other improvements such as new studio gear.

If the FCC starts an AM stereo proceeding, there could be a costly legal battle forcing a "longer delay," she added.

"Broadcasters have a strong self interest in going to AM stereo," Glauberman said. "It would be unnecessary to revisit the FCC's original marketplace decision."

Following the meeting, Mass Media Bureau Chief Alex Felker stressed that the FCC was not sending an "uncertain signal" to broadcasters.

He maintained that the risk against the eventual development of AM stereo would be "smaller" with the FCC's decision than with a decision to make a ruling or to open up a rulemaking and risk "turmoil and delay."

"Receiver manufacturers would not want to throw money into (the development of) receivers while they were waiting for the FCC and the courts," Felker said. "That would not be good public policy."

Without mentioning either of the two remaining stereo system proponents, Felker discussed the likelihood of "litigation from the losers . . ."

Motorola put an optimistic face on the FCC action.

Payne said his firm was pleased that the Commission has eliminated the possibility that it will defer the action again.

In the past two years, the FCC continually hinted that it would issue a statement on the matter, but kept deferring it. In late 1987, it twice bumped the issue off meeting agendas.

"The FCC did what it is going to do. (The industry) does not have to wait for anyone else," Payne added.

"When we studied the transcripts (of the meeting) and the press release, we can see threaded throughout the (FCC's) discussion that it has reached the basic concept that the marketplace has converged to a defacto standard," he said.

"And, Motorola is way out in front any way you measure it," Payne added. In dismissing the three petitions, the FCC indicated that the market is clearly reaching a decision to support the C-QUAM system, and it is not in a "morass," he claimed.

Payne said that Motorola believes the Commission has "evaporated the AM stereo standard question . . . We believe that many broadcasters will convert to AM stereo in 1988. Now is the time to let go and get the thing on the air."

Texar President Glen Clark said he was "disappointed but not surprised" by the Commission's decision. He maintained that the FCC based its decision on "bad information."

"The FCC hangs its hat on the fact that five (AM stereo) systems have been whittled down to two. But two of the systems dropped out right away, with the third pulling out several years ago. Neither of the two final systems (C-QUAM and Kahn) shows any signs of compromise," he said.

Clark also criticized the Commission's downplaying of the cost of converting to stereo.

He said it would cost a station about \$12,000 to convert to stereo. While that is not much for a big city station owned by a large corporation, "that may be all

of the profit a small town station would make in a year—if the station made any profit at all," he added.

If a station did make a mistake and picked the wrong system, Clark said that technically the conversion of a Kahn exciter to a C-QUAM exciter, or vice versa, would only cost about \$400.

However, he indicated that patent and

He said he will wait to see the FCC's formal Report and Order on the latest move before he makes a decision whether to file a petition for reconsideration, a prospect he said is a "strong possibility."

Press Broadcasting President Bob McAllan said that the FCC's decision "did not come as a surprise." He added that the Commission should still "adopt a dual receiver standard and use a dual standards chip if it cannot pick a single (AM stereo) system."

He added that Press is considering whether to file a petition for reconsideration.

Both the NAB and the NTIA were keeping their mouths closed about the issue.

NAB spokesperson Bob Hallahan said the NAB would not comment on the FCC's action.

R.T. Gregg, spokesperson for the NTIA, said his organization was "waiting to see how it (the decision) finally sits out."

He added that the NTIA might ask the Commission to reconsider its decision not to protect an AM stereo pilot tone, but as of mid-January had not made a decision on that.

For more information on the FCC's decision, contact Marcia Glauberman at 202-429-6302.

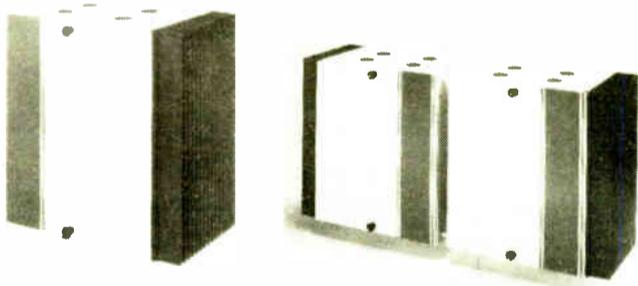
“ I don't care if we get the Black and Decker standard, I just want the FCC to set a single standard. ”

copyright regulations would prohibit that type of modification. A station would have to spend another \$12,000 for a new exciter, Clark said.

He also criticized the FCC's apparent fear of litigation from the loser if it were to pick a single standard. "It is not a healthy state to be in to have the government be afraid to pick a system because of the fear of a lawsuit," Clark added.

"I don't care if we get the Black and Decker standard, I just want the FCC to set a single standard," Clark said.

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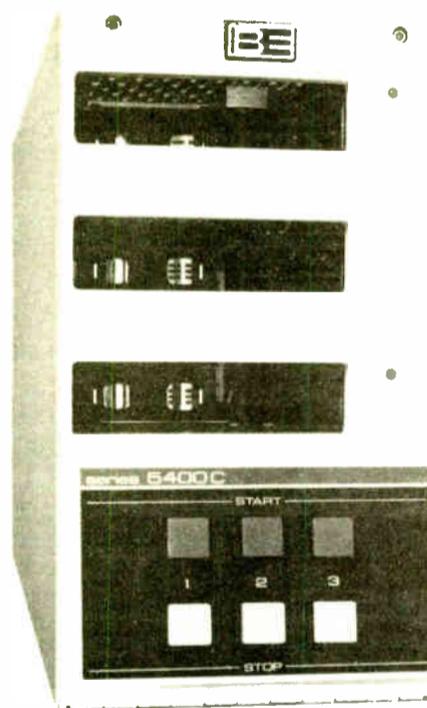
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AM Stereo: Home From the Wars

by Judith Gross

Falls Church VA . . . It wasn't exactly the Magna Carta . . . but the FCC at least showed plain old common sense in its long-awaited announcement on AM stereo.

For all the AMers sitting on the sidelines, that *was* the starting bell (or maybe warning bell?) you heard from Washington back in January.

Yes, the marketplace is working. Once there were five systems, which whittled down to three and finally two. Then there was one.

One system that can be received by every AM stereo radio that is made today. And by the way, there are more of them around than you might think, in late model cars, and in stores, even if the spaced-out clerk behind the counter has never heard of it.

And one system adopted by other countries which have chosen an AM stereo system. And the one chosen by 70%



of all the stations that have gone stereo.

Anybody notice some kinda trend here?

There isn't going to be any formal endorsement. As for multisystem radios . . . nice idea, but nobody wants to make them. That's no conspiracy, that's just the dog telling the tail who's in charge of wagging whom.

So . . . what's next?

Now it's up to AM stations to make their move. It's 1988 and your listeners are turning away in droves from mono, which they (wrongly or rightly) equate with low fidelity.

The industry gave you NRSC to help out. Now it's time for AM to help itself and just go stereo. Don't put the blame on the FCC. Don't use the very tired "C-QUAM vs. Kahn" controversy as your feeble alibi.

Let's see some common sense from GMs and CEs who decide that their stations and AM overall cannot afford one second more of delay. Go stereo. The war is over . . .

☆☆☆

Heavy combat . . . The morning the FCC made its AM stereo pronouncement, Commissioner Jim Quello digressed with a story about WW-II. It was a winding but amusing little anecdote, which set the stage for MMB chief Alex Felker's comments about AM stereo.

Felker prefaced his comments about the stereo situation with, "Here's a war story of a different sort." Yes, we all know only too well.

But good news on the AM stereo scene continues to come from Target Tuning, the maker of those walkman-type radios crystal-locked to a station's frequency and getting an incredibly good sound. FM stations have been using them for promotions.

Talked to president Daniel Flohr at the company's headquarters in good old Moonachie NJ (any excuse to get the name of that town in print!) and he's optimistic about getting AM stereo models ready in time for the NAB show in April.

Walking a thin line to avoid the standards controversy, Target Tuning will be producing AM stereo radios with both the C-QUAM and Kahn systems, at the same price for each.

The C-QUAM radio is being designed for the company by Jon Grosjean. The Kahn radio is being designed by Leonard Kahn himself.

Flohr says that with the interest in AM stereo he's heard, he feels he could sell a million AM stereo radios in the



MMB Chief Alex Felker (2nd from right) et al at the AM stereo battlefield.

first year.

As he points out, "for FM, Target Tuners are a great little promotional item. But for AM, they're a necessity."

☆☆☆

You may have noticed some new names on the pages of Radio World.

Warm welcome to Bill Higgs with his new column *BottomLine Broadcaster* appearing monthly and aiming at stations trying to beat the high cost of broadcasting . . . George Riggins will be drawing on his and other engineers' storehouse of good stories to write some *Old Timer* columns for us . . .

Alan Carter is our new news reporter keeping you updated on FCC and other matters . . . while Alex Zavistovich has moved over to become production editor.

Congrats and welcome aboard.

☆☆☆

And now that the standards war has virtually been laid to rest, the challenge for AM is far from over.

Once the technical problems have been solved, or even before they are completely resolved, the single most important thing AM stations can do to get back

listeners is good programming. GMs, are you listening?

In Las Vegas, at the CES in January, folks were heading for the booths with AM stereo radios on display (I think you needed a treasure map or something to find them, but they were there) so they could listen to "The Crusher."

"The Crusher" turns out to be KRSR, playing a "commercial metal" format in C-QUAM AM stereo. The format was devised by John Parikh's company Joint Communications, out of Canada.

Senior programmer Steve Young described it as Rock 40—a top 40 format with harder rock and the more saleable not-so-heavy-metal sound. It's designed for a disenfranchised 18-24 demo, although the actual demos probably stretch 15-35.

The Crusher's OM/PD, Bob Berzins says "commercial metal" includes such things like Poison, Motley Crue, Rush, and AC/DC. None of the bash-your-baby's-head-against-a-wall-type stuff, but more daring than any of the FMs in town are playing.

☆☆☆

The Crusher (which is said with a heavy bass reverb a la *Battlestar Galactica*) recently scored a coup when it received the latest AC/DC release from Atlantic before its across-town competition got it.

The idea is ingenious. Here's a format that the FMs looking for broad-stroke demos and cautious about ratings points would hesitate to try.

It's designed specifically for younger listeners. And how will The Crusher get them to try AM? Well, Young reports some very intriguing promotions including, "Just try it once" and (my personal favorite), "Music your parents hate."

Expect to hear The Crusher, which is currently airing music from Sony 8mm videotape, showcased at the April NAB.

The message here for AMs is clear. Find that alienated audience: young, old, metal rock, sweet love ballads, whatever. Give them what they want.

And then stereo or no stereo; 3 kW receiver, or super-duper Hi-Fi, NRSC wideband stereo tuner; they will tune in.

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And, best of all, the RC16+ is cost effective. No other unit on the market offers these features and capabilities at this low price.

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Plug-In Automatic Logger	2,499.00
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OPINION

Readers' Forum

Got something to say about *Radio World*? Any comments on articles? 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).

More separation needed

Dear RW:

Isn't it a shame that we have to use black boxes such as the StereoMaxx to put the separation into stereo records that should have been there in the first place!

Maybe the record producers will take note of this trend and give us some wider separation in the original mixes.

Then mono compatibility would be assured and the risk of increased multipath caused by monkeying with the L-R level would be eliminated.

Harley Drew, PD
WBBQ
Augusta, GA

Kudos and questions

Dear RW:

Kudos to Judith Gross on Cousin' Brucie (*When Radio Was Your Cousin*, 15 December RW)—great story. I trust she has heard the great emulation by WNBC of the old days on Saturday nights?

Shame on the NAB, though, as reported by Alex Zavistovich in *Hi-Fi Radios: On the Way?* How dare the NAB label the proposed station transfer fee an "unlawful double taxation."

Since when is Senator Hollings (or anyone else in Washington) to be held to limits on government as specified in the Constitution? Didn't the NAB realize the recent tax reform continued erosion of the "double taxation as illegal" beliefs with the elimination of state sales

taxes as deductible items?

Seems it started years ago with non-deductible taxes on theater tickets...and no one complained.

Now broadcast stations...is anyone left to complain?

NAB should have started its fight long ago, for everyone.

Great publication you have, keep it coming!

David Solinske, Broadcast Engineer
WSYR
Syracuse, NY

Satellites are to blame

Dear RW:

Surely author Steve Church, in his part II of "The Basics of POTS Buisness" (15 November RW) did not mean to imply that long satellite delays are a function of the speed of the radio signal to and from the satellite, compared to the speed of light within a fiber optics system.

The long delays, of course, are a function of the signal path, from one earth station to the satellite back down to the distant earth station (and a return path for the echo).

A fiber optics system with the same physical length as the propagation path for a satellite system will have almost equally long delays.

Sheldon Daitch
Greenville, NC

Giving up on AM

Dear RW:

It is with sadness I inform you that I have completely given up AM radio.

It's a big thing for me to make that statement; I get all misty eyed when I think about it.

I grew up with AM, I even used to *pirate* on AM, I loved it so much! I loved the feeling of squeezing every watt out of my modulation with a one band audio limiter; it sounded so loud, just like KRLA.

My ears can't hear above 10 kHz, so FM's improved fidelity never impressed me; neither did stereo.

Last night I went out to pick up a friend at the airport. I turned on my AM-only car radio. Normally I would listen to KSRO—they play garbage music, but it's better than hearing the engine.

However now they are all talk, and I'm not interested on how to grow fuschias.

KFI, 600 miles away, plays the same garbage, but they were fading severely, and I didn't want to keep riding gain.

The one oldies station, KWFN, is daytime only so that was out.

Two country-western stations boomed in, but I hate CW.

Larry King's talk show came in on at least three spaces on the dial. (Back in the 60's when my antenna wasn't tuned properly, the FCC called that symptom "harmonics" and shut me down. In the 80's it's called "syndication"—and it's completely legal.)

Add about 10 more stations that are ei-

After months of speculation and delay the FCC has finally put the AM stereo question to rest.

In refusing to act on several petitions before it, the Commission has declared that the marketplace is working and that receiver manufacturers and stations are in fact coalescing around a single standard.

The marketplace has indeed made its feelings known over the past five years, whittling five AM stereo systems down to two, with one clearly dominating the field.

As far as can be interpreted from available sales data, the only significant AM stereo activity involves Motorola's C-QUAM system, with stations converting to stereo at a steady pace.

Also, every foreign country which has chosen a single AM stereo standard has decided on C-QUAM.

The fact that all of the AM stereo radios manufactured are C-QUAM compatible and that 70% of AM stations broadcasting in stereo use the C-QUAM system are enough to make it the defacto standard.

Considering the current deregulatory political climate, this FCC AM stereo statement was as strong an endorsement of C-QUAM as the industry can expect from the Patrick Commission.

The decision to act on this endorsement now falls squarely into the AM broadcaster's court. There is no reason to wait.

Those stations which have been putting off making a decision on stereo should consider the Commission's action as a sign to end their uncertainty and convert to C-QUAM stereo now.

Those stations which have been using one of the other systems should let common sense dictate that they also make the switch.

Receiver manufacturers who have been waiting for some guidelines from the industry should also see the Commission's action as a clear sign and begin to incorporate C-QUAM stereo along with the NRSC standard into their designs for improved, higher fidelity AM radios of the future.

If, in this time of deregulation, AM stereo is not going to be moved along by government dictum, then it's time for the question to be settled by industry fiat.

All factions in the industry should get together and make a unanimous decision in favor of AM's future.

The time for argument is past. The debate is over. C-QUAM has won.
—RW

ther running back-to-back commercials, or are too weak to receive, and you have the complete picture of AM radio in Santa Rosa, CA.

It really *hurts* me to write this letter, but I must tell you.

When I got home, I yanked my '67 Dodge factory AM radio out. I cried as I tossed it into the kitchen trash can; it was symbolic.

Tomorrow I'm going to my local K-Mart and buy an FM radio. I don't care if it's mono or stereo or has graphic EQ.

I just want freedom. The freedom of *some* sort of music. Jeez, I'll even settle for Top 40!

There may be more variety out there in larger cities, but I'm not going to keep a radio in my car that I can use only when I visit San Francisco!

One thing crossed my mind. I'm an old stogey, and it took a lot to make me throw out my radio.

But how many others, years ago, have completely divorced themselves from AM for the same reason?

How many more millions of people will do it this year because Corporate America, in honor of the all-mighty dollar, has fired anybody with artistic talent or originality and replaced them with automation machines, satellite receivers and an endless supply of babble?

I used to have a fantasy about going 'legit' and buying an existing small-market AM. But I've changed those plans.

In fact, I'm even disassembling my 250

W transmitter that I built 20 years ago.

If I ever pirate again, it will be on FM, where creativity still exists.

D. Evans (in-between jobs)
Rio Nido, CA

In defense of McMartin

Dear RW:

In reference to two recent stories on McMartin Industries and Ray McMartin.

I would like for your readers to know that not all Ray McMartin did was bad.

Ray McMartin was able to have his jet, boat and big car because of the hard work of people like Tom Bulter, Bob Switzer, Ken Jones, Don Jones, John Schnieder, Bill Turney and many many more who I have left out.

I enjoyed my stay with this company and made many good friends. I am sorry that I have to read about the problems Ray McMartin is going through.

I hope he is able to work his way out and conduct his business in a professional manner.

To all my fellow McMartin friends, Happy New Year.

And if you don't mind, on the subject of AM stereo, why does it cost more to go AM stereo than it does to go FM stereo?

If Motorola will get right on the price maybe more of us could see our way to make the switch.

William K. Hoisington
WTCC
Andalusia, AL

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NRSC Proceeds With AM Goals

by Alan Carter

Las Vegas NV ... The National Radio Systems Committee (NRSC) is making strides in instituting its preemphasis standard for AM radio as more stations voluntarily adopt the curve.

Five-hundred twenty-three stations had converted to the standard when the NRSC met 9 January at the Consumer Electronics Show (CES) in Las Vegas, according to NRSC Coordinator Michael Rau.

The number of conversions had increased to 533 by 13 January, according to Rau, who also heads the NAB's Science and Technology Department.

The NAB and the Electronics Industries Association (EIA), which represents receiver manufacturers, are continuing a move to have the American National Standards Institute (ANSI) recognize the NRSC standard.

ANSI recognition is another step to give the NRSC standard credibility, said Glynn Walden, Group W's engineering manager for AM stations.

The more places they see the standard as being the standard, the more a stan-

dard it will be,' Walden explained.

The NAB filed a request with the FCC in November for the NRSC standard to be mandatory for AM broadcasters by 1990. The petition addresses the transmission portions of the standard, citing the 75 μ S preemphasis curve and the 10 kHz audio bandwidth.

Even with the standard only voluntary, receiver manufacturer Delco reported it had seen an improvement in the interference level, which NRSC members agree is helping create the right climate for further implementation.

In other news from the meeting, members discussed establishing a trademark, which would be given out free, for a high quality AM receiver with the NRSC standard.

The NRSC decided the trademark issue should undergo further evaluation, Rau said. No time frame was set for this process.

The NRSC also discussed continuous tuning, a process where no distinction would be made between AM and FM on a radio dial. Group W's Walden said the committee believed continuous tuning was a marketing rather than an en-

gineering issue and should be addressed from that approach.

Other topics the NRSC addressed included FM allocations, especially Class A stations seeking a power increase

tion's out of band emissions.

John Bisset, a Delta broadcast product representative, stated in the letter that Delta expects to have a completed production unit by the end of February. Delta showed a prototype at the Society of Broadcast Engineers (SBE) convention last November and asked for industry comment.

The device would measure splatter from a user's station as well as that of its competitors. It measures the I (in-phase) signal as well the Q (quadrature) signal with a selector switch. The monitor can measure the entire audio passband and beyond, also transmitter-generated IPM and the effectiveness of a station's NRSC filter.

New features that Delta said it incorporated into the prototype include making it portable to operate from a car battery and adding an active antenna input for field measurements.

Delta's new features also include a remote control output allowing a limit for tolerable splatter with an alarm and alarm trigger, and a provision for the splatter monitor to be used up to 1700 kHz for future AM band expansion.

For additional information about the NRSC, contact Michael Rau at the NAB: 202-429-5346. For details on the splatter monitor contact Delta at 703-354-3350.

FMX Moves Forward At Winter CES Show

Las Vegas NV ... The FMX FM stereo extension system is one step closer to realization after 12 manufacturers displayed prototype receivers and tuners with FMX capability at the Consumer Electronics Show (CES) held here in early January.

Three stations also operated at the show with FMX equipment, conducting tests that FMX Co-developer Emil Torick called "quite successful."

Home receiver and tuner manufacturers displaying prototypes with Broadcast Technology Partners, the company which handles FMX development, were Denon, Fisher, Luxman, Magnum Dynalab, NAD Electronics and Sansui.

Automobile receiver manufacturers at BTP's booth were Alpine, Clarion, Concord and Sanyo. Kenwood and Fujitsu-Ten also had prototypes at the show.

Torick predicted a "maturing of the prototype" by summer CES, slated for Chicago in June.

Station tests

The station tests conducted during the CES showed FMX could reduce the background multipath noise to be equivalent to the stereo-to-mono mode of conventional automobile radios but retaining stereo separation in the FMX reception mode, Torick said.

The three Las Vegas area on-air tests took place at KRLV, KNPR, and at a KNPR translator.

"We conducted a number of demonstrations in an FMX-equipped automobile for these manufacturers, and they (the tests) were quite successful," Torick said.

These tests come after Torick and co-developer Tom Keller, who was recently named the new NAB HDTV lab's chief scientist, modified the FMX system to reduce multipath interference complaints.

Engineers for KRLV and KNPR said

they were impressed with the test results.

Gordon Alsum, KRLV consulting engineer, noted the FMX equipment made an improvement in the "broadcast voice." The FMX also reduced the hiss at the studio receiver, he indicated.

"I'm very favorably impressed with the new FMX," said Mike Worrall, KNPR CE. He noted that KNPR has always had a problem with multipath.

"It does what it has been touted to do, and that's noise reduction in marginal reception areas," Worrall said.

Worrall also said he thought BTP's efforts at the CES to attract interest from electronics manufacturers were successful.

Chip developments

On the issue of FMX decoder chips, Torick reported that Sanyo is making deliveries to manufacturers and Sprague is working on a chip.

He also said two manufacturers are preparing product for radio manufacturers: RE Instruments, a Danish company with offices in Cleveland, OH, and a Japanese company, Kikusui.

There is no further progress, Torick said, from manufacturers working on modified FMX systems. Companies which have been interested in manufacturing FMX exciters include are Inovonics, Orban Associates, Aphex and CRL.

Most companies adopted a "wait and see" posture while recent tests on FMX were conducted.

Torick said he expects broadcast product to be offered at the NAB convention, which will be held 9-12 April in Las Vegas.

For more information on FMX development, contact Emil Torick at BTP: 203-622-2643. For a related story on FMX station tests, see p. 12 this issue.

Delco reported it had seen an improvement in the interference level ...

across the board (see related story, this issue).

Members also discussed the FMX FM stereo extension system, and ongoing studies by Harrison Klein on FCC AM standards and by Bronwyn Jones on the public's expectations of quality and audience tolerance for a variety of interferences.

During the 9 January meeting, Rau also gave the NRSC members a letter from Delta Electronics updating the company's progress on developing a splatter monitor, which would measure a sta-

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Radio's New Secret Weapon

StereoMaxx

StereoMaxx™ is a hit with scores of Chief Engineers and Program Directors from coast to coast. Our spatial image enlarger is their new "SECRET WEAPON". And it's a secret they'd prefer to keep to themselves as long as possible.

A Southwest top 10 market CE explained to us:

"After you asked me for a quote about StereoMaxx, I talked it over with management. We agreed on two things: First, StereoMaxx is making a difference at our station. It gives our sound a fullness and richness we didn't have before, and nobody else has now. And second, we don't want our competition to know what we're doing. So no names, OK?"

We understand. StereoMaxx users love the box, but most don't want publicity. After all, it's no secret that audio processing can be a potent weapon in the "ratings wars." A West Coast Chief Engineer tells us how StereoMaxx is working out at his station:

"It's terrific. The extra separation and depth we get from StereoMaxx makes us not only sound bigger, but better. It's amazing... The PD has been bugging me for months to give our station a sound that stands out from the other CHR's. With StereoMaxx, we're finally able to do it. I followed your instructions for connecting StereoMaxx with our Texar Audio Prisms. There were no problems putting StereoMaxx in, and it gives us no problems on the air."

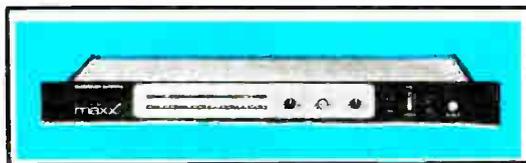
We're glad he said that. Enlarging the stereo image is one thing, but doing it without creating big hassles is quite another. A top 5 market CE put it this way:

"I was a little skeptical because I'd played with several ambience gadgets in the past. But they were more trouble than they were worth. StereoMaxx is different. It really does make us 'more stereo'. And it really doesn't cause us any undue multipath hassles. Also, I don't like unknown 'black boxes', so I was impressed that you sent me complete specs, and a block diagram. The unit comes with full schematics... no mystery modules! Eric Small, you've done it again."

To sum up, we like these comments from a West Coast Program Director:

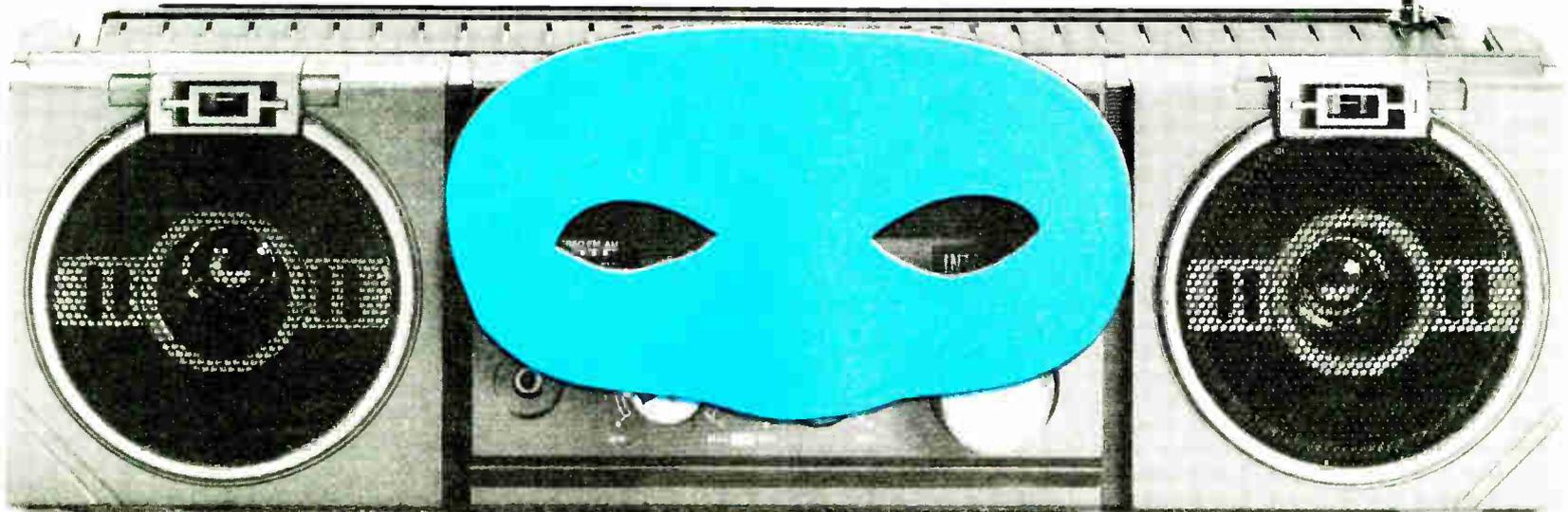
"When I first heard about StereoMaxx, I thought it was a little expensive. But now you couldn't buy it back from us. Every song we play now has as much separation as the best produced stereo record or CD. Turning off StereoMaxx is like going back to mono."

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Distributor Named For R-DAT

by Alan Carter

Decatur IL . . . Systemation, a broadcast automation vendor, will be the exclusive distributor to radio stations of Marantz R-DAT players—but sales may have to wait while Congress ponders the copycode issue.

The two companies announced that Systemation would be responsible for sales of the new technology to radio stations. Marantz also will appoint Systemation its authorized factory repair station for the decks, which will be dubbed Model DT-84.

"We have not formally entered a distribution agreement," said Marantz President James Twerdahl. "We are intending to enter an agreement with them."

R-DAT sales are on hold in the US in the wake of an "informal understanding" among Japanese manufacturers, Twerdahl said, because they fear adverse publicity.

Record companies have asked for protection from the possibility that R-DAT users could tape directly from compact disc to obtain "bootleg" digital recordings and thus sidestep copyright restrictions, as occurred when tape cassettes began to replace vinyl disks.

Congress is considering requiring that R-DAT players have a device to prevent

such bootlegging and that all music recorded contain a triggering tone for the device.

Legislation regarding such copycode chips is on hold while the National Bureau of Standards conducts listening tests to answer critics who claim the copycode tone is audible.

Twerdahl argued that restricting consumers from taping for their personal use is like prohibiting them from photocopying material for personal use. "The whole argument is ludicrous," he maintained.

No action expected

Twerdahl doesn't expect there will be legislation blocking R-DAT sales. "Time will probably solve it (whether R-DAT sales are allowed) on its own merit," he added.

Twerdahl did not have a date when Marantz would begin sales of R-DAT players. "My guess is it will be in 1988, but I can't say for sure," he said.

But Systemation President Steve Bellinger said he has R-DAT gear to sell now, and will have players on display and will take orders at the NAB convention in April. "I'll sell you one right now," he said. He reported that prices for the machines start at \$2,000.

Bellinger said he can obtain brands including Marantz, Sony, Aiwa, Kenwood

and Clarion.

However, at least until the copycode issue is settled, Bellinger is discouraging broadcasters from buying R-DAT.

He noted that Congress could make the sale illegal "with one stroke of a pen," and then buyers would be stuck with equipment lacking any formal service and operational support. But like Twerdahl, Bellinger does not expect Congress to prohibit sales.

Incompatibility

Another reason Bellinger said he does not encourage stations to buy R-DAT now is the incompatibility between recording systems, a problem manufacturers are trying to overcome. A tape recorded on one manufacturer's R-DAT system may not play on another.

Further, he said that since manufacturers don't condone R-DAT sales in the US, they aren't providing repair service to product purchased on the "gray" market.

R-DAT players are entering the US from purchases made in Japan.

Bellinger said he expected automobile players to be in the marketplace in the next 30 to 60 days.

The Marantz R-DAT player, like the others Bellinger says he has available, are consumer players, and not designed

specifically for radio even though that is the market Marantz appears to be targeting with this agreement.

As for the possibility that stations will purchase consumer R-DAT players as they have been doing with CD players, Bellinger said there is no need to make a distinction between consumer equipment and broadcast-quality decks sold specifically to radio stations.

Bellinger called the traditional distinction between consumer equipment and professional products sold to radio stations a "myth," claiming that consumer gear is superior to radio equipment.

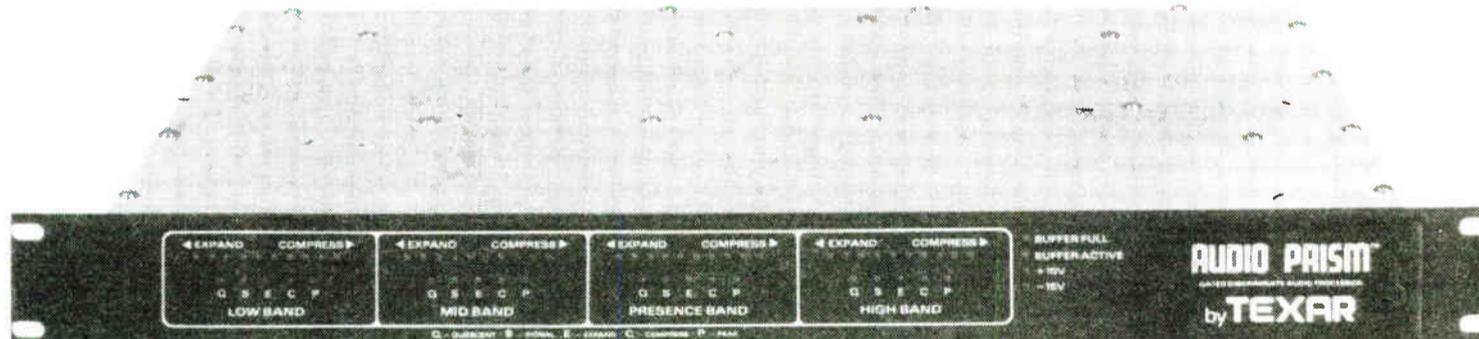
Manufacturers emphasize development in the consumer market because of higher sales potential, Bellinger said, and the consumer product has "few problems, higher quality at a lower cost."

About "a half dozen" stations throughout the US use R-DATs and others are making inquiries, Bellinger estimated. He did not have specific names or numbers.

Even with the problems, radio stations want the new R-DATs because it is the latest technology. "Radio people like to be trendy," Bellinger said, "and it's a hot conversation."

Contact Systemation at 217-428-7101 or Marantz at 818-998-9333 for more information.

ALL NRSC PROCESSORS ARE NOT CREATED EQUAL!



On January 10, 1987, The National Radio Systems Committee (NRSC) approved a standard for high-fidelity AM transmission. When implemented by both broadcasters and receiver manufacturers, the standard will bring near-FM quality to the AM band. Many people are not aware however, that all NRSC processors do not sound alike.

The standard established a maximum audio response for frequencies at or above 10 kHz. In the common language of filter design, this is called the "stopband specification" but the NRSC elected not to establish a minimum "passband specification," electing instead to let the passband performance be dictated by competitive market pressures. The passband specification is the performance of the filter below 10 kHz.

Simply stated, while the NRSC standard requires response to be at least 15 dB down at 10 kHz, there is no minimum response requirement for frequencies below 10 kHz. One other NRSC processor begins its rolloff early so that its response is already down several dB at 9 kHz. The Texar Phoenix™ maintains flat frequency response to

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We could talk for hours about why we think our NRSC processor is better, but then so can any other manufacturer. The true test is to listen with your own ears. For a no obligation, 10-day trial of the digitally-controlled Texar Phoenix, call your favorite broadcast distributor or call Barry Honel at (412) 856-4276.

Considering an "add-on" NRSC filter for your present AM processor instead of a fully integrated package? There are reasons you may not be pleased with the performance of an "add-on" box. Call the factory for our pamphlet "Technical Limitations of a Non-Integrated Approach to Processor Design."

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VOA Says Project On Schedule

by David Hughes

Washington DC ... Despite the news last year that a government investigation found widespread waste and inefficiency in the Voice of America's (VOA) 10-year \$1.3 billion modernization program, VOA officials contend that the current project to renovate 19-studios at its Washington DC headquarters is on schedule.

That's not to say there haven't been problems, according to Bob Peterson, the VOA official who is the "authorized representative of the contracting officer" for the studio project.

While health hazards, including PCBs and asbestos, had to be removed from the old studio facility before new construction could take place, some delays were recorded last fall because additional asbestos was discovered in floor tiles, he confirmed.

But Peterson maintains that the delays were minor and that the \$6.6 million, 20-month project, which was begun in May 1987, will be completed on time in early 1989.

New construction

As of mid-January, Peterson said that work on the first phase of the contract, which includes the renovation of 10 of the 19 studios, has seen the completion of the removal of the old studios, including the PCB lubricated wires and asbestos tiles.

It has progressed to the construction of the new facilities, including the construction of new cabinetry and the installation of new wiring, he indicated.

Peterson added that "most" of the

broadcast equipment is "in stock" at a nearby warehouse and ready to be installed. Jullien Enterprises of Chantilly, VA, has been handling the acquisition of broadcast gear.

The only major gear that still had not been delivered by mid-January were the audio consoles from Harrison, which had to be constructed especially for the VOA project. He added that the "longer lead time" for the consoles was not unexpected.

Peterson predicted that the first 10 studios will be completed in June, 13 months after the project got underway in May 1987. However, that leaves only seven months for the second batch of nine studios to be completed in order to meet the project's 20 month timetable.

With work slated to get underway on the second series of studios in July, Peterson said he saw no problem with the studios being completed on schedule by early 1989.

"They will take less time because the (broadcast) equipment will already be in stock," Peterson said. "The second series won't have any surprises, such as the asbestos in the floor tiles. The cabling will be tested. It will largely be a mass production phase."

Yet, not all are optimistic the project will be finished on time.

Gary Marco, president of the National Federation of Federal Employees, which represents VOA technicians, said that the project is "moving ponderously."

He added that the first ten studios, more than eight months into the project, "were nowhere near ready for the broadcast (related) construction. They

(Grunley-Walsh, the Rockville, MD, contractor for the project) are still in the physical plant construction."

Marco did confirm that much of the equipment has already been delivered and is sitting in storage.

Grunley-Walsh Project Manager Chuck Sanata could not be reached for comment.

Related project on hold

In related news, no progress has been reported in the contract for audio consoles for an additional four VOA studios. The Government Accounting Office (GAO) has been investigating a complaint from console manufacturer Wheatstone.

Wheatstone President Gary Snow alleged in August 1987 that the specs for the four additional consoles, as well as the original specs for the consoles in the 19 studios, seemed to favor the Harrison design.

Originally, officials at the US Information Agency (USIA), the VOA's parent organization, indicated that the contract would be revised and placed up for rebid by November 1987.

However, Brad Harrison, of console manufacturer Harrison Systems, indicated that the rebidding process had not gotten underway by the end of 1987.

Mary Wood, the chief of the USIA's Construction Division, said that as of mid-January the four-studio project had not been placed up for rebid and she said that there was no plan to reopen it.

Even as work continues to revamp the studios, there is continuing talk that the VOA may move its facility to a new Washington DC location by the early 1990s.

An official who did not want to be identified has confirmed that the USIA is looking to plans to move the VOA into a new facility by 1991.

Peterson said that while he had heard the same talk, he did not know for certain if the VOA would make the move, which would appear to render obsolete the studio improvement work now underway.

"I have heard some rumors about a move, but I have no idea what effect it will have on the agency," he added. "As far as I am concerned, we're getting things all set up here (at the present location). We're ready to stay here."

For more information about the VOA, contact Beth Knisley at the VOA public relations office: 202-485-6231.

Delays in NAB Lab, S&T Staff Changes

Washington DC ... At Radio World's press time in mid-January, the NAB still had not finalized plans for the reorganization of its Science and Technology (S&T) Department.

Three of the department's four staff engineers have already undertaken or will soon face new assignments because of two recent events—the creation of a high definition TV (HDTV) lab, and the selection of NAB staff engineer Michael Rau to be the S&T Department's new head.

Further complicating matters is a delay in the creation of the laboratory facility.

Dubbed the Broadcast Technology Center (BTC), the lab project was announced by NAB President Eddie Fritts last September. However, as of January neither space for the lab nor a director for it had been announced. The lab will be used to study the wide range of high and enhanced definition TV systems.

The creation of the lab would affect the S&T Department because two of the staff's four engineers would be moving to the lab, which will be a joint venture of the NAB and outside organizations, including broadcast groups.

In addition, since Rau was made head of the S&T Department in December, his now vacant staff position will also have to be filled.

Interviews being conducted

Rau indicated in mid-January that the S&T Department is actively interviewing candidates for his replacement on the department's engineering staff. However, he said that the two engineers—most likely Ben Crutchfield and Ed Williams—who will be moving to the new lab are still waiting for the formation of the facility.

"Something will happen soon," Rau said in reference to the personnel changes. He added that the NAB has

been holding meetings with broadcasters on funding for the new lab.

At the time of the announcement for the lab last fall, Fritts said he envisioned an entity that "will be housed in new facilities which will include a laboratory stocked with hundreds of thousands of dollars of necessary electronic and computer equipment."

In addition to funding from the industry, the lab will receive a portion of the \$700,000 the NAB has already targeted for HDTV research.

Space up in the air

Last November, the NAB was close to finding space for the lab within walking distance of the association's downtown Washington DC headquarters. That was according to Tom Keller, then the S&T Department head. Fritts also announced last September that Keller would be heading the lab.

However, with the December announcement that Rau would be replacing Keller as S&T head, came the word that Keller would become chief scientist at the new lab instead of director.

And although it appeared in November that space for the lab was close at hand, Rau indicated in January that the NAB "may have lost it."

The search for space for the lab is being expanded to include the entire Washington DC metropolitan area including suburban Virginia and Maryland.

As of early January Rau said the HDTV lab was "still in the planning stage." He also indicated that meetings were scheduled during January with various "broadcast interests" to determine the level of industry support and to secure additional financing and equipment.

Rau stressed that there is "definitely a need for the tech center. It is unlikely that it will be scrapped."

For more information, contact Michael Rau at 202-429-5346.

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FM Translators: Use or Abuse?

Editor's note: In the 1 January RW we looked at the problems broadcasters say they have with the proliferation of translators, particularly those operated by third parties. This second article on FM translators looks at the issue from the translator operators' point of view.

by David Hughes

Washington DC . . . With the news that the FCC is planning to reexamine its rules regarding what some broadcasters, including the NAB, call the "abuse" of FM translators, translator owners maintain they provide a valuable public service.

Translator owners insist that the broadcast signals they relay provide program diversity to many small markets. They maintain that even in large markets their signals are usually so weak that they do not threaten established, full-powered stations.

However, broadcasters argue that in many cases translators do not serve local communities and unfairly extend major market stations from outside markets into their smaller markets.

The issue of the "proper" use of FM translators is particularly hot in the southwest.

For example, owners of stations in markets like Tucson, AZ, where translators owned by third parties relay stations from Phoenix, complain that these extra services do not serve the local community and siphon off listeners and advertising revenue.

A similar situation is said to exist in communities like Palm Springs, CA, and Lake Havasu, AZ.

In late 1987, the Commission indicated that it would issue a rulemaking asking for changes in its FM translators, particularly the use of translators to extend a station's coverage well beyond its 1 mV/m coverage area.

The notice, which is expected to be released by late winter, will also examine the use of "third party" ownership of translators, in which a party not related to the station signs a contract for the use of its translator.

Translator firms

John LaTour, of Power-duPree Broadcasting, which owns approximately 40 FM translators throughout the southern

Special Report

US—"from Texas to Georgia, and from Iowa to Mississippi"—claims that third-party operated translators provide a public service by providing radio formats that for economic reasons are not available in small towns.

He says that full-power broadcasters are just trying to hold on to their large slice of the pie.

"We bring in narrow appeal formats," says LaTour. "From the public's perspective, we are doing them a favor. In many smaller markets, and small towns, if you don't like country or rock, you're out of luck."

He says "typically" the stations his

firm's translators relay are religious, classical or jazz. "We look for stations with unique formats. There are many small towns that do not have access to urban contemporary stations."

The translators provide a way to deal with "insensitive broadcasters who won't respond to the public need," LaTour adds.

Marketplace diversity

He indicated that he hopes the FCC will favor "diversity in the marketplace" when it makes a final decision on its proposed translator rulemaking.

LaTour sees no reason to preclude the use of translators if there is room for them spectrum-wise. "Even in a major market like New York," he indicated, "there is a need for community, neighborhood oriented radio stations. They wouldn't be taking existing revenue from the big guys."

"Not all FM translators are bad," adds Jay Zucker. His firm, Lemmon Rock Communications, owns an FM translator in the southwest, and wants to buy more.

In many respects, translators are very much like full-powered stations, he claimed. Translators simply relay a signal from a nearby station, while an increasing number of broadcasters simply relay a satellite delivered program feed.

The main difference, he said, is that the full-powered broadcaster is allowed to insert local commercials and announcements.

Already handicapped

Zucker said full power stations should view the success of a translator as an opportunity, not as undue competition.

"Translators, by their very nature, are very handicapped signals. If a translator is making an impact (in a market's ratings) then why shouldn't a full-power station take advantage of the situation by programming the same format?" Zucker questions.

He adds that translators often act as "security blankets" for full-power stations. If a full-power station is programming album rock in a market, up against a low-powered translator relaying an inferior signal with the same format, then the very presence of the translator would discourage another full-power station from adopting a similar format.

"The original station would be competing against a handicapped translator, rather than a Class C," Zucker said.

While Zucker said he is not against the FCC "further defining" its translator rules, he says that the marketplace has proved there is a need for translators. He says they are to radio what cable is to TV.

The FCC contact on the translator issue is Larry Eads: 202-632-6485.

In future issues, RW will examine how the FCC enforces its translator regulations, which broadcasters argue are vague at best.

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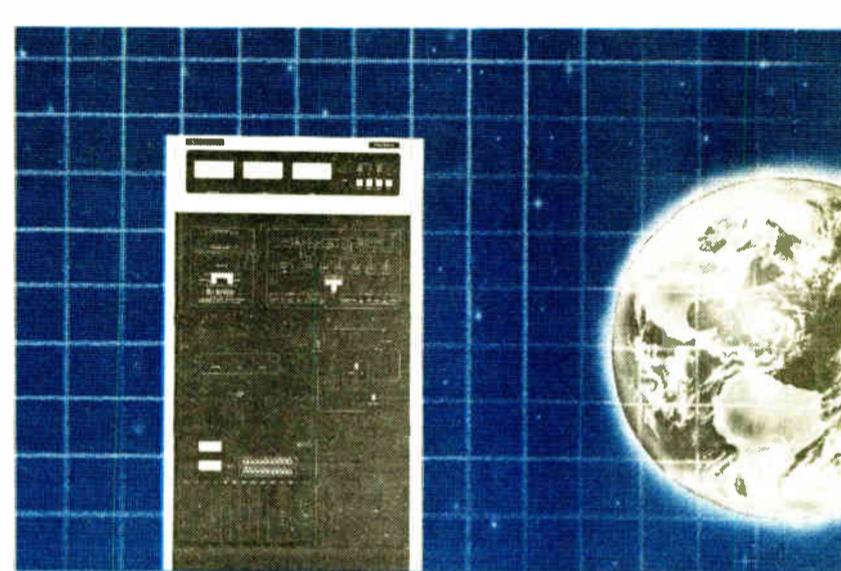


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Station Tests Show FMX Works

by Stephen Waldee

San Jose CA ... FMX may now be ready to add the final touch of fidelity to your FM signal, if your station features programming other than "wall-to-wall" rock music.

My recent tests at classical KBOQ-FM have shown that almost all of the undesirable artifacts of the first generation of FMX circuits seem to have been overcome.

When you think about it, the FM stereo

signal is a really clever bit of mathematical manipulation.

Despite the inherent drawbacks of a partially amplitude-modulated system, the Zenith-GE stereo multiplex of 1961 incorporated the compromises necessary for compatibility with existing FM broadcast standards.

These include preserving the use of commercial subscription FM subcarriers by protecting them from unauthorized reception; giving a full-fidelity, mono compatible signal to just about any FM

radio made since 1946; conserving the available bandwidth and preserving the inherent ruggedness of the FM mono signal.

FM's strong coverage

Just how rugged and reliable this mono baseband signal is was dramatically demonstrated to me recently when my exciter PA fuse blew, leaving only about 3 W of RF trickling out of my antenna instead of 2300 W.

The station still seemed to cover the main service area, though few radios switched to stereo!

Now I can believe how Major Armstrong blanketed almost all of New England with a 2 W transmitter in the 1930s. And our station's translator serves a huge metropolitan area with only 1 W TPO!

Add the 19 kHz pilot and the stereo subcarrier, and you still have good old quiet mono. But stereo is just downright poor for many listeners, especially those with portables and line-cord antennas.

The solution until now has been to switch the radio back to mono.

But FMX, developed originally by Emil Torick's engineering team at the (now defunct) CBS Labs in cooperation with the NAB, offers another choice for many stations.

Now that Broadcasting Technology Partners has succeeded CBS Labs and FMX is off the back burner, the early problems of extra multipath distortion have been enormously alleviated.

Early problems solved

I never heard the first FMX tests, but I heard about them and was skeptical, knowing that you can't get something for nothing.

The system's designers say the problems of early FMX were due to the interaction of the extra 90° phase-shifted stereo 38 kHz suppressed subcarrier interfering with the regular L-R subcarrier under less than perfect reception conditions.

The extra FMX subcarrier is modulated with highly-compressed L-R audio,

plus a 10 Hz pilot tone inserted after audio modulation.

When the regular L-R amplitude is low, the compressed FMX L-R amplitude is very high, and a distortion product was "punching through" during multipath conditions or picket-fencing, causing a "grungy" sound on regular stereo radios.

What those developing FMX did was to reverse the phase of the audio of the compressed subcarrier, and reduce its modulation level below several hundred Hz.

This, of course, limits the potential noise reduction, but reduces the interference. My tests at KBOQ were to demonstrate any diminishing of stereo quality by transmitting FMX to conventional radios.

How it works

In the FMX receiver, the compressed L-R subcarrier is demodulated and then compared with the uncompressed L-R, and an "adaptive" expansion of the signal is performed to restore it to the exact dynamics of the original L-R.

Then the difference signal can be mixed with the sum signal to derive quiet L and R channel audio, instead of the old-fashioned noisy L and R, with the hiss of the stereo subcarrier superimposed out of phase on both channels.

A terrific idea: add a few more mathematical twists to the FM carrier and get a nearly 20 dB reduction in stereo noise.

Everything is still compatible, including your SCA. All you need to hear the improvement is a new radio—old radios sound the same as ever.

I wanted to find out if that was true in the real world, and so I obtained an Inovonics stereo generator with the latest FMX circuitry, and audited the signal on two different NAD FMX tuners, plus all of my regular receivers.

Testing for multipath

In order to test the multipath characteristics of FMX, I used my mobile-radio equipped van.

I installed the FMX generator as an alternate stereo source to the KBOQ STL transmitter, switched in place of the Orban 8100A stereo generator by a passive composite relay.

The signal to the Inovonics unit was the preemphasized L and R audio output at the Orban unit "test" jacks, utilizing the exact audio processing of our regular programming.

The 75µ second preemphasis of the Inovonics generator was disabled by simply removing a plug in each channel on the main circuit board.

Thus I was able to precisely match the audio levels and peak modulation, verifying that FMX does not really change the modulation or loudness perceptibly.

In addition, it was not possible at the station's modulation monitor to hear any difference between the two systems in normal stereo.

Then I took two portable stereos into my van, each equipped with a fairly good FM stereo car radio.

On the road

I next drove around the Santa Cruz-Monterey peninsula to test the coverage of the main KBOQ transmitter, as well as the San Jose area to test the effect on the translator.

There probably isn't a topography in the country that is harder on FM stereo than the KBOQ reception area.

(continued on page 14)

Capitol Deal Still Pending

Hollywood CA ... Attempts to arrange a sale of Capitol Industries' broadcast cartridge business were continuing at press time.

Industry sources reported that Capitol may now be talking with as many as five interested parties.

As negotiations went on, production of Audiopak carts continued at the company's Winchester VA plant where at least two and possibly three shifts a day were said to be working.

Meanwhile broadcast cart and tape manufacturer Fidelipac, one of the companies interested in buying the rights and certain manufacturing assets and keeping the Audiopak line going, reported nothing new in the negotiations.

But Art Constantine, VP marketing for Fidelipac maintained that the company was still "cautiously optimistic" about completing an agreement.

Capitol Industries decided in December to withdraw its Capitol Magnetic Products Division from the magnetic base tape business, and close the Winchester plant down.

The decision was based on losses in the cassette manufacturing part of the business due to overseas competition. The broadcast cartridge line, although only a small part of the company, has managed to continue to make a profit, however.

Capitol Industries had tried to find a buyer for Capitol Magnetics previously, but without success.

However, when the company announced it would shut down the business, interest in the cartridge and cart tape business surfaced, and the company is now looking at offers from prospective buyers.

While the talks progress, sources report that the Winchester plant is maintaining production of Audiopak carts, relying on a store of raw materials, including back-lubricated tape.

Production on the cassette products, however, appears to be slowly winding down as the company prepares to consolidate that part of the business at its Jacksonville IL plant.

Broadcast distributors report that in spite of some initial fears by stations that they would be unable to obtain Audiopak carts, the product is still available, orders are being taken and carts are being shipped to buyers.

According to sources, Capitol intends to keep production of broadcast cartridges going and maintain a good store of the product while a sale is negotiated with a prospective buyer.

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Circle Reader Service 47 on Page 22

FCC Pares Expenses For 1988

by Alex Zavistovich

Washington DC ... At press time in mid-January, the FCC was trying to find ways to stay within a greatly reduced 1988 budget—\$99.6 million, down from an original \$107 million operating fund hoped for by the Commission.

FCC Associate Managing Director Marilyn McDermett said the Commission was engaged in a "scrubdown"—a decision-making process "to see what we can do without."

Roughly \$7 million was lopped off the Commission's budget for the 1988 fiscal year by Congressional action this past fall. Now McDermett and others in the FCC's Office of the Managing Director are examining ways to make ends meet, including furloughing some employees for several days without pay.

McDermett commented, however, that a furlough would come about only as a "last-ditch effort" to stay within the Commission budget. She also denied rumors of a possible reduction in force (RIF) of some FCC employees.

"RIFs don't save money" in the short term, she maintained, adding that FCC policy "has always been reduction through attrition."

Engineers Wages Up

Washington DC ... In 1987, radio station chief engineers earned an average salary of \$23,792; technicians earned \$20,105; and contract engineers earned \$7,966.

That is according to the NAB-Broadcast Financial Management Association (BFMA) Radio Employee Compensation and Fringe Benefit Report, which also indicated that the average salary for station GMs was \$45,511.

The report includes 34 tables compiled for various station and market sizes and for various station types: AM fulltime, AM/FM combination, FM and AM daytime.

The study also provides information on fringe benefits and average salaries for departments, department heads and support and sales staff.

Mark Fratrik, the NAB's financial research director, said the survey is designed to allow station management to place its company in relation to other stations in similar markets.

Generally, the survey shows that radio employees enjoyed a slight earnings increase this year over last year. The 1986 version of the NAB study reported that CEs earned an average of \$21,665, while technicians made \$19,527 and contract engineers took home \$7,010.

However, Fratrik cautioned that, while the study is useful in ranking a station's salaries and benefits, the study had a response rate of 23.5%, which means that only 2,075 stations responded out of the 8,837 polled.

Because of the response rate, Fratrik said "care should be taken in interpreting the data."

Although response to the study is up over last year's 21.5% return rate, Fratrik said the figure is still rather low. He sus-

(continued on page 14)

Things were not so bleak for the Commission last year, when the budget for fiscal year 1988 was first being hammered out.

In July the Senate's Federal Communications Commission Authorization Act of 1987 gave the FCC a budget of \$107,250,000. The legislation, introduced by Senator Daniel Inouye (D-HI) had also authorized the FCC an extra \$2 million for fiscal year 1989.

However, as McDermett explained, "authorization is not appropriation." By the fall of 1987, an across-the-board 2.54% cut was made on the floor of the House, and the FCC saw a \$7 million "negative adjustment" in its budget.

The budget cuts were not made solely in the FCC's operating funds, McDermett said. The House Appropriations Subcommittee slashed the budgets for all but three agencies under its purview.

At the FCC, McDermett said, belt-tightening has been complicated because 75% of the budget is earmarked for personnel compensation and benefits, and 12-13% is for "fixed costs"—rent, phone service, mail, and computer center operations.

The remainder, she added, is only "partially discretionary" income. That is, no one category of expenses can be done away with entirely.

"We can cut back on copying machines

or employee travel," McDermett said, "but obviously we can't get rid of it altogether."

Still, such reductions are under consideration, as are cuts in the purchase of technical and computer equipment. The Commission may also reduce its \$161,000 budget for trade publication subscriptions.

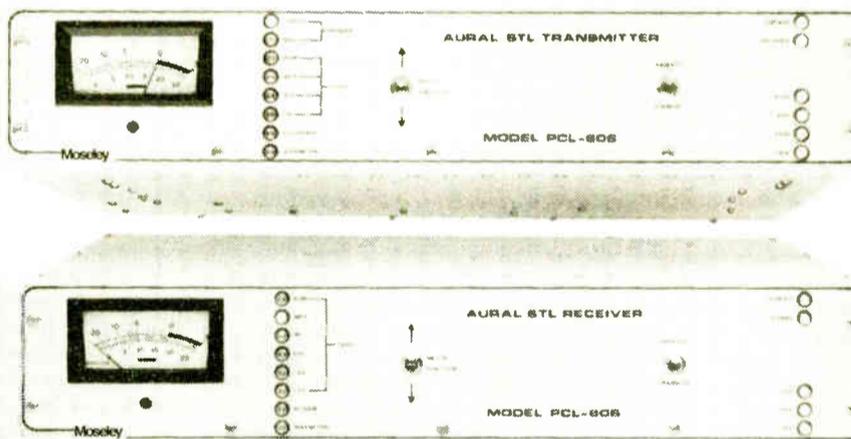
"It will be a tough year," McDermett admitted. "But the FCC will do its dead-level best to meet our mandates."

An operating budget was expected from the Commission before the end of January.

For additional information, contact Marilyn McDermett at 202-632-5316.



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FMX System Tested

(continued from page 12)

Rolling hills and coastal mountains, communities buried in valleys, and a fairly low transmitter elevation of only 1,000 feet, cutting off line of sight coverage for fringe listeners, can hinder reception of all the FM stations on our tower.

I knew intimately the spots between Santa Cruz and Carmel that harbor severe areas of picket-fencing and fuzz, and by means of my mobile phone I was able to call the studio and instantly switch the FMX in and out.

After days of checking about 50 locations, I concluded that FMX does not seriously hamper normal reception.

In only two locations did the addition of the FMX carrier increase the fuzziness

of the sound, and both spots were in such areas of bad multipath that the signal was already very unpleasant in stereo.

The car radio didn't seem bothered at all by FMX, but the cheap portable stereo *inside* the van needed to have its whip antenna moved around a couple of inches at one or two spots to achieve clean reception when FMX was turned on.

I drove over bad spots of highway with and without FMX, comparing picket fencing, always noticeable but not really the worse for the addition of FMX. It didn't seem possible while driving the vehicle to perceive if FMX was on or off.

At specific fixed locations, FMX didn't

seem to hurt the signal.

KBOQ sounded exactly the same on the Santa Cruz and Monterey cable systems, and the FMX encoding made it all the way through the cable system to the NAD receiver, reducing the noise.

Even over our San Jose translator signal with 1 W TPO, I was able to discern a quieting effect of FMX demodulation, though not as dramatic as switching to mono.

Easy to install

Installation of the Inovonics FMX generator from the Orban 8100A feed took no more than about 10 minutes with no changes to processing settings!

If you are not using an 8100A it may be a bit more complex, but it shouldn't pose any problems, as the Inovonics unit looks like any other stereo generator to the outside world.

The remarkable improvement offered by FMX is most clearly noticeable during announcing breaks, when the DJ's voice is heard against a nearly-silent background instead of the usual FM stereo hiss (almost as good as mono!).

So if you have a constant din of squashed sound with jocks talking over records, FMX never has time to work.

Public stations, talk formats, beautiful music and classical stations are the beneficiaries of FMX, not CHR.

Complex demod

Broadcast Technology Partners was also kind enough to let me try a frightfully complicated looking FMX demodulator board.

I put it in a Bud box and hooked it up to the baseband output of my Belar.

The result was perfect stereo and FMX sound at just the right levels.

Fortunately, the enormous partcount required for FMX demodulation will be reduced to a handful of ICs when the FMX chips are out.

Now we need those receivers with FMX chips!

Stephen Waldee is CE and PD of KBOQ-FM and CE of KOFY-AM, San Jose, and has been in broadcasting for more than two decades. He can be reached at 408-384-5755.

RADIO Classics

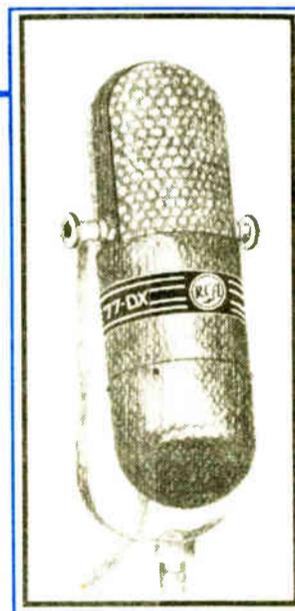
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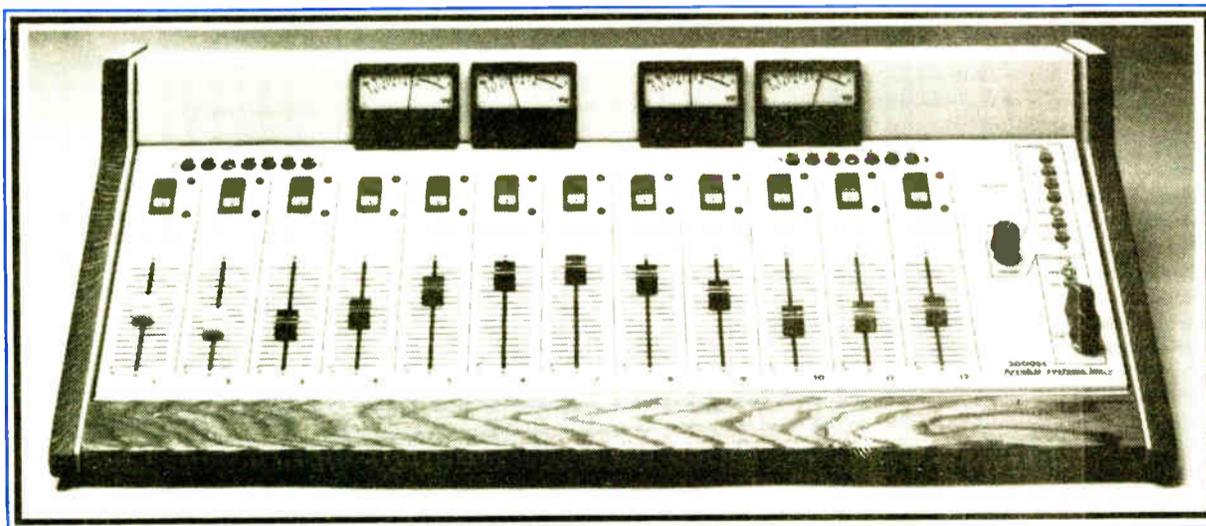


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Circle Reader Service 16 on Page 22

Salaries Up In Survey

(continued from page 13)

pected the study may have "a bias towards larger market stations."

After last year's study, NAB teamed with BFMA, a professional association of chief accountants and station managers, to beef up its return rate. For next year, the study will also take on the accounting firm of Price-Waterhouse, which Fratrick hopes will further improve the response rate.

With Price-Waterhouse's participation, Fratrick said, "We can assure that no one at the NAB or BFMA will see individual station data."

Other findings in the report showed news directors earn an average of \$19,459 and program directors earn \$25,162. General Sales Managers (GSM) reportedly earned \$44,097 in 1987.

Fratrick noted a similarity in GM and GSM average salaries—only a \$1,500 difference in the former over the latter. However, he explained this was due to reporting from some stations in which the two hats are worn by the same person.

The most common fringe benefit for station employees was group life, followed by surgical benefits and hospitalization.

A similar study conducted by NAB and BFMA for television stations in various market sizes showed that TV station chief engineers earned an average of \$40,464 in 1987, production managers earned \$29,395, and maintenance technicians had average salaries of \$25,082.

The average TV station GM makes \$90,650 yearly, while GSMs reportedly earn \$75,801.

Copies of the Radio or Television Employee Compensation and Fringe Benefits Reports are available from the NAB Stations Services Department, 1-800-368-5644. The price is \$40 for members and \$80 for nonmembers.

For more information, contact the NAB at 202-429-5350.

Stalking the Perfect Spare Part

by John "Q" Shepler

Rockford IL ... "I am a parts scrounger!" writes John Gaboury of Yuma, AZ. John is chief engineer of KJOK and KEZC.

He also seems to have perfected the fine art of parts scrounging, sending me a list of his choice finds and favorite haunts. I'll pass those along to you in this column along with some new ideas of my own.

First I'd like to pass along a note from an old friend, Jim Jones of Allied Broadcast Equipment, who says that his company has accumulated a large supply of parts and electronic junk from the estate of a deceased consulting engineer who never threw anything away.

Included is a pile of RF milliammeters, military surplus and General Radio test equipment dating back 30 or 40 years. Call Jim (317-962-8596) if you're interested.

This brings up an interesting approach to accumulating tubes, parts assortments and test equipment. Watch for estate sales of electronic hobbyists and professionals. Most of us have accumulations in the basement that won't go until we do.

Also keep your eyes open for going-out-of-business sales on TV and audio shops. An especially good source is someone who is fixing electronic equipment part time in his garage and decides to get out of the business.

A big shop may well sell the entire inventory to another shop. A moonlighter may choose to try an ad in one of the "shopper" newspapers or rely on word of mouth. Where else are you likely to find a tube tester these days?

Take the initiative

If you really want to flush out the dormant equipment around town, try running your own ad offering to pay cash for old radio and TV test equipment. Grandpa Smedley might just decide to cut loose his EICO scope for a couple of bucks.

Another group of people that always seems to be going in and out of business are musicians. Here is a prime source for disco and PA equipment at reasonable prices.

A friend of mine picked up some big Altec loudspeakers just by watching the newspaper ads. You can also find mixers, amps, reverbs and light shows.

When you are near a college campus, take a look at the bulletin boards. They are plastered with scrawled ads from students selling equipment to finance their educations.

Schools are also the best place to find clubs. There are Ham, CB, audio, radio and computer clubs, all with members who buy and sell parts and equipment. There will also be newspaper mentions of non-school clubs meeting in the community.

Scrounger's notes

Now here are some suggestions from John Gaboury.

Look in thrift stores, especially the Salvation Army. John just picked up a Thorens turntable with a 16" Shure arm for a dollar.

A week ago he found 5,000' of #18 wire for \$10, also some old stereos with 2 and 4 amp 24 V transformers for fifty cents

and a dollar.

Patio sales are also good. How about a working OS-8E/U oscilloscope for five dollars?

You may also find old video games filled with 7400 and CD 4000 logic chips and special sound effects chips. They go cheap once the kids get tired of them, which fortunately for scroungers, doesn't take long.

You might not like to get anywhere near a hospital, but they do use a lot of electronics and sometimes dispose of what isn't useful.

And, according to John, the local Arizona military bases often hold surplus sales. You know Uncle Sam buys only the best.

Q-Tips

Sometimes the only thing wrong with military equipment is that it has sat on the shelf too long and has been replaced by more exotic technology.

Army and Navy stores are along the same idea, but the military base comes to you. I've prowled around a few of these and found some interesting equipment.

One store in Seattle had a pile of very rugged rack mount electronics, most of which appeared to be receivers of some sort. Maybe you could convert one of these into a bullet-proof EBS or SCA receiver.

Parts feasts at fests

We've mentioned Hamfests. Other electronics groups also have swapfests, and even the routine flea market may have a lot more than fleas.

John picked up a Triplet 310 type meter for \$10 and a RE-15 mic in the box for \$25, among other goodies. I'm sure this more than paid for his gas, not to mention the fun involved.

Thanks for those tips, John. Your scrounging adventures have certainly turned up some valuable treasures. Now for some more possibilities.

Try church rummage sales. People will gladly donate things to a good cause that they wouldn't dream of throwing out and wouldn't go to the bother of selling.

Most of this stuff is in reasonable condition, although it might need a little work. Some possibilities are tools, cassette recorders that can be converted to air-check machines and various electronic equipment suitable for parts.

The highest bidder

If you know what you want and its value, and rather enjoy a little competition, auctions might be a good place to spend your Saturdays. With most auctions, you have a chance to look over the merchandise before the shouting starts.

That's the time to decide the absolute upper limit you'll pay for each item. If you just go with the flow, you can wind up paying new prices for used junk. Pick the limit and walk away when somebody bids over it.

Sometimes, you'll be pleasantly surprised at the lack of competition on your favorites. My best deal? A Crosley console AM/SW radio with pushbuttons. It was a neighborhood auction and I cheerfully paid the man with the cashbox one

dollar even.

Are you aware that computer and software stores sell transistors, integrated circuits and capacitors?

They also have uninterruptible power supplies, surge suppressors and ribbon cable, in addition to the computers and discs you would expect.

Unusual outlets

Hobby stores stock miniature lights, remote control transmitters and receivers, miniature copper tubing, thin sheet metal and dry transfer lettering for projects.

Ever hear of the company surplus store? Employees only and Saturday mornings only. But, ooooh the bargains to be found.

I used to follow my dad into the Micro Switch store to gather up baskets of slightly flawed switches, used but working fluorescent lights and miscellaneous office supplies.

Friends that have worked at the bigger electronics outfits tell of being able to get grocery bags full of chips and circuit boards for next to nothing.

Some of these companies even give away new parts and loan out test equipment to any employees who want to tinker at home. Makes your mouth water just to think of it.

Personal notes

In chuckling through John's letter, I remembered some earlier adventures of my own.

In HS, a bunch of us formed an outside radio club called the Mid-West Com-

munications League. Kind of a classy title, don't you think?

Back then, we had a lot more energy than money. We had no equipment to start with, but we did have a garage. We also secured the use of a pickup truck.

With that five guys went begging from TV shop to TV shop and filled that truck with TV sets, radios, boxes of used tubes and phonographs.

You will be amazed at what you can get for the asking. One field trip stocked up the MWCL for the rest of the school year.

We actually got some of the radios to work and then used parts from the other stuff to build projects from *Popular Electronics* and *Electronics Illustrated*.

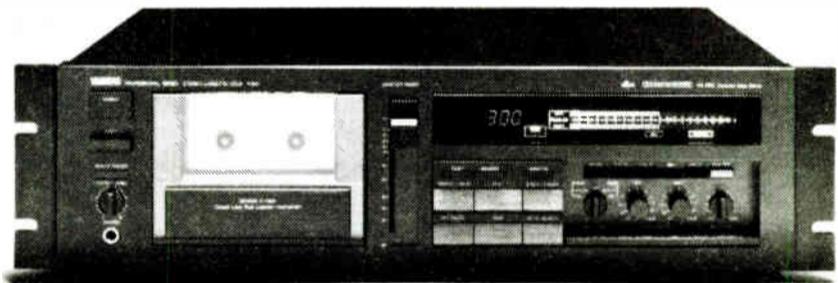
In the family

Another year my uncle Art, who was a radio officer in the Merchant Marine and a Ham operator, passed away, leaving an attic full of radio relics from the 20s and 30s.

My dad and I wound up with boxes of strange tubes that looked more like light bulbs, big coils wound with cloth wire and other collectables.

The most interesting device was a homebrew telegraph receiver that made dot and dash marks on a paper tape. I think Art was working on some automatic radiotelegraph equipment—50 years before packet radio!

I hope this inspires you to investigate the old homestead attic and perhaps look up some long lost relatives. Your flair for technical things probably goes *(continued on page 23)*



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Keeping On Top of EBS Rules

by Harold Hallikainen

San Luis Obispo CA ... Well, I think we've just about discussed remote control to death. The Commission is looking at issuing a "clarification" of the current rules.

Actually the rules appear to be clear but the Commission's interpretations of them cannot be readily derived from the rules themselves.

I've gotten a few calls regarding EBS, since many stations using nontraditional control points must take special precautions to insure the EBS rules are com-

plied with. Let's take a closer look.

The Emergency Broadcast System provides a method for the President and the Federal government as well as heads of state and local government to communicate with the general public [73.902].

There are several "program origination points" for EBS for each level of emergency. There are also several redundant paths for emergency programming to insure that all stations—as well as the public—are notified of the emergency condition.

Under the EAN—Emergency Action Notification of 73.931—in cases of na-

tional emergency the White House notifies the broadcast networks and wire services through a dedicated teletypewriter network.

The EAN message is passed by the networks and wire services to their affiliates and subscribers using their internal alerting facilities.

EAN messages received over wire services are checked with the authenticator word list, which is provided to wire service subscribers.

The broadcast stations that are network or wire service subscribers run the EBS attention signal followed by the ap-

propriate announcement from the EBS checklist.

Nonsubscribing stations receive notification of the emergency from their EBS receivers. Through this redundant network of communications all stations should be aware of a national emergency condition.

All broadcast stations are either "participating" or "non-participating". A participating station is one with an EBS authorization [73.913]. A nonparticipating station is one without an EBS authorization.

On receipt of a national EAN, participating stations are *required* to run the EBS attention signal, run the appropriate script from the EBS checklist and broadcast the "common emergency program".

The "common emergency program" feed is available from a Common Program Control Station (CPCS), one of the broadcast networks or one of the broadcast relay stations in the state relay network [73.933].

Non-participating stations are required to run the EBS attention signal, run the appropriate script from the EBS checklist, then remove their carriers from the air.

Insight on Rules

On termination of the emergency all stations follow the procedures in the EBS checklist. Participating and non-participating stations may return to normal programming.

State and local emergencies

Stations may participate in a state or local emergency broadcast whether or not they have an FCC EBS authorization.

That authorization refers to national EBS only. Further, stations may participate in state or local EBS "at management discretion."

The management discretion apparently comes into play once notification of a state or local emergency has been received [73.935(a) and 73.936(d)].

Under state or local emergencies each station is free to choose whether to participate or not for each emergency.

State EBS activations will generally originate with the state government. Local EBS activations will generally originate with a county office of emergency services or something similar.

Emergency notifications may also arrive from the National Weather Service or other such agencies. Although individual stations are authorized to activate the EBS at the local level [73.935(a)], I believe that this should be discouraged.

A local activation should occur on notification of a local emergency by some government agency responsible for the public safety.

If individual stations declare emergencies on their own it may reduce the effectiveness of the EBS, as other stations do not want to routinely turn over their programming, probably to a competitor.

Stations originating emergency programming should also not needlessly broadcast their call letters or other promotional information during the time that other stations may be rebroadcasting them.

The state EBS plan makes monitoring assignments for each broadcast station [73.932(a)]. This assignment forms a network of stations to carry common emergency programming.

(continued on page 18)



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* (Suggested List)

How To Secure a "Secure" Boss

by Tim McCartney

Boise ID . . . It was, indeed, a rare moment. At the same time I was seeking an engineering position, three job interviews soon materialized!

Adding to the unique situation was my current RW article which addressed a few of the difficulties I had seen in manager-engineer relations.

The suggested title "Manager-CE Horror Stories" was wisely improved by RW to "Aid Manager/Engineer Interface." The stories were printed as submitted.

It seemed safe to assume that the publication of this article at the same time as the interviews would serve to improve one's odds of being taken seriously by the GMs.

That assumption was off target. Instead, the article served as one of the primary barometers by which to judge the GMs.

In the first instance, the GM and CE both conducted the interview. Neither made reference to the article, so I assumed that they didn't read RW—at least, not recently.

As it turned out, the GM registered the world's worst listening skills. In subsequent interviews, he was unable to recall major aspects of my background be-

“ . . . the GM registered the world's worst listening skills.”

cause he had not paid attention the first time around.

It's truly amazing that he ever succeeded in selling radio time to anyone. He now serves as my ultimate stereotype of the former sales manager following the Peter Principle to the top.

Subsequent stories from that market proved that staying away was the right move.

Interviewing in the second underwhelming community on a grey day didn't do much on the inspiration scale. But the reason to stay away turned out to be (again) the GM himself.

Yes, he had read my article but his comments caught me by surprise. Yes, their station would truly enjoy the publicity that would come with hiring a RW writer, but . . .

The "but" turned out to be worries that horror stories from his station would end up in national print for all of his fellow GMs in the state to froth over as if it were a TV soap opera story.

I pointed out that the stories were not from my then-present position, but rather had been drawn anonymously from previous years of experience.

He then proceeded to take a swipe—of sorts—at my current GM, who he knew. He lamented that he "pitied" her because of the ridicule she must be facing as a result of the article. Yikes!

Out of curiosity, I asked my current GM her reaction to the article. She said it was fine, and she did not recognize any of the stories.

Why would a GM feel so fearful about stories written about others who had been protected by time, name, call let-

ters, community and state?

After considerable thought, I attributed this fear to insecurity on the job.

In the third case, the GM embraced the article I had written. He thought it was a balanced approach to manager-engineer problems and that it adequately presented the legitimate points of view of both sides.

After more time, it became clear that he was secure in his position due to his qualifications and job performance.

So an unexpected element—the article—helped in an important decision. Four GMs had a chance to comment: one did not, one was scared (insecure), and the other two felt totally unthreat-

ened (secure).

While the decision in this scenario was easy, most of us have been in other situations in which we have completely misjudged the new boss.

It is a colossal error to work for someone who later turns out to be insecure as a GM. Rarely do we need a job so badly as to put ourselves voluntarily at such terrific future career risk.

While the interesting options cited in this instance are truly unusual, the lesson learned can be carried forward to future job interviews.

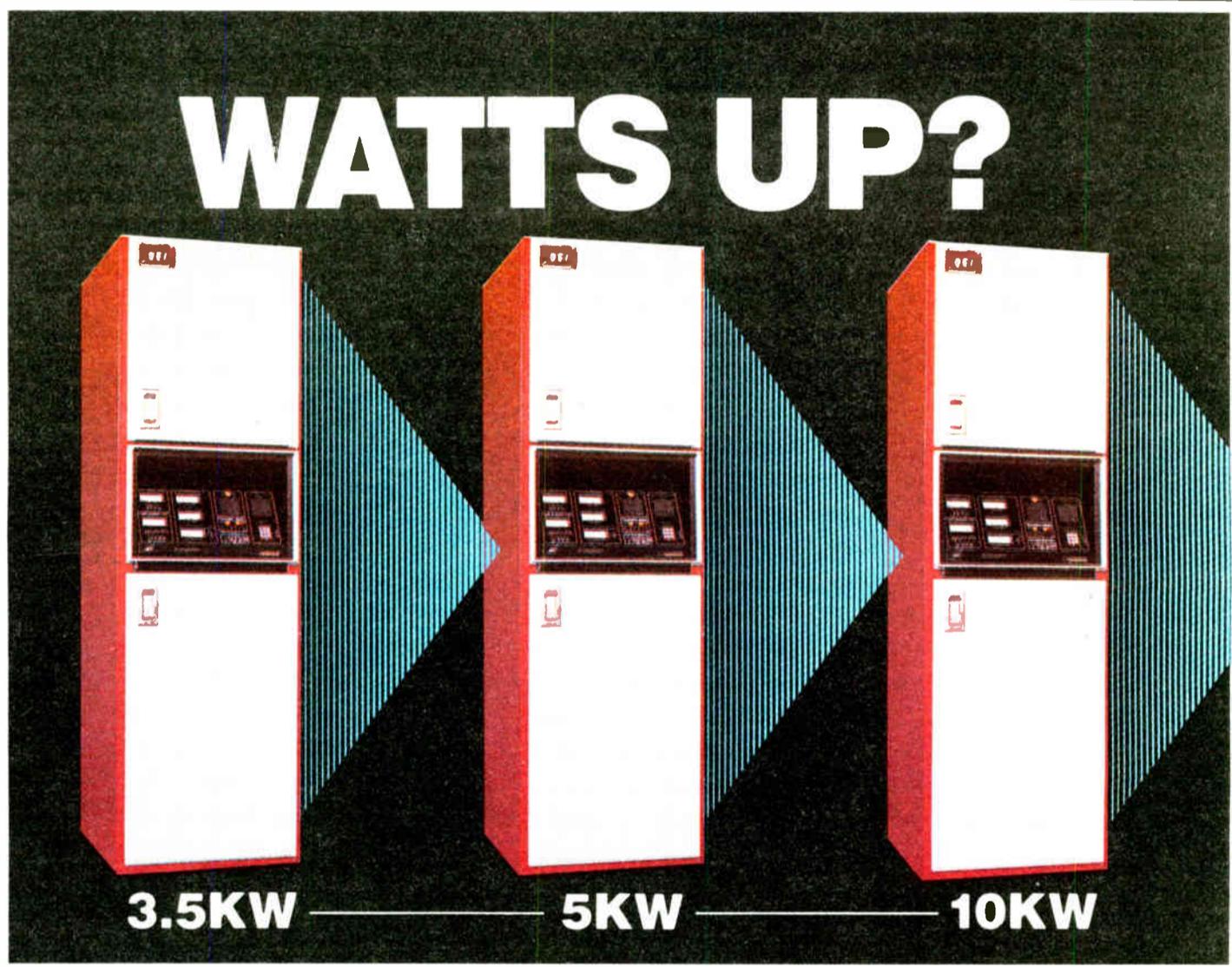
If you can somehow get at this "security or lack thereof" question, you may well have learned the single most impor-

tant character issue of them all.

Remember that an interviewer is not the only one being examined with a magnifying glass. The interviewee has just as much on the line. And, neither person will volunteer any "dirty laundry."

Security is an important issue—maybe the important issue—for you in any new relationship with a GM.

Tim McCartney is director of engineering and operations at KBSU, Boise State University. He is an SBE broadcast engineer, a former GM and has a masters degree in human resources development. He can be reached at 208-385-3760.



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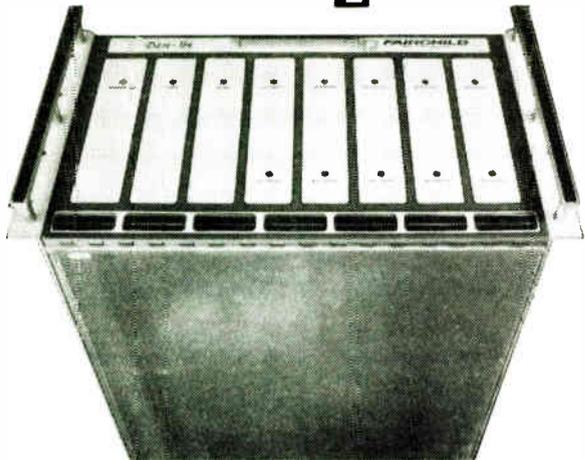
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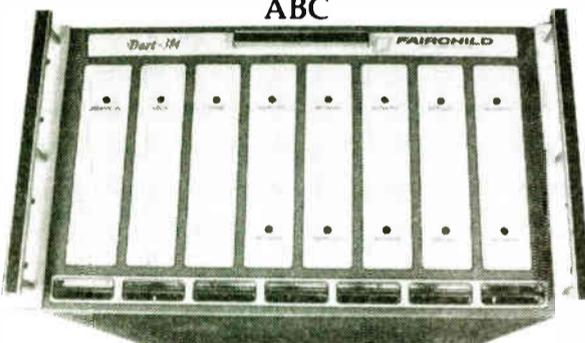
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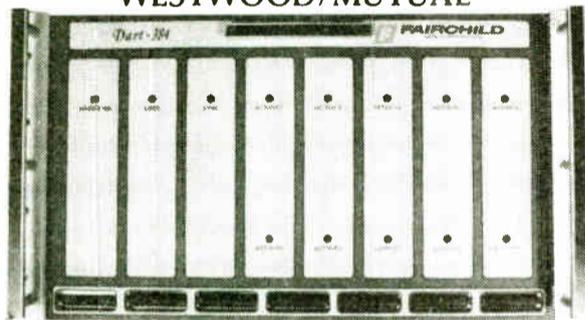
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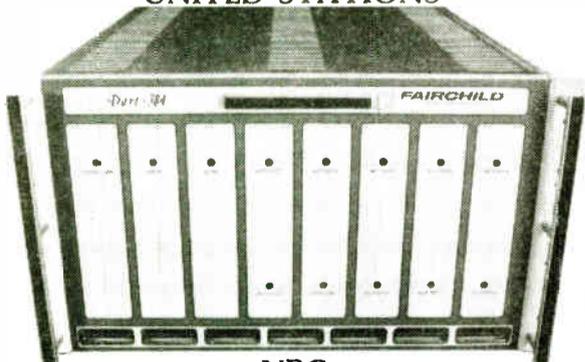
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EBS Rule Guidelines

(continued from page 16)

Each state network has an emergency programming origination station. A network of primary relay stations monitor the originating station or another primary relay station.

This forms the "backbone" of a network that can carry state or national emergency programming into each EBS operational area.

In each area, there are one or more Common Program Control Stations (CPCS).

The CPCS-1 station monitors the local primary relay station, introducing state or national emergency programming into the operational area.

Other CPCS stations (CPCS-2, CPCS-3) monitor the CPCS-1 station and take over program distribution into the operational area on failure of the CPCS-1.

Other stations in the operational area monitor one of the CPCS stations or another station that is monitoring a CPCS.

With these monitoring assignments, state or national emergency programming comes down the state relay network to the CPCS station, where it is relayed to the other stations in the area for rebroadcast.

In a local emergency the CPCS originates the programming, which is rebroadcast (at management discretion) by all the other stations in the operational area.

You may wish to check your local and state EBS plans to make sure your monitoring assignments make sense.

Required equipment

All broadcast stations (except NCE stations running 10 W or less) must have an EBS encoder (generator) [73.940]. These are generally FCC type accepted, although stations may build their own [73.943].

These are to generate an 853 and 960 Hz tone (± 0.5 Hz). The distortion of each tone is to be less than 5% at the output of the encoder. On activation they are to send the tones for 20 to 25 seconds.

The encoder is also to include an indicator that shows whether the generator is activated and a switch guard that prevents accidental activation.

Each tone must modulate the transmitter at least 40% and the tone levels must be within 1 dB of each other [73.906(c)]. This may require you to place the EBS encoder after your audio processor.

My favorite EBS encoders include a "program loop through" relay that substitutes the EBS tones for programming when the unit is activated. This is simpler than requiring an operator to bring up the appropriate input on the board.

Note that except for class D NCE sta-

tions, all stations must have an EBS encoder, even "non-participating" stations.

All stations must have an EBS receiver [73.932]. It must be capable of receiving the EBS attention signal and emergency programming transmitted by other broadcast stations.

The receiver can be either continuously monitored by station staff or can be equipped with a muting circuit that activates the speaker on receipt of the EBS attention signal. The EBS receiver and decoder need to be FCC certified.

Testing EBS

All stations are required to run an EBS test once a week at random times between 8:30 am and local sunset [73.961(c)]. The test consists of running the EBS attention signal along with a test script from the EBS checklist.

Class D NCE stations need not run the EBS tones, since they are not required to have the EBS encoder.

You should be receiving an EBS test once a week from your monitoring assignment.

All EBS tests transmitted and received should be logged in the station log.

As part of the designated chief operator's weekly review of the log, a check should be made of compliance with the EBS test transmission and reception requirements.

You may operate without an EBS receiver or generator for up to 60 days.

The date and time of the equipment removal along with a notation as to why transmission and reception tests were not completed must be recorded in the station log [73.932(d)].

If you are unable to get the equipment working within 60 days, an informal request can be filed with the engineer in charge of your radio district for additional time.

In the control room you should have the EBS checklist and a red envelope containing the EBS authenticator list.

Making any system as large as the Emergency Broadcast System operate reliably is difficult.

However the EBS may be the only method of notifying the public of an emergency. As part of your responsibility for the technical operation of the station make sure that your EBS equipment and procedures are ready.

Next month we'll look at the "station log." Many people think the FCC eliminated logs. They still exist in 73.1820 and, hopefully, at your station.

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

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Circle Reader Service 35 on Page 22

Source-Induced FM Multipath

by W.C. Alexander

Part III of III

Dallas TX . . . In the last installment, we discussed vertical plane nulls, their significance and the problems likely to be experienced in the null zones.

In this part we'll look at source-induced multipath, some of its causes and cures.

We discussed in Part I the causes of obstruction-induced multipath and some of the things that can be done to minimize it.

Unfortunately, obstruction-induced multipath is a fact of life in urban areas and most of the time we have to live with a certain amount of it.

Source-induced multipath is a different story. It is, as the name implies, generated at the source.

Different causes

Common causes of this type of multipath are all antenna or antenna system related.

Standing waves in a transmission line can be a prime cause of source-induced multipath. Stereo stations are more susceptible than are mono stations, and stations with subcarriers are more prone to experience the problem than stations with no subcarriers.

Over the years I have experienced situations in which FM stations were having trouble with multipath in places where there should not be any.

Weeks of signal measurements and experiments told me virtually nothing,

until I turned the subcarrier off.

A Class B station in Detroit was using a 67 kHz subcarrier in addition to the 38 kHz and 19 kHz stereo subcarriers.

Multipath was showing up in places that were within five miles of the transmitter site and completely in the clear with no obstructions to explain the multipath.

“

Weeks of signal measurements and experiments told me virtually nothing, until I turned the subcarrier off.

When stopped at a traffic light and in a multipath area, I inched forward in the rental car looking for the null in the signal.

Interestingly enough, at the worst place in the null, I could hear the programming of the subcarrier coming through the speakers!

I stopped and called the station engineer and had him turn off the subcarrier for a few minutes. Returning to the same spot at the same traffic light, I inched forward again looking for the null.

But it was gone. I could not only no longer hear the subcarrier programming, but the noise was completely gone as well. It was like listening to a new radio station!

The realization that the subcarrier and the multipath were related led me to experiment with a number of things, including subcarrier modulation, injection level and even to check crosstalk (which proved to be acceptable).

Eventually, activity in the PA screen current caught my interest. The reflected power was less than one percent, so I

had not considered the antenna to be a factor.

But screen activity can only mean two things: either the PA is out of neutralization, or the load impedance is changing with modulation.

After the neutralization checked okay, the only thing left was the antenna.

The antenna manufacturer was called in, and using the techniques described in the previous series of articles, the antenna was tuned to resonance with

a slug in the matching section.

After the antenna tuning the screen current settled down nicely. No modulation was visible in any of the transmitter meter readings. And the multipath was gone, even with the subcarrier on.

Since that time I have done some research on the causes and cures of source-induced multipath, and it always brings me back to the same place: the antenna system.

Reflected power

It would seem that reflected power in a system—even a small amount that might be considered “normal”—causes sideband distortions in the baseband signal.

I believe that this happens when reflected energy in the sidebands reflects from the antenna back down the line to the transmitter, where it is reflected back up the line to the antenna.

In the antenna the reflected sideband energy, which has now made three trips along the length of the line, recombines with the other energy and causes sideband distortion.

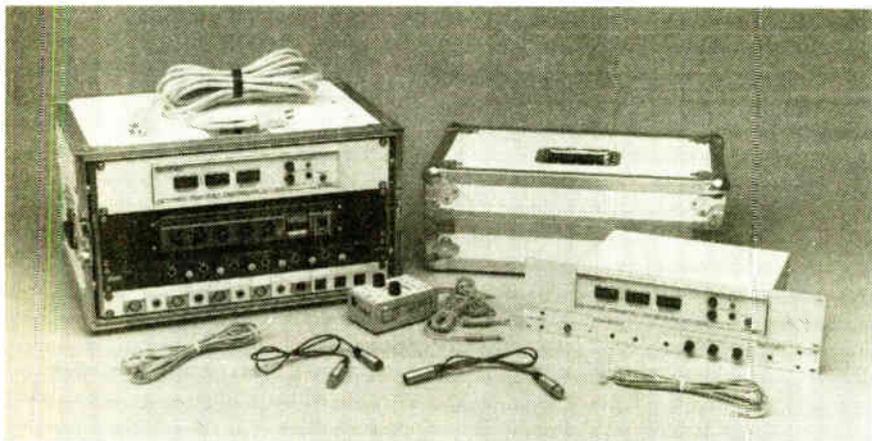
The result of this sideband distortion is tremendously increased sub-to-main crosstalk and what otherwise sounds

(continued on page 23)

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CAD Eases Station Project Tasks

by John Bisset

Manassas VA ... Perhaps the biggest pitfall in any studio or transmitter installation project is the lack of adequate documentation.

It's not that we engineers don't have good intentions, but somehow we never have the time or the manpower to produce detailed wiring diagrams, wire running lists, or equipment layouts.

As more station managers get burned by having to pay a contract engineer to decipher a previous engineer's lack of documentation, the issue of adequate station documentation becomes more crucial.

Although there is no argument that adequate documentation is needed, the time required to prepare an extensive documentation package must be passed on to the customer.

Depending on the project, these costs can tilt the profit/loss balance away from the profit side.

Enter CAD

Most of us are aware of the way Computer Aided Design (CAD) systems have revolutionized the design of products; however, few of us have the resources to invest in such elaborate software—to say nothing of the hardware costs.

Although low-cost or bootleg CAD systems are available for the less expensive PC's, a company called Video Design Pro has taken its system a step further.

In software for audio (and video) installations traditional CAD programs are available; but also offered is an equipment data base.

This software supports architectural plans and studio design, system block diagrams, cable run lengths and layout, console cabinetry design and layout, rack equipment location and placement, as well as cable identification labelling.

Creating an "image"

The uses of such a package are limitless. Consider it in terms of sales tools. An initial system floorplan included with

“ “

The length of time required to create the system ... would make a draftsman shudder.

an engineer's proposal achieves two goals.

First, it signifies your professionalism—this is no fly-by-night contractor. Second, it provides your client with a visualization of the completed project (see Figures 1 and 2).

The system will produce these drawings on familiar 8½×11 sheets, rather than the large D-size blueprints, with no loss of detail. In this fashion, they can be easily included with your proposal.

The length of time required to create the system illustrated in Figure 1 would make a draftsman shudder. The AudCad system makes such drawings effortless.

Equipment is selected from the system's data base, placed on the drawing,

and labeled (i.e. CART-3). In addition to the system's database of both video and audio equipment, customization is also possible.

Take, for example, the creation of a patch bay. The steps are illustrated in Figure 2.

Not only can the system provide patch bay designation strips and coordinate patch bay jacks with master wiring documents—numbering and identifying each patchbay cable—the system can also be used to provide specific milling instructions for custom metal work requirements.

An extra advantage is the ability to save each custom drawing. Once your customized patch bay is completed, it can be recalled again and duplicated for each studio. Documentation time is dramatically reduced.

Rack drawings are equally simple to prepare. The components that will be placed in the rack are loaded from the system library. A mouse then places them where you wish. The rack markings simplify equipment placement, as in Figure 1.

Component shuffling is effected by either erasing or moving the equipment in question. Such drawings, when plotted life-size, make ergonomic planning easier.

Equipment location problems can also be detected before the components are screwed in place.

On how many studio projects have you either over- or under-estimated your cable requirements? The CABLE-DOC software permits calculation of cable

lengths.

An extensive choice of documenting methods includes the creation of custom cable identifying labels.

Difficult tasks

Although system flow diagrams are helpful, especially when using entry-level technicians to perform some of the wiring, to place *all* of the components on one drawing used to be nearly impossible.

AudCAD permits each component to be placed on the screen, with the required cable connections shown as well. Such a detailed document aids in wiring and interconnection and also provides a complete bill of materials.

And where a specific component or group of components is used, that cluster may be saved and repeated again and again.

The system is designed to operate on an IBM-PC or PC-clone. One which runs on the Apple MACintosh is about to be released.

High definition monitors and plotters are also available from Video Design Pro.

One of the best features of the system is its price. The AudCAD software costs under \$1,000, and the CableDOC software costs \$650.

John Bisset has worked as a contract engineer and CE. Most recently, he joined the broadcast marketing department of Delta Electronics, Alexandria, VA. He can be reached at 703-345-3350.

Video Design Pro is located in New Mexico and can be reached at 505-524-8959.

Figure 1.

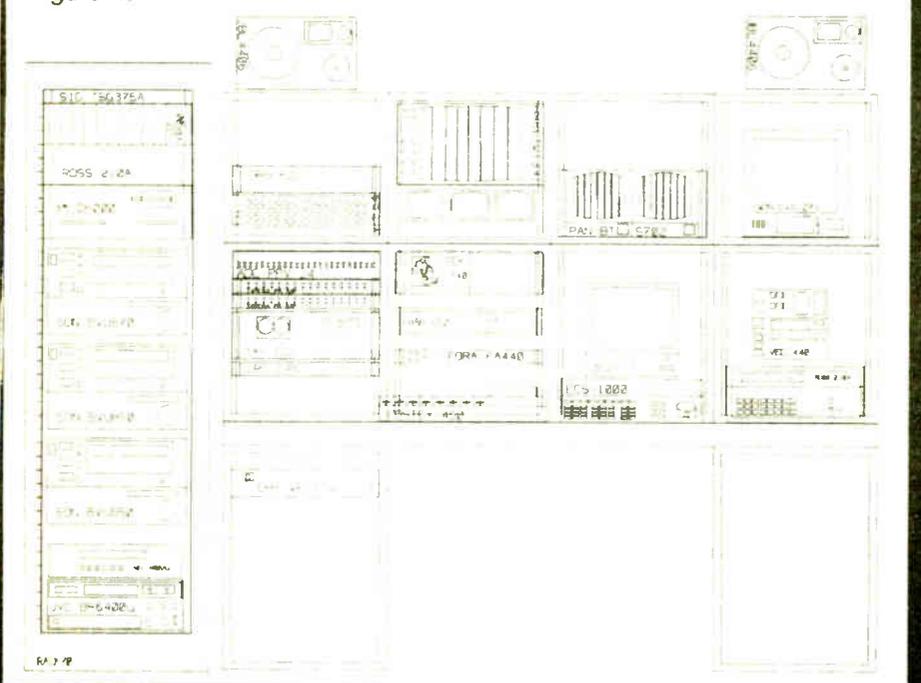
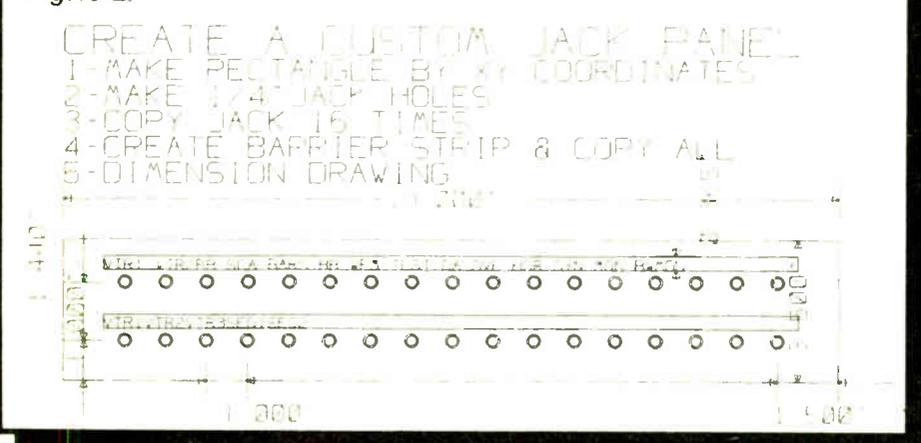


Figure 2.



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BROADCAST COMPUTING

Stop Computer Time-Sharing

by Peter Burk

Pepperell MA ... Didn't time-sharing go out with button-up shoes? Seems like many of the engineers I talk to have to fight accounting or sales for a little time on a personal computer.

Can you justify a machine strictly for engineering? You can if you present the package in terms of benefits to the station. Computing pi to 115 places or printing lists of prime numbers may light your fire, but a bottom-line oriented GM isn't so easily swayed.

Let's spend a few minutes looking at some of the tangible benefits we can expect from a PC.

If your station has any RF projects under way or anticipated, you've got an instant need to perform many tedious calculations.

You'll still want to rely on the expertise of your consulting engineer, but quick, approximate answers are often all you need to help keep you on track.

STL paths and new FM antennas are two good examples.

Station upgrades

Armed with topo maps and a distance and bearing program, you'll be all set to calculate a proposed STL shot, complete with fresnel zone clearances, path loss, transmission line losses and fade margin.

For FM antennas, selecting the proper size line and comparing antennas with different gains and power handling

capabilities are quickly accomplished, again with off-the-shelf software.

Even your daily RF operation benefits from a personal computer. High power stations especially need to be careful about replacing final tubes. Too soon wastes money, but wait too long and reliability suffers.

Tracking tube performance on a PC is

“ Even your daily RF operation benefits from a personal computer. ”

easy, especially with a spreadsheet such as Lotus 1-2-3. Correlations between filament voltage and tube life are especially apparent.

Some tubes can be stretched for many extra hours if they are operated as little as three percent below rated filament voltage.

Watching efficiency tail off is a dependable sign that the tube is reaching the end of its useful life. This is easy to monitor if you enter the values into your spreadsheet regularly and plot the results.

Better yet, if your remote control has an RS-232 output, you can collect all the

data you can possibly use right from the studio unit. A 1-2-3 macro can be written that will load the data, analyze it, then provide you with actionable results, all with a single command.

Maintenance logs

Want to reduce maintenance costs while improving reliability? A database manager such as dBase III plus can go a long way toward organizing your preventive maintenance program.

Every time you work on a piece of equipment, you can quickly see what work has been performed on it in the past and even what parts are on hand. Cart machines can be tracked by serial number through on-air to production rotations.

By keeping accurate, cross-indexed records on every piece of gear, it becomes easy to spot when it's time to replace something.

The owner or GM may not sound overjoyed at the thought of buying a new unit, but with the advance notice you can give, at least there won't be any surprises.

Documentation on the station wiring can also be handled nicely with a database manager. To/from lists can be kept

in each room and easily replaced with new printed copies any time changes are made. Details such as color codes, signal names and levels can all be kept neatly and efficiently.

We've just scratched the surface here. You can probably come up with many more ways your station would benefit from an engineering computer.

Which one should you buy? Match the machine to your needs, but make sure it can grow with you. Spend some time talking to other engineers before you decide, and if at all possible, visit several computer stores. Most will demonstrate the software you are interested in and let you operate several competing computers.

Can you make the sale? Armed with a list of practical benefits and some well-researched product literature, you're much more likely to make your point.

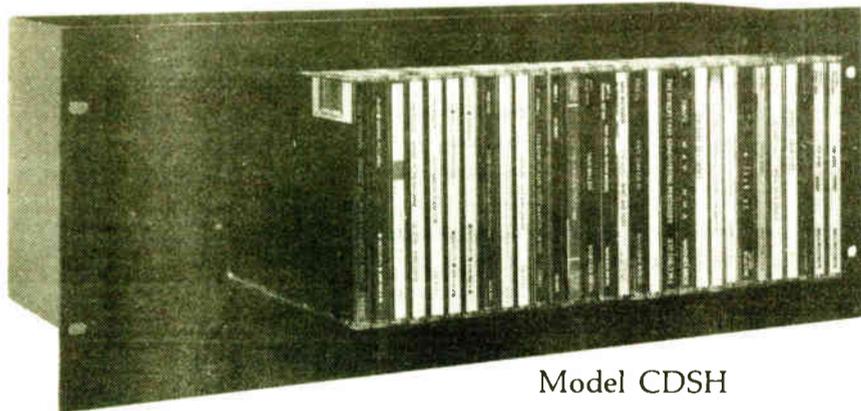
If the phrase time-share still creeps into the conversation, mutter something about a vacation home on Hilton Head and wait for another day.

RW welcomes your contributions to Broadcast Computing. Peter Burk is president of Advanced Micro-Dynamics. He can be reached at 617-433-8877.

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Go To the Source of FM Multipath Woes

(continued from page 19)

like multipath.

Some types of antennas and matching schemes seem to be more susceptible to this phenomenon than others.

Antennas that use matching transformers and 50 ohm bays seem to have more trouble than the matched feed point type of antenna.

This is probably due more to the characteristically narrower bandwidth of this type of antenna than anything in the antenna itself.

Other causes

I have seen things other than the station's antenna system cause source-induced multipath.

Sometimes, in situations where another station is operating into a panel-type multi-user antenna, the filters that are used in the combining equipment can cause problems for stations operating in close proximity.

I believe that the cause is the same as in the situation presented above, but it is occurring in someone else's antenna instead of the station's own antenna.

Curing this type of problem is considerably more difficult and expensive than curing a similar problem caused by a station's own antenna.

Since there is another station involved (and probably several), diplomacy is the word of the day.

System defense

It is probably necessary to retain a qualified consulting engineer, preferably one familiar with the exact antenna design in question (or from the antenna manufacturer), to document and suggest cures to the trouble.

Some down-time is to be expected for all stations using the antenna, as precise signal measurements in the offending system will be necessary.

The best defense against source-

induced multipath is to have a matched system from transmitter output connector to antenna bays. A broadband antenna will help.

Also, proper transmitter operation is essential because any condition that increases the amount of crosstalk in a system will contribute to this type of problem.

If you are having problems with multipath that are seemingly out of nowhere, take a careful look at your antenna system. Chances are, the solution to your problem is right in front of you.

W.C. Alexander is Director of Engineering for Crawford Broadcasting Company, and a horror fiction novelist. He can be reached at 214-445-1713.

Spare Parts Scrounging

(continued from page 15)

back many generations.

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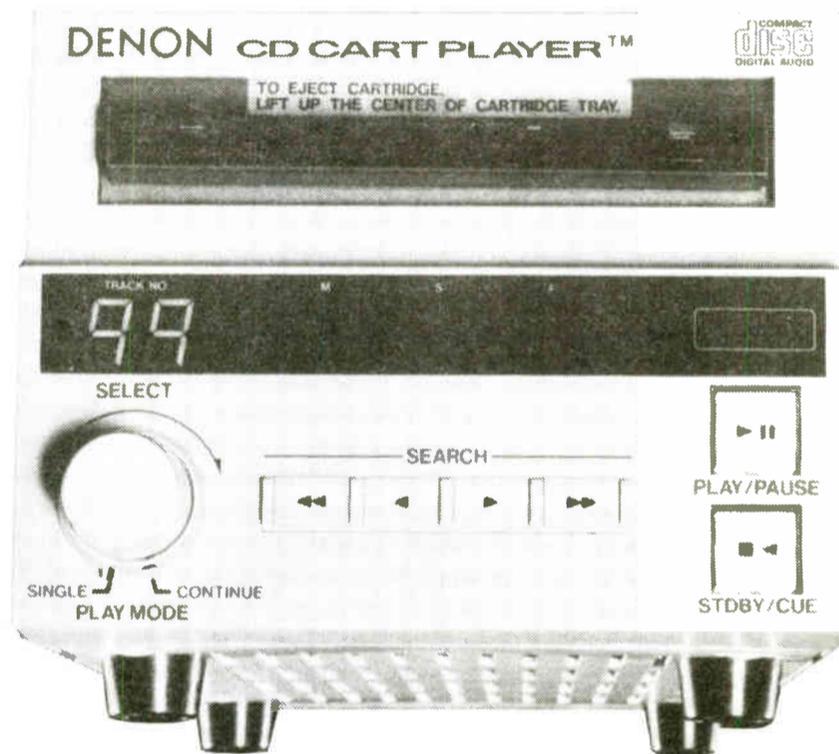
John Shepler is an engineering manager, broadcast consultant, writer and regular RW columnist. He can be reached at 815-654-0145.

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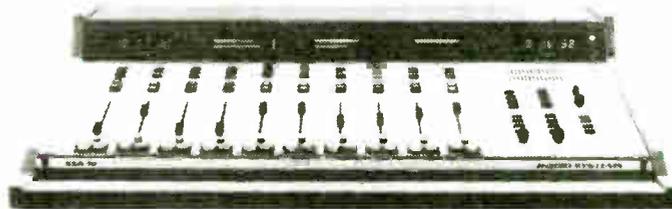
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Pacific Recorders SDA-8 stereo rack mnt DA's, (4); PR&E LSM-10 line switcher, BO; Crown D-60 stereo power amp, BO. B Royster, KQM Bdctg, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

Crown DC300, vgc. \$300; Crown D150, gd cond. \$200 plus ship. W Laughlin, KDCV, 2636 N 56, Lincoln NE 68504. 402-466-8670.

Kenwood KA-5700 integrated amp, 40 W/ch, \$135. R Streicher, 545 Cloverleaf Way, Monrovia CA 91016. 818-359-6012.

Ampex 620 speaker amp, (3), \$375/all or \$150 ea. Mr. Oliver, 212-874-0274.

Dynaco Stereo 70, \$150. Mr. Oliver, 212-874-0274.

Hafner P225 power amp, \$350; Hafner DH110 preamp, \$250. H Underwood, Underwood Audio, 1909 Tree Corners Pkwy, Norcross GA 30292. 404-449-5502.

Shure M64 phono preamp, \$50. P Cibley, Cibley Music, 138 E 38th St, NY NY 10016. 212-986-2219.

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Dynakit 70 stereo, \$75; Ampex 620 spkr-amp, \$100. L Oliver, 304 W 89th St, NY NY 10024. 212-874-7660.

Langevin AM16 preamps, rack of 12, excel cond w/manual, \$450; Langevin AM17 (5) program amps, excel cond, w/books, \$100 ea. R Estes, 11557 Sunshine Terr, Studio City CA 91604. 818-769-6569.

Ampex 620 speaker/amp; newer 1969 model w/BL speaker, \$75. M Matthews, Rockwell, 3318 Shield Ln, Garland TX 75042. 214-996-5844.

Sparta MAS-50 (2) 50 W monitor amps. M McKenzie, KALL, 312 E S Temple, Salt Lake City UT 84111. 801-364-3561.

Belar AM RF amp, \$250. J McGinty, WEKC, Jackson Mall, Williamsburg KY 40769. 606-864-7843.

RCA BA-40 dist amps (3), as-is, \$45 ea. M Holladay, WCOS, POB 748, Columbia SC 29303. 803-256-7328.

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Towers, (2) 310', 5' face single guy level, has insulated guys; 190' utility tower 2' face; 240' angle tower 3' face; 6 bay Phelps Dodge CP antenna w/radomes; 4 bay Phelps Dodge CO antenna; 6 bay RCA CP antenna; (300) 3" Andrews Heliac; also tower erection equipment for heavy & tall towers. Southern Tower Service, 804-539-8365.

Harris FMS-11AC 11 bay center fed w/radomes, 96.1 MHz, \$5000 FOB OKC. B Lockhart, KXXY, 101 NE 28th St, Oklahoma City OK 73105. 405-528-5543.

ERI FM 3 bay directionalized, handles 50 kW, separate hor & vert elements arranged in cantelabra, cardioid pattern, you pick up, BO. J Seaman, WQPO, Box 752, Harrisonburg VA 22801. 703-434-0331.

Dielectric 5000 coax switch, brand new, BO. J Guber, WVOK, 236 Goodwin Crest Dr, Birmingham AL 35209. 205-945-4646.

Phelps Dodge ECP xmtg antenna for 94.3 MHz, w/assembly diagram, \$1000. T Dufresne, Foster Comm, 1 City Hall Plaza, San Angelo TX 76903. 915-653-3387.

Heliac, 300' of 1-5/8", 5ft. T Dufresne, Foster Comm, 1 City Hall Plaza, San Angelo TX 76903. 915-653-3387.

Comark 3" xmsn line, 4 pole, \$1500. J Whitney, WPXY, 55 St Paul St, Rochester NY 14604. 716-325-5300.

Comm Products 3-1/8" transmission line, 20' sections. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

Anixter-Mark P4120GRN grid type dish, 10', less feed; (2) Anixter-Mark P472GRN grid type dish, 6', less feed; Anixter-Mark 450-470 feed for 6" dish; Phelps Dodge 1 bay educ CP FM antenna at 100.9; Powerstate 3 phase 20 A Variac; Triad Ultrad transformer 230 V; pri, 3000 V 0.5 A sec; (6) Bird 4230 wattmeter line sections, N connectors \$25 ea. J Hunter, KBRE, Box 858, Cedar City UT 84720. 801-586-5273.

CSP 1000 W 50 ohm dummy load, \$200/BO. R Dietrich, WAMQ, 411 7th Ave, Pittsburgh PA 15219. 412-471-2181.

Jampro JSCP 12 bay w/heaters, 105.1 MHz retunable to any higher freq, \$10,000 plus ship/handling. D Booth, KMJX, 11300 Rodney Parham, Little Rock AR 72212. 501-224-6500.

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Celwave 4 bay, class A 3 kW tuned to 101.7, \$2500 + move & shpg. J Chunn, KKIQ, 1603 Barcelona St, Livermore CA 94550. 415-455-4500.

Phelps-Dodge CFM-10 on 96.3 & 528' of Cablewave 3-1/8" transmission line, BO. M House, KLLL, 1314 50th St, Lubbock TX 79412. 806-763-1911.

Jampro 2 bay FM, 92.1 MHz, excel cond, BO. B Mishkind, KFX, 3222 S Richey, Tucson AZ 85713. 602-748-1450.

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Accuphase T-100 stereo tuner, \$195; Technics ST-9030 stereo tuner, \$165. R Streicher, 545 Cloverleaf Way, Monrovia CA 91016. 818-359-8012.

Eventide RD-770 w/dbx, 2 chan mono/stereo rec/rep w/dbx for eliminating cart phase error; Fidelipac 300 & 350, music lengths; AKG BX20E1, transmission line reverb, 2 chan w/remote, excel cond; Orban 516EC, 3 chan unit. B Matta, 5001 Baum Blvd, Pittsburgh PA 15213. 412-683-2020.

Fairchild 664NLS (2) equalizer modules, BO. P Cibley, Cibley Music, 138 E 38th, NY NY 10016. 212-986-2219.

Shure M62V Level-Loc, gd cond, \$50. E Helvey, Helvey Prod, POB 1357, Winchester VA 22601. 703-877-1191.

Studio Tech Echoplate II, \$800/BO. M Fiedler, Mahoney-Fiedler Prod, 5346 Dupont Ave S, Minn MN 55419. 612-822-0013.

Shure Level Loc, cond unknown, looks gd. \$75; McCurdy dual row tip-ring-sieve patch bay, to solder trees, 2 sets, \$100 ea. R Dietrich, SBN, 411 Grande Plaza, Pittsburgh PA 15219. 412-471-2181.

Shure Voice Masters excel cond, one has rack mount, \$150/both. M Banks, WSTH 208 Main, Alexander City AL. 205-234-2566.

dbx 216 16 chan NR system (2) w/spare modules/16 chan system, \$2000 ea. P Costa, Eastern Snd/Video, 462 Merrimack, Methuen MA 01844. 617-685-1832.

UREI 533, mono graphic audio EQ, excel cond, \$200. L Bergman, Universal Snds, POB 18716, Spokane WA 99208. 509-328-0766.

Tascam MH-4Q 4 ch headphone amp; Eventide BD955 digital delay; Ramko DA-6RIE 6 ch DA; UREI 545 parametric EQ; Collins 26-U2 compressor. M McKenzie, KALL, 312 E S Temple, Salt Lake City UT 84111. 801-364-3561.

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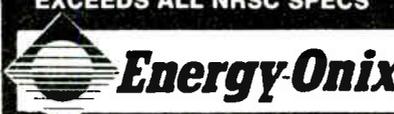
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Lapp 2912 tower insulator, 24" high, BO. W Heizer, 7830 Heizer, Wisconsin Rapid WI 54494. 715-423-3667.

Cablewave FLC78-50S TCC (2) connectors, new, BO; Cablewave FLC78-50J, 6' section, new BO. L Seidenderg, WSCT, POB 1350, Aberdeen NC 28387. 919-944-1350.

Tower, 980', solid leg zone A w/guy wires on ground; Continental ERI 12 bay CP antenna 93.1 MHz. L Dupree, KQID, 318-445-1234.

Andrew 83799 1-5/8" fittings EIA flange for Andrew HJ7-58 heliac, \$69 ea. W Foster, WBBK, POB 762, Blakely GA 31723. 912-723-6628.

Pi-Rod tower, 430', 24" face, galvanized & painted, \$12,000 plus ship/handling. D Booth, KMJX, 11300 Rodney Parham, Little Rock AR 72212. 501-224-6500.

RCA TFU 24DM UHF ant on chan 41, \$5000; Emcee UHF corner reflector antenna 10 gain, \$200. C Haynes, WJMI, POB 31235, Jackson MS 39206. 601-948-1515.

Jampro 25 kW harmonic filter, BO. G Kippel, KAMB, 90 E 16th, Merced CA 95340. 209-723-1015.

Trusscom 254' self-supporting tower on ground, near Des Moines IA, w/all bolts, lighting, base insulator, etc, install plans avail. J Hanson, KFMD, 100 Court Ave #103, Des Moines IA 50309. 515-282-1033.

Approx 3-L's & 550' o rigid, 70 ohm, 2 bays, BO. M Banks, WSTH, 208 Main, Alexander City AL. 205-234-2566.

Tower, coastal Maine, 341' above sea level, can include 21,000 sq ft of bldgs w/security, etc, lease or buy. G Jodoin, POB 231, Manchester NH 03105. 603-669-5710/883-7903.

Gates antenna shunts (2) w/meters, gd working cond, \$40 ea/BO. E Hudson, WIYD, 900 River St, Palatka FL 32077. 904-325-4556.

AM sampling line/isolation coil, w/weather proof enclosure, \$200; also one additional weatherproof enclosure, \$50. R Topp, KOLM, 1220 4th Ave SW, Rochester MN 55902. 507-288-1971.

Phelps Dodge 12 bay, 106.7 FM, 1000', 3-1/8" rigid transmission line, on ground, BO. J Sorensen, WJQY, 2100 NW 21 Ave, Ft Lauderdale FL 33311. 305-484-8107.

Rohn 45G 260' 18" face, w/light package & cable, gd cond, \$2900. A Saks, WAGP, POB 119, Beaufort SC 29901. 803-525-1859.

Harris/ERI FM8-8 FM antenna 67/33 power split, set for 101.9. M Fiedler, KCOR, 1115 W Martin, San Antonio TX 78207. 515-225-2751.

Harris FMH-12AC CP 12 bay FM, 92.9 MHz, salvage as replaced due to ice damage, \$1000. D Weisenberger, Crawford & Co, POB 581, Bismark ND 58502. 701-258-2090.

Andrew 1304-2 4-bay hor FM, \$200; Phelps Dodge 1 bay FM, \$400. John, 315-487-2393.

Fittings for 3-1/8" hard line, 90's, 45's, T's, BO. J Scaggs, KGNZ, 542 Butternut, Abilene TX 79602. 915-673-3045.

Scala MF960 miniflector STL antennas (3), gd cond, 2 yrs old, \$175/BO. J Torsitano, KARZ, POB 1918, Redding CA 96099. 916-244-2600.

Want to Buy

S-A QCS-4 quad stack receive antenna chnl 4-6. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

Lighting for 300' tower. J Stromquist, WNCB, 2816 Hagberg St, Duluth MN 55811. 218-722-3017.

FM, 3-5 bay antenna and/or tower. M Gaunt, WHCB, POB 2061, Bristol TN 37621. 615-878-6279.

S-A or Fairchild satellite dish & digital receiver, for ABC Network. D Fernquist, WBRB, POB 288, Mt Clemens MI 48046. 313-792-1400.

Guyed tower, 800' for FM in gd cond. J Stitt, WIOK, 7075 Industrial Rd, Florence KY 41042. 606-727-0800.

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IGM time announce control for 2 single play cart decks, gd cond w/manual. D Garder, KDUZ, POB 10, Hutchinson MN 55350. 612-587-2140.

Schafer 800 brain never used, w/(3) Carousels, (2) SMC 250 & SMC 350, \$3000. B Bundgaard, KLKS, POB 300, Breezy Point MN 56472. 218-562-4884.

BDSMC TG-25/TS-25/4CM1 will sell separately or all for \$500. B Hoffman, WRTH, 7711 Carondelet Ste 304, St Louis MO 63105. 314-727-2160.

PR&E DT-2 digital uptimer in factory case, BO. B Royster, KQM Bdcgt, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

SMC 452 Carousels (3) stereo, Audiotronics 10M-915 video display, PDC-4X clock, SMC ESP-1 programmer, (2) racks, TSB-3 power control, DS-20A digital switcher, (2) Otari R-R reproducers & all manuals, well maintained. C Larsen, KAMI, 835 Meridian, Cozad NE 69130. 308-784-1580.

Cetec 7000, in use w/Level II software, (5) Revox A77, (3) Audiophile 1 stereo 2 mono, (2) Control Design Carousels, (2) Beehive terminals, (3) ITC 750, 25 Hz tone gen, Automated Bdcgt Control time announce & numerous parts, for sale or lease \$25,000/BO. D Digerness, KMMT, POB 1284, Mammoth Lakes CA 93546.

Schafer 800 complete in one rack & cannibalized system, sell as is, \$200. R Bagby, KWEY, POB 587, Weatherford OK 73096. 405-772-5939.

SMC Minipro controller, 10 source inputs, 100 events, 50 timed events, perfect for sm operation, memory backup, \$1200. L Seizle, KFBC, 1806 Capital Ave, Cheyenne WY 82001. 307-637-7771.

SMC ESP-1, gd cond, w/many options, \$6000/BO. P Wolf, WRCC, 2600 Pine Island, Cape Coral FL 33909. 813-574-5548.

IGM 504 3 chan, \$900. S Weber, KGRV, POB 1598, Winston OR 97496. 503-679-8185.

Cetec-Schafer 7000, (3) Audiophile, (2) Otari RR, (2) Carousels & misc. BO. D Mance, WCDO, 75 Main, Sidney NY 13838. 716-335-2273.

Harris 9000 complete w/IGM Go-Carts & terminals, SMC DP20 w/5 Carousels & R-R equipment, P Scott, WJMI, 1850 Lynch, Jackson MS 39203. 601-948-1515.

SMC random select Carousels (4); (3) SMC cart machines, SMC 592 R/P cart machine, D Jackson, WPRN, POB 566, Butler AL 36904. 205-459-2835.

Schafer 800S 10 ch auto controller (2); other auto equip supplies, BO. B Van Proogen, 2111 Shangriia Dr. SE, Grand Rapids MI 49508. 616-243-2026.

Harris 9000 program controller w/IGM 48 tray Go-Cart, IGM 78 tray Instacart, TEC70X terminal & video monitor & TI thermal printer, on air, \$15000. J Moore, WPEX, 1517 Aberdeen Rd, Hampton VA 23666. 804-827-0911.

SMC RSC100 w/cables & drum switches & controls, (2) 250 or 250 Carousels, \$900/will ship. J Young, KIBS, POB 757, Bishop CA 93514. 619-873-6324.

SMC ESP-1 complete w/RC, data encoder, (5) tape decks, (5) 24-tray, digital switcher, auto record & interfaces, BO. V Balkcum, WEQR, 914 W Grantham, Goldsboro NC 27533. 919-734-3336.

IGM Instacart 48 tray stereo, gd cond, \$6500/BO. B Potterton, KSGN, 11498 Pierce St, Riverside CA 92505. 714-687-5746.

Tone gen, 25 Hz. M McKenzie, KALL, 312 E S Temple, Salt Lake City UT 84111. 801-364-3561.

BE Control 16, (4) Otari ARS1000 decks, (2) ITC 770 decks, (4) IGM Go-Cart 24, ITC 3D cart deck, (2) ITC RP stereo cart decks, plus lots more. D White, WYBR, Box 7180, Rockford IL 61126. 815-874-7861.

Want to Buy

Control Design or ABC 24 Hz R-R EOM detectors & companion generator. D Williams, KLCB, POB 730, Libby MT 59923. 406-293-6234.

IGM Instacart 48 tray stereo, operating condition, to be used w/IGM Rampart system. J Parker, WUBE, 225 E 6th, Cincinnati OH 45202. 513-621-6960.

Harris Instacart mod board 994-7789-001 for 90/9000 Harris auto system; IGM Instacart 48-tray mono, less than 10 yrs old. B Frahm, Pacific NW Bdcgt, POB 1280, Boise ID 83701. 208-336-3670.

IGM 500 parts, control drawers, monitor panels or complete 500; SMC 581 time announcer for parts. B Van Proogen, 2111 Shangriia Dr SE, Grand Rapids MI 49508. 616-243-2026.

CAMERAS (VIDEO)

Want to Sell

RCA ENG TK-760 camera, \$1800. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

JVC KY1900 w/battery, battery charger & case, excel cond, \$1900. R Larson, Metropolis Video Prod, 316 S Maple, Oak Park IL 60302. 312-848-3172.

Thomson studio camera chain, multicore cable, mint cond, \$5000. T Judge, Tag Comm, 75 Weaver Rd, W Milford NJ 07480. 201-697-8454.

GE PE-400's & PE-201's, for spare parts, (2) complete 400 packages, (2) incomplete 400 packages, (2) semi-complete 201 packages, nice Angenieux lenses, approx 200' camera cable, BO plus shpg. K Knowles, Knowles Video, POB 12127, Tallahassee FL 32317. 904-575-6689.

JVC KY-1900 3 tube camera w/10X zoom, AC adaptor, case, charger, Anton Bauer 4 AH battery, service manual, etc, vgc, \$1375. G Ormrod, GFO Prod, 432 East X St, Tumwater WA 98501. 206-352-8028.

Sanyo B&W 1600L system, \$300 complete; camera & lenses, \$200, TV/monitor, \$125. R Streicher, 545 Cloverleaf Way, Monrovia CA 91016. 818-359-8012.

Underwater camera, custom made by Fujinon & Sony, gd to 1,000'. \$30,000. W Norman, A/V Industries, 15 E Mall, Plainview NY 11803. 516-753-9393.

RCA PK-701 color std camera, \$1250; Panasonic 3890B color portable, \$1995; Norelco PC-70, BO; Norelco PCP-90, \$750; Houston Fearless pedestals, \$350. C Haynes, WJMI, POB 31235, Jackson MS 39206. 601-948-1515.

Sony B/W portable video system, AVC3450, AV3400, AV3600, AC3400, monitor, light, xtra Canon TV16 lens & 65 reels tape, \$600/BO. R Branske, WLOO, 875 N Michigan, Chicago IL 60611. 312-440-3100.

Ikegami HL79A w/Angenieux lens, BO. M Geraci, Light Scope, 420 W 45th, 4th FL, NY NY 10036. 212-757-0204.

Panasonic AK760 3 tube diode-plumbicon w/studio & ENG config, Canon 9-118, 11.6 w/2X & macro green line lens, hard case, excel cond, \$3500. R Kragen, Box 397, Roosevelt NJ 08555. 609-448-4739.

Ikegami HL79EAL w/studio finder config & tripod, \$26,000. W Norman, A/V Industries, 15 E Mall, Plainview NY 11803. 516-753-9393.

Sony DCX-5000 (4), w/(2) Fuji zooms; (2) Panasonic WV2100, (2) WV3700/3702, WV2310. M Holladay, WCOS, POB 748, Columbia SC 29303. 803-256-7328.

Want to Buy

RCA late mdl TK45/46's & access & cable, H Henson, Henson Prod, 4569 Havencrest Rd, Winston-Salem NC 27106. 919-924-8717.

CART MACHINES

Want to Sell

ITC RP Series, mono R/P, BO; IGM 12A, stereo (2) PB, BO. M Hensley, 1655 Olive, Evansville IN 47714. 812-424-8284.

Tepecaster, Spotmaster machines repaired, bought & sold. Advent Duplication, 9723 Riggs Rd., Adelphi MD 20783. 301-439-7222.

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ITC stereo RP-4, SP-3, mono PDII, Series 99 stereo PBs, ESL-IV splice finder, PR&E Tomcat PBs (3) & R/P, many spare parts. heads, boards for ITC cart machines, 750 Series R-R's, BO. B Royster, KQM Bdcgt, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

Rapid Q RQM-2 mono PB, gd cond, \$100 plus shpg. T Vernon, Vernon Assoc, 1001 Dale Pl, Carlisle PA 17013. 717-249-1230.

Tepecaster 700RD delay cart machine, will take A-B size carts, also will work in a normal mode, \$100. R Dietherich, SBN, 411 Grande Plaza, Pittsburgh PA 15219. 412-471-2181.

Criterion 80 (3) w/record amp that matches, fair cond, \$300 for all. S Blair, WKCB, Rt 550 West, Hindman KY 41822. 606-785-3129.

Audicord Twin R/P, stereo, like new, \$1500. B Baron, Bdcgt Prod E, 23 Rustic Ave, Medford NY 11763. 516-286-8125.

Fidelipac CTR 100's, (4) stereo R/P, (8) stereo players, 2 yrs old, BO as group or individual. J Lackness, KRJA, 3407 NE Pkwy Ste 210, San Antonio TX 78218. 512-828-3737.

UMC stereo PBs (3), gd working cond, new heads, complete w/service manuals; UMC stereo R/P, needs alignment & set-up, gd cond. J Gerard, WIHS, POB 117, Middletown CT 06457. 203-346-3846.

Sparta Century mono cart PB (8); BE 3200RP mono R/P, gd cond, Spotmaster mono cart PB, ATC mono cart PB, M McKenzie, KALL, 312 E S Temple, Salt Lake City UT 84111. 801-364-3561.

Spotmaster 500C R/P, gd cond, \$280 plus frt. E Hudson, WIYD, 900 River St, Palatka FL 32977. 904-325-4556.

ITC SP Series, stereo, 3 tone sensor, gd cond, \$1000/both; BE 900-3202-000 (2) 1 yr old, excel cond, stereo, \$1100/both. M Banks, WSTH, 208 Main, Alexander City AL. 205-234-2566.

Tepecaster 700RP, \$120; 700 P gd cond, \$200; Auto-Cue 25 Hz tone gen/detector, \$100. John, 315-487-2393.

ITC R/P stereo, fair cond, \$700. P Christianson, WIVY, 2101 Univ S, Jacksonville FL 32216. 904-721-9111.

Tepecaster 700RP mono in excel cond, \$250. L Bergman, Universal Snds, POB 18716, Spokane WA 99208. 509-328-0766.

Scully 280 2 trk R/P, gd cond, \$450 ea; Gates mono PB, \$150 ea. A Moore, WVOC, POB 21567, Columbia SC 29221. 803-772-5600.

BE 500C DL, R/P, mono, new heads, excel cond, \$150. J Gardner, Cutting Edge Prod, 2 Maria Hotchkiss Rd, Prospect CT 06712. 203-758-4769.

IGM Instacart 48 tray mono, BO over \$2000. L Dubose, WBLR, POB 410, Batesburg SC 29006. 803-532-4315.

SMC mono recorder, mono player, clean, (2), \$350/both; ATC PC-190 updated, \$150; several Viking decks & amps; Gates ST101 (antique), \$75. M Holladay, WCOS, POB 748, Columbia SC 29202. 803-256-7328.

Want to Buy

ITC Encore RP manual, buy/trade. D Brintnall, KBUF, Box 798, Garden City KS 67846. 316-276-2366.

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

Manual & schematic for Visual Eclt R/P machine, will buy or pay photocopy charges. M Hensley, 1655 Olive, Evansville IN 47714. 812-424-8284.

ITC 3D's, (3) stereo w/tones, must be solid machines. J Lackness, KRJA, 3407 NE Pkwy Ste 210, San Antonio TX 78218. 512-828-3737.

Collins/ATC, need several Collins 642A cart machines & 216C record amps or ATC AB150 R/P. S Todd, 2911 Simpson St, Roseville MN 55113. 612-633-4458.

UMC 111-01 or 101-111-034 Beaucarts, type 10 repro, also need record/repro. D Christian, KPLU, Tacoma WA 98447. 206-535-7265.

ITC SP mono. T Dngger, Driggers Bdcgt, 818 Quail Ct Healdsburg CA 95448. 707-433-9370.

CASSETTE & REEL-TO-REEL RECORDERS

Want to Sell

Otari CB116 auto locator, \$475. S Sullivan, WGGG, 900 NW 8th Ave, Gainesville FL 32601. 904-376-1230.

Revox A-77 circuit cards, all types, BO; Harris/Gates Criterion 80 record amps, stereo, circuit cards & rack mount adapters, all new. BO. B Royster, KQM Bdcgt, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

Amplex 440B w/ruby guides; PR&E motor drive amp & custom roll about console. BO. B Royster, KQM Bdcgt, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

Criterion 80 (3) w/record amp that matches, fair cond, \$300 for all. S Blair, WKCB, Rt 550 West, Hindman KY 41822. 606-785-3129.

Audicord Twin R/P, stereo, like new, \$1500. B Baron, Bdcgt Prod E, 23 Rustic Ave, Medford NY 11763. 516-286-8125.

Fidelipac CTR 100's, (4) stereo R/P, (8) stereo players, 2 yrs old, BO as group or individual. J Lackness, KRJA, 3407 NE Pkwy Ste 210, San Antonio TX 78218. 512-828-3737.

UMC stereo PBs (3), gd working cond, new heads, complete w/service manuals; UMC stereo R/P, needs alignment & set-up, gd cond. J Gerard, WIHS, POB 117, Middletown CT 06457. 203-346-3846.

Sparta Century mono cart PB (8); BE 3200RP mono R/P, gd cond, Spotmaster mono cart PB, ATC mono cart PB, M McKenzie, KALL, 312 E S Temple, Salt Lake City UT 84111. 801-364-3561.

Spotmaster 500C R/P, gd cond, \$280 plus frt. E Hudson, WIYD, 900 River St, Palatka FL 32977. 904-325-4556.

ITC SP Series, stereo, 3 tone sensor, gd cond, \$1000/both; BE 900-3202-000 (2) 1 yr old, excel cond, stereo, \$1100/both. M Banks, WSTH, 208 Main, Alexander City AL. 205-234-2566.

Tepecaster 700RP, \$120; 700 P gd cond, \$200; Auto-Cue 25 Hz tone gen/detector, \$100. John, 315-487-2393.

ITC R/P stereo, fair cond, \$700. P Christianson, WIVY, 2101 Univ S, Jacksonville FL 32216. 904-721-9111.

Amplex 351 tube-type elect (3), \$400 ea. T Dufresne, Foster Comm, 1 City Hall Plaza, San Angelo TX 76903. 915-653-3387.

Amplex AG445 PB decks (3), in custom roll-around cabinets w/storage below, meter bridge mounted above deck w/manual, \$1200. B Hoffman, WRTH, 7711 Carondelet Ste 304, St Louis MO 63105. 314-727-2160.

Revox PR99, not much use, heads gd, PB only, w/25 Hz sensors & NAB hub adaptors, 3.75-7.5 ips, \$900/BO. D Talbot, WGUS, POB 1475, Augusta GA 30913. 803-279-1380.

Amplex 351 elect (8), all in gd working order, BO. R Kaufman, POB 462247, Garland TX 75046. 214-271-7625.

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Collins/ATC, need several Collins 642A cart machines & 216C record amps or ATC AB150 R/P. S Todd, 2911 Simpson St, Roseville MN 55113. 612-633-4458.

UMC 111-01 or 101-111-034 Beaucarts, type 10 repro, also need record/repro. D Christian, KPLU, Tacoma WA 98447. 206-535-7265.

ITC SP mono. T Dngger, Driggers Bdcgt, 818 Quail Ct Healdsburg CA 95448. 707-433-9370.

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Concertone 90 FT, 7.5/15 ips transport & elect, rk mt, as is, \$100/BO; steel record-reel/eq rack w/casters, gd cond, \$50. E Helvey, Successtrax, POB 1357, Winchester VA 22601. 703-877-1191.

Amplex 3200, 5 slaves 1 master, \$2000. F Sinjusckin, American Lutheran Church, 1568 Eustis St, St Paul MN 55108. 612-645-9173.

Nagra III 3.75-7.5-15 ips 5" or 7" reels, vgc, \$1200/BO; Crown 800 Series (2) 2 trk w/spare electr & parts, \$150 ea. (1) 4 trk w/electr, \$250. J VonVieck, V Tech, 2844 Beachtree Ln, Woodbridge VA 22191. 703-221-6984.

Tascam 34, 4 chan in excel cond, low hrs, w/manuals, \$995. B Osborne, A/V Assoc, 4760 E 65th St, Indianapolis IN 46220. 317-253-8562.

ITC 750 rack mount reel deck, gd cond w/plugin-in 25 Hz sensor card, PB only, heads worn, w/manual, \$700. B Hoffman, WRTH, 7711 Carondelet Ste 304, St Louis MO 63105. 314-727-2160.

Tascam 122 stereo cassette rec/PB deck, light use, mint cond, BO. K Browall, KTRZ, Box 808, Riverton WY 82501. 307-856-2922.

Amplex 350 3 ik console, \$725; Amplex AG350 8 ik SS, \$1850; Amplex 300-350 SS 4 ik, \$900; Amplex 350-351 2 ik (2) \$725 & \$750/both for \$1350. L Oliver, 304 W 89th St, NY NY 10024. 212-874-7660.

Teac A-4010 GSL, excel w/case, \$125; Teac A4010S, gd cond, auto rev, \$60, plus ship. W Laughlin, KDVC, 2636 N 56, Lincoln NE 68504. 402-466-8670.

Revox A77 2 trk, 7.5-15, low time on recent heads, w/remote, \$595. B Borrelli, Media Group, 462 Merrimack St, Methuen MA 01844. 617-688-5373.

Amplex 351 tube-type elect (3), \$400 ea. T Dufresne, Foster Comm, 1 City Hall Plaza, San Angelo TX 76903. 915-653-3387.

Amplex AG445 PB decks (3), in custom roll-around cabinets w/storage below, meter bridge mounted above deck w/manual, \$1200. B Hoffman, WRTH, 7711 Carondelet Ste 304, St Louis MO 63105. 314-727-2160.

Revox PR99, not much use, heads gd, PB only, w/25 Hz sensors & NAB hub adaptors, 3.



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Parasonic, cassette deck, gd cond. \$75. Wolensak R-R, \$75. M Banks, WSTH, 208 Main, Alexander City AL. 205-234-2566.

Ampex 8 trk 1" recorder. MM1000, gd cond. TC 850 Sony 2 trk 1/2 trk recorder, gd cond. G O'Neal, Tiki Recd, 195 S 26th, San Jose CA 95116. 408-286-9840.

Altec 604 spkrs, \$400 ea. Ampex ATR-800 2 trk, \$4200. Ampex 440-C (2), \$3600 ea. A Adams, United Research, 681 5th Ave, NY NY 10022. 212-751-4661.

Teac V-350 stereo cassette decks (2), \$85 ea. Teac V-300 stereo cassette deck, \$75. P Cesta, Eastern Snd/Video, 462 Merrimack, Methuen MA 01844. 617-665-1832.

Pioneer RT-1011L stereo 1/4 trk, 4 head, fair cond, w/manual. \$175/BO. E Hudson, WIYD, 900 River St, Palatka FL 32077. 904-325-4556

ITC 750 PB, \$100 & ITC 750 R/P stereo, \$400, both need minor repair. L Wilkins, WLWI, POB 4999, Montgomery AL 36195. 205-240-9274

Scully 280-B 1/2 trk stereo, gd cond, Ruslang cabinet. M McKenzie, KALL, 312 E S Temple, Salt Lake City UT 84111. 801-364-3561

Ampex PR10 & 600, \$125/BO. M Kantor, WPOB, 50 Knickerbocker, Plainview NY 11803. 516-822-6915

Want to Buy

Ampex 350 console for 350 machine B Sauber, WFRA, POB 908, Franklin PA 16323. 814-432-2188.

MCI/Sony capstan & reel motors, any cond., recdg heads, most migs, machines, new, used. Relapped then sold. Amp Services, 224 Datura St No 614, W Palm Beach FL 33401. 800-826-0601. in FL 305-659-4805.

MCI JH110-2, need repro-record & bias boards, power supply chimney, phase lock loop board, analog torqueboard, control logic board, MCI JH110A-2 elect tray & all above for JH110A-2. C Hertzberg, Kinura Records, Box 660236, Miami Springs FL 33166. 305-887-5329

Crown solid state recorders, working or not, also parts docs, lit & access. J Phillips, WZOQ, POB 1487, Lima OH 45802. 419-222-9292.

Late model R-R w/10-1/2" reel capability. D Jackson, WPRN, POB 566, Butler AL 36904. 205-459-2835.

Revox A77 remote control. G Give, Your Video Connection, 31844 Rancho Amigos, Bonsall CA 92003. 619-749-7662.

CONSOLES

Want to Sell

Cetec Centurian I 12 chan mono w/power supply, \$500/BO. B Simonson, Bdct Technical Support, 290 N Ruth #4, St Paul MN 55119. 612-731-1741.

Shure M67, gd cond w/battery supply & manual. \$200 plus shpg. T Vernon, Vernon Assoc, 1001 Dale Pl, Carlisle PA 17013. 717-249-1230.

Tascam 106, 6 input, 4 buss output mixer w/effects loop & 2 band EQ. RIAA phono inputs, vgc w/manual, \$395. Tascam 30, 8 input 4 buss output mixer 8 trk monitor submix, 3 band EQ, RIAA phono inputs, excel cond, \$895. B Osborne, AV Assoc, 4760 E 65th St, Indianapolis IN 46220. 317-253-8562.

Shure M-68 mic mixers (2), used; Autogram IC-8 8 chnl stereo console, BO. B Royster, KOM Bdctg, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

Gates 994-5133-003 10-pot board, gd for parts, \$300; (2) BE boards, 4-pot Spotmaster 4 BEM 50, (2) 5-pot Spotmaster 5 BEM-100, \$600/pr. T Dufresne, Foster Comm, 1 City Hall Plaza, San Angelo TX 76903. 915-653-3387.

Blamp 1642 16x4x2 mixer, modified w/junction transformers, TT patchbay w/wire & harness, hardwood pedestal, separate rack mount power supplies, 4 band EQ, \$1600. B Black, 1228 Weymouth Ln, Ventura CA 93001. 805-652-5557.

Tascam 5B, 8 mic/line inputs, 4 out, eff, moni- tor, talkback, pan pots, EQ each input, vgc, \$800. E Helvey, Successtrax, POB 1357, Winchester VA 22601. 703-877-1191.

Autogram IC 10 stereo, new, few hrs, BO. R Kaufman, POB 462247, Garland TX 75046. 214-271-7625.

Ramsa WR500 mixing console, portable, vgc. \$750. C Butler, Butler Bdct Srns, 1775 Barlett, Orange Park FL 32073. 904-264-8169.

Autogram IC-10 10 chan rotary, 28 inputs total, on air, updated 1-87 w/Henry Engr module package, \$7500. CRL SEP-800 4 chan EQ stereo processor, 2 yrs old, \$1200. R Lane, KTYD, 5360 Hollister Ave, Santa Barbara CA 93116. 805-967-4511.

Quantum 12A custom, excel cond, w/ATA- type flight case w/casters & full docs, \$2950. R Streicher, 545 Cloverleaf Way, Monrovia CA 91016. 818-359-8012.

Ampex MX35's (3), \$250 ea/all for \$725; Sigma 4 chan (3), \$100 ea/all for \$275. Altec portable mixers (2) 1567A, \$265 ea; Harmon-Kardon mixers (2) mdl DPR7, \$100 ea; echo bleeds (3) passive off mic input lines to echo Fisher or any, \$25 ea/all for \$60. L Oliver, 304 W 89th St, NY NY 10024. 212-874-7660.

Shure SE30, 4 input mic mixer w/compres- sor, \$300, Sparta A10B 4 pot mono, cond unknown, BO. R Dieterich, SBN, 411 Grande Plaza, Pittsburgh PA 15219. 412-471-2181.

Must Sacrifice
\$100,000 of commercial quality audio/video equipment. Some near new, some not so new. Call for inventory.

Northwestern Inc.
1224 SW Broadway
Portland, OR 97205
1-800-547-2252
Oregon 226-0170

Micro-Trak 6618 6 ch stereo, 18 inputs, 4 yrs old, \$850. G Durham, WWXL, Rt 5 Box 50, Manchester KY 40962. 606-598-5102.

Gates Executive program amps (2), \$200 ea; Sparta RA-4 remote mixer, \$165. K Gordon, 10622 SW 100 St, Miami FL 33176. 305-271-1671.

Gates Yard mono (2), 1 OK, 1 needs repair. 1 power supply. R Ness, WCSG, 105-1/2 Main, Morris IL 60450. 815-942-0022

Gates Gateway mono 8 ch solid state com- plete w/book, gd cond, will trade, \$1300. T Crockett, Hot Tracks Recdg, POB 10501, Blacksburg VA 24062. 703-953-0222.

Gates Stereo Statesman, \$600. B Payne, 5198 Perry Rd, Mt Airy MD 21771. 301-875-2423.

Autogram IC 10 stereo, new, few hrs, BO. R Kaufman, POB 462247, Garland TX 75046. 214-271-7625.

UREI 1681, trade for 4 output prod mixer of like quality. M Cohen, KDUR, POB 7339, Durango CO 81301. 303-247-7261.

Altec 1567A mic mixer, \$90 N Carlson, Mo- bile Snd Group, 721 W Melrose, Chicago IL 60657. 312-871-7459.

Gates Yard mono 8 chan, complete & work- ing, \$200; Spectrum SA-90 slide pot stereo prod board, fair cond. \$30. John, 315-487-2393

Ampro DCS10B 40 chan, dual stereo, talk- back, mono mixdown amp & some spares, gd cond, \$2000. M Banks, WSTH, 208 Main, Alexander City AL. 205-234-2566.

Cetec/Sparta AS30B 5 ch stereo w/TTs, low hrs, stored 6 yrs, like new cond, new Stanton cartridges, all preamps incl, detachable legs, \$125. J Gardner, Cutting Edge Prod, 2 Maria Hotchkiss Rd, Prospect CT 06712. 203-758-4769.

Quantum 16 x 16, gd cond. G O'Neal, Tiki Recd, 195 S 26th, San Jose CA 95116. 408-286-9840.

BE 4M50 mono, 4 chnl std mixer, excel cond, \$500; 5 chnl mono board, looks like a BE board, vgc, has changeable circuit boards, \$350. L Bergman, Universal Snds, POB 18716, Spokane WA 99208. 509-328-0766.

Quantum/Concept Design console, mod- ified, 16 x 8 x 2, direct coupling & 5534 IC's, has noisy pots, BO. D Petrik, KACE, 1710 E 111th St, LA CA 90059. 213-564-7951.

Gatesway 10 chan mono in gd cond, \$700. C Cage, WERT, POB 487, Van Wert OH 45891. 419-238-1220

Sparta AS100-B 4 ch; Sparta A-15B, mono M McKenzie, KALL, 312 E S Temple, Salt Lake City UT 84111. 801-364-3561.

Gates Executive, 10 pot, clean, \$1900. D Swanson, KTFK, RR 2, Sioux City IA 51106. 712-252-4621.

Harris Executive 10 chnl, working fine, \$1500. L Wilkins, WLWI, POB 4999, Montgomery AL 36195. 205-240-9274

CCA Futura 6, looks clean, \$300; Collins 212-T2 stereo w/extras, \$2200. M Holladay, WCOS, POB 748, Columbia SC 29202. 803-256-7328.

UREI 1681 to trade for prod console of like quality. M Cohen, KDUR, POB 7339, Durango CO 81301. 303-247-7261.

Tapco C12 mixer, 12", 4-2-1 main outs, plus echo & effects sends & returns, 3-band EQ, monitor, aux & effects busses, (4) large meters switchable between busses, head-phone monitor, manual & spare parts, gd cond, \$1000/BO plus ship. L Josephson, Radio Foundation, 1 W 89th, NY NY 10024. 212-595-1837.

API console parts: type 2061 input modules, 4 ch/assembly, faders, blank panels, connectors, meters & metal rails. R Robinson, TNA, Box 57, Wallingford CT 06492. 203-269-4465.

Ramsa WRT-820 w/optional meter bridge, new, never used, \$3900. B Cover, WMBO, 504 Metcalf Plaza, Auburn NY 13021. 315-253-7355.

Autogram IC10 stereo, new, few hrs, BO. R Kaufman, POB 462247, Garland TX 75046. 214-271-7625

Harris Stereo 5, excel cond, BO. B Mishkind, KFXK, 3222 S Richey Ave, Tucson AZ 85713. 602-748-1450.

API console parts, type 2061 input modules, faders, meters, 440 faders, 475 faders, custom echo returns, custom monitor section. R Robinson, TNA, Box 57, Wallingford CT 06492. 203-269-4465.

Ramko DC 38-8S 8 chnl stereo, \$700. A Moore, WVOC, POB 21567, Columbia SC 29221. 803-772-5600.

Altec 250 SU tube type, 9 in 2 out, excel cond, BO. B Woolf, 3986 Edidin Dr, Jacksonville FL 32211. 804-744-1661 aft 5 PM.

Automated mix system retrofitable to any console, Optimix disc based system w/40 chan capacity, 32 VCAs in this system, \$10K. R Robinson, TNA, Box 57, Wallingford CT 06492. 203-269-4465.

RCA 5 chan, 4 inputs/chan, gd cond, \$500, Ampro DCS10B, clean & rebuilt, gd cond, \$2000. M Banks, WSTH, 208 Main, Alexander City AL. 205-234-2566.

Want to Buy

Collins 212P-2, R Davis, KJHK, Univ of KS Flint Hall, Lawrence KS 66045. 913-864-4746

Autogram IC10 8 to 12 chan stereo or equiv, min 20 inputs. J Gerber, WGLQ, 816 Ludington St, Escondido CA 92029. 906-789-9700

Stereo board, 6 chan for on air. M Gaunt, WHCB, POB 2061, Bristol TN 37621. 615-878-6279

Console, bdct quality, donation or reason- able price, tax deductible. R Yoder, WJMU, Millikin Univ, 1184 W Main, Decatur IL 62522. 217-424-6369.

Harris Stereo Statesman, doesn't need work but complete. T Crockett, Hot Tracks Recdg, POB 10501, Blacksburg VA 24062. 703-953-0222.

DISCO & SOUND EQUIP.

Want to Sell

Altec-Lansing 600B, 12", excel cond, \$90; Jensen C3781 ST 600 ohm, line feed, 15" duplex, \$120. Good Sound, 171 Drexel Ave, Lansdowne PA 19050. 215-626-9322.

JBL L-100 Century monitors, avg cond, \$300 plus ship. W Laughlin, KDCV, 2636 N 56, Lincoln NE 68504. 402-466-8670.

Home made tape echo machine, 16 delay, needs work, 2 trk, play heads 8202, all heads lapped or new, \$650. S Russell, 60410 Klett Dr, Decatur MI 49045. 616-782-9258

EMT 140ST reverb plate, excel cond, \$2950/BO. R Vogt, VQR Digital, Box 302, Needham MA 02192. 617-444-8686

Koss ESP-10 electrostatic headphones, \$325; AKG K-240 headphones, \$40 ea. Telex CB-88 headset for CB system, unuseo, \$35; assorted loudspeakers from \$5. R Streicher, 545 Cloverleaf Way, Monrovia CA 91016. 818-359-8012.

Pultec HLF-3C hi & lo filter. R Robinson, TNA, Box 57, Wallingford CT 06492. 203-269-4465.

JBL 4311B, \$400/BO for pair. M Fiedler, Mahoney-Fiedler Prod, 5346 Dupont Ave S, Minn MN 55419. 612-822-0013

Sennheiser HD414, \$25 J Sunier, Audi- ophilie Auditor, 21 Stetson Ave, Kenfield CA 94904. 415-457-2741.

Fairchild 644B (2) equalizer module, BO. P Cibley, Cibley Music, 138 E 38th, NY NY 10016. 212-986-2219.

8 trk recording pkg, all US gear, take car/truck trade, \$5500. G Burchett, Dur-K Inc, 842 Bellfont Princess Rd, Ashland KY 41101. 606-324-8812.

Want to Buy

EV 100A Sentry speaker system. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

Ibenez MSP 1000 limiter/EQ. D Wade, Col- legium Snd, 3541 72nd, Jackson Heights NY 11372. 718-426-8555.

LIMITERS

Want to Sell

ATI Emphasizer audio processor, \$850. M Tait, Tait Recdg, 1347 S Capital St SW, Wash DC 20003. 202-488-3905.

Harris 994-7059-002 AM limiter, asymmet- rical capable, gd cond, w/manual. D Garder, KDUZ, POB 10, Hutchinson MN 55350. 612-587-2140.

Gates Solid Statesman AGC single band, \$100. B Hoffman, WRTH, 7711 Carondelet Ste 304, St Louis MO 63105. 314-727-2160.

dbx 142 (2) rack mount NR systems, new. BO: CBS Labs 4110, 4111, 4450A, (2) CBS Labs dynamic presence EQ's; stereo audio DA, 410/411, 4110 & 4450A stereo processors: UREI BL-40 AM compressor/limiter, BO. B Royster, KOM Bdctg, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

Gates Solid Statesman single band, \$100. B Hoffman, WRTH, 7711 Carondelet Ste 304, St Louis MO 63105. 314-727-2160.

Volumax 411 FM stereo limiter, \$300. B Hoffman, WRTH, 7711 Carondelet Ste 304, St Louis MO 63105. 314-727-2160.

Valley People Stereo Dynamite, \$275. G Ernst, Bayside Snd, POB 166, Lincoln City OR 97367. 503-996-6020.

dbx 163 compressor, \$75. G Ernst, Bayside Snd, POB 166, Lincoln City OR 97367. 503-996-6020

Harris ME-1 AM mod; CRL SPP800 split band compressor; Orban 418A stereo limiter; Orban 622B stereo parametric EQ; PR&E AM&FM Multilimiters & Multimax's. BO. B Royster, KOM Bdctg, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

CBS Labs Audimax 4440A, gd cond, \$400 plus shpg. T Vernon, Vernon Assoc, 1001 Dale Pl, Carlisle PA 17013. 717-249-1230

Harris MSP-90 AGC amp, BO or pr of DAP 310. J Caracciolo, WLIR, 175 Fulton Ave, Hempstead NY 11550. 516-485-9200

Ampex Compellor in superb cond B Mat- ta, 5001 Baum Blvd, Pittsburgh PA 15213. 412-683-2020

Orban 8000A, \$1800. B Downs, KJCS, Box 11111, Nachodages TX 75963. 409-564-4444.

UREI LA4 (2) limiters, \$250 ea. H Underwood, Underwood Audio, 1909 Tree Corners Pkwy, Norcross GA 30092. 404-449-5502

CRL APP-400, gd cond, \$375; CRL SMP-800, gd cond, \$600. P Wolf, WRCC, 2600 Pine Island, Cape Coral FL 33909. 813-574-5548

CRL PMC 300 processor, BO. C Mendel, KAMP, POB 1018, El Centro CA 92244. 619-352-2277

Gates Harris solid state limiters, \$100. C Haynes, WJMI, POB 31235, Jackson MS 39206. 601-948-1515.

UREI LA5, w/rack mt, \$250/BO. E Helvey, Helvey Prod, POB 1357, Winchester VA 22601. 703-877-1191

Fairchild Conac 600 mono, \$250. Gates Stay-well M5167, \$200. L Oliver, 304 W 89th, NY NY 10024. 212-874-7660.

Harris-Gates M6631 1976 matched pair, w/manuals, \$250/both. S Blair, WKCB, Rt 550 West, Hindman KY 41822. 606-785-3129

Orban 8000A, new caps, hi slew IC update \$2000/BO. D Hacker, WHZZ, POB 23, Huntington TN 38344. 901-986-2205.

Gates M5546 Level Devil. R Ness, WCSG 105-1/2 Main, Morris IL 60450. 815-942-0022

Automated Bdct Controls Sta-Max compos- ite processor, gd cond, \$300; Pacific Recorders Multi Max AM limiter similar to BL-40, gd cond, \$500. R Dieterich, WAMO, 411 7th Ave, Pittsburgh PA 15219. 412-471-2181

Orban 8100 Optimod, excel cond (2) Gates Sta-Level compressors, Spectra-Sonics comp-limiter: CBS Audimax II, tube type. M McKenzie, KALL, 312 E S Temple, Salt Lake City UT 84111. 801-364-3561.

Orban 8100A Optimod, excel cond, \$3700 Orban 8000A, excel cond, \$1900; Dorough 610 stereo processor (2), w/80-B stereo gen, excel cond, \$4900. P Christenson, WIVY, 3101 University S, Jacksonville FL 32216. 904-721-9111.

Pye stereo compressor, discrete transistor design from early 70's, spare parts & doc. R Robinson, TNA, Box 57, Wallingford CT 06492. 203-269-4465.

UREI LA-4, excel cond, \$150. M Banks, WSTH, 208 Main, Alexander City AL. 205-234-2566.

Orban 8000 Optimod, excel cond, new caps \$1500. P Russell, Bowdoin College, WBAR, Sils Hall, Brunswick ME 04011. 207-725-3066.

Mari CLA40, BO. C Cage, WERT, POB 487, Van Wert OH 45891. 419-238-1220

Dorough 310 DAPs (3), gd cond. A Somers, KBBY, Box 5600, Ventura CA 93003. 805-656-6300

Texar Audio Prism, stereo, pair w/RCF-1 card for Optimod, excel cond, \$3000. P Christenson, WIVY, 3101 University South, Jacksonville FL 32216. 904-721-9111.

Gates Solid Statesman FM 994-6631-006 (2), \$150 ea/\$275 both; CBS FM Volumax 411, \$180. John, 315-487-2393.

Distributor Directory

The following distributors serving the broadcast industry would be glad to help you with any of your requirements.



Broadcast Equipment Exchange

LIMITERS . . . WTS

CBS 450 dynamic presence EQ/manual. \$250; Harris ME-1 mod enhancer, \$75; (2) Gates Level Devils, \$75 ea; (3) Kahn Symmetra-Peaks, \$75 ea; (2) Gates SA-39 limiter. BO; Altec 1591 compressor, \$200; CBS 411 stereo Volumax, \$600; (2) Collins 26W, BO; (2) RCA BA-6, BO; Gates dual limiter, \$300. M Holladay, WCOS, POB 748, Columbia SC 29303. 803-256-7328.

CRL 300A peak mod controller. in use, vgc, \$380/BO. E Hudson, WIYD, 900 River St, Palatka FL 32077. 904-325-4556.

Harris MSP-100 mono. working but needs minor power supply work, \$300. L Wilkins, WLWI, POB 4999, Montgomery AL 36195. 205-240-9274.

CRL APP300A, SEP400A, PMC300A mono audio processing unit. V Balkcum, WGBR, 914 W Grantham, Goldsboro NC 27533. 919-736-1150.

Harris Solid Statesman, as is, works but needs minor repair. \$75. L Wilkins, WLWI, POB 4999, Montgomery AL 36195. 205-240-9274.

Want to Buy

Orban 8000. M Dailey, Dailey & Assoc. 311 S Gloucester, Tupelo MS 38801. 601-841-1506

Harris MSP100. E Harrell, WRTH, POB 1019, Moorehead City SC 28557. 919-247-2002

Sony PCM's, all models T McCartney, KBSU, 1910 University Dr, Boise IA 83725 208-385-3760

MICROPHONES

Want to Sell

EV PL76/77 RE & PL20s, RE50 & others. gd prices. J VonVleck, V Tech, 2844 Beachtree Ln, Woodbridge VA 22191. 703-221-6984

RCA mic stands/bases (2) 91C MI 4092E. \$75 ea, MI-11008 base brand new in box \$75 Good Sound, 171 Drexel Ave, Lansdowne PA 19050. 215-626-9322

Sennheiser MD421U mics. (2) new. EV RE-20 mic, EV 635A mic; EV rolloff filters, plug-in. Luxo mic spring arm. BO B Royster, KOM Bdtg 1019 Cordova St, San Diego CA 92107 619-223-3413

RCA BK-1 w/base & P3 conn. marked NBC gd cond, \$120. Shure mic level tone gen, \$30 Good Sound, 171 Drexel Ave, Lansdowne PA 19050 215-626-9322

Beyer 740 studio condenser mic, perfect cond, large diaphragm, 5 patterns, \$700 R Duval, 84 Martens Rd, San Rafael CA 94901 415-456-7106

Sony C-37A tube mics, large diaphragm, all orig w/supplies, tables & cases, mint cond, \$995/pr/BO/trade R Katz, Allegro Snd, 15015 Ventura Blvd, Sherman Oaks CA 91403 818-766-9101

Sennheiser MD421U, almost new, \$175 A Tranmer, KBOY, POB 1280 Boise ID 83701 208-336-3670

Neumann U47 w/PS & mic stand. \$2000. L Oliver, 304 W 89th, NY NY 10024. 212-874-7660

Pressure zone mics, original pre-Crown versions (6) \$120 ea/\$685 for all. R Streicher, 545 Cloverleaf Way, Monrovia CA 91016 818-359-8012.

Sennheiser 404 & 405, both need work, spare cables, PS, BO/trade, parts for AKG C-28 & S7C 4126A, mainly outer shell & windscreen. R Robinson, TNA, Box 57, Wallingford CT 06492. 203-269-4465.

EV RE-15 in excel cond. \$100. L Bergman, Universal Snds, POB 18716, Spokane WA 99208. 509-328-0766.

Comrex RRB 450 belt pack xmtr & rack rcvr. 455.5 & 455.9. \$200. L Wilkins, WLWI, POB 4999, Montgomery AL 36195. 205-240-9274.

Want to Buy

RCA 77DX, pay up to \$375 for gd cond unit B Gowa, KTIM, 1623 5th Ave Ste D, San Rafael CA 94901 415-456-1510.

Neumann U67, reasonable working order. R Kaufman, POB 462247, Garland TX 75046. 214-271-7625.

Old mics for collection, working or not, esp want 44BX, 77DX, other ribbon mics, Altec Birdcage, 20's carbon mics, Shure PA mics, stand, booms, cables, etc, also collect radios & TV's from all eras. L Josephson, Radio Foundation, 1 W 89th, NY NY 10024 212-595-1837

MISCELLANEOUS

Want to Sell

Tandy 600 portable, like new, sell or trade for X700RP Tapecaster cart recorder, \$400 G Arroyo, WONQ, 2483 John Young Pkwy #R, Orlando FL 32804 305-290-2020

Catalogs/magazines, 50 yrs worth, IRE/IEEE, GR, HP, Tektronix, Sears Roebucks, Allied, Lafayette, etc, SASE for list F Yonker, 7 Old Farms Rd, Saddle River NJ 07458 201-825-1895

Hall Electronics Quality Used Equipment 30 Day Guarantee!

Belar AMM-3 AM mod mon \$895 00
Ramko DA-6RE 1x6 dist amp \$125.00
RCA 74B mics (antique-AS-IS) \$125.00
Patch panels 1/4" tip-ring-sleeve \$ 35 00
We Buy Used Equipment-Send for Free Flyer
**P.O. Box 7732
Charlottesville, VA 22906
PHONE: (804) 973-8697
OR (804) 978-1220**

Canon old style XLR-3 females. Canon P-3s, male & female, chassis females & pieces, \$100/\$6 ea/\$10 pr. Good Sound, 171 Drexel Ave, Lansdowne PA 19050. 215-626-9322

Tandy Radio Shack Mod III computers, several, some w/80 trk disk drives, gd cond, \$350 ea E Helvey, Successfrax, POB 1357, Winchester VA 22601. 703-877-1191

Tandy Radio Shack Mod 4P port computers (2), w/40 trk disk drives, vgc, \$400 ea, modified for ext dual 80 trk disk drives w/drives, vgc, \$500; w/CPM software. E Helvey, Successfrax, POB 1357, Winchester VA 22601. 703-877-1191

Studer hybrid. F Sinjuschkin, American Lutheran Church, 1568 Eustis St, St Paul MN 55108 612-645-9173

Chain link fencing, 100' of 7' high fencing, w/barbed wire barriers, top fence post mounts & matching gate, fence posts & hardware, \$600 T Dufresne, Foster Comm, 1 City Hall Plaza, San Angelo TX 76903 915-653-3387

Riders PA manual, Vol 1, \$65. B Woolf, 3986 Edidin Dr, Jacksonville FL 32211 804-744-1661

Equipment rack, new, 77" rack space, white, \$275.5" rack, fair cond, \$50. 77", great cond, \$100. M Banks, WSTH, 208 Main, Alexander City AL 205-234-2566

Outdated Broadcasting Yearbooks. P Hunn, WOSC, RD1 Box 1067, Westport NY 12993 518-546-7985.

Cetec Stereo 10 console manual or copy for cash. SA Cislis, Orbit Radio/Video, 2405 Hermitage Way, Louisville KY 40241. 502-458-7420

UTC LS-49 or Chicago BD-2 audio xmtr or similar class B driver. M Carroll, So Bctg Svcs, 108 Wessington Ct, Hendersonville TN 37075 615-822-0082

CCC AMM-1T AM mod mon, gd cond, 1140 kHz, \$400. G Arroyo, WONQ, 2483 John Young Pkwy #R, Orlando FL 32804. 305-290-2020.

Equipment rack, new, 77" rack space, white, \$275.5" rack, fair cond, \$50. 77", great cond, \$100. M Banks, WSTH, 208 Main, Alexander City AL 205-234-2566

Outdated Broadcasting Yearbooks. P Hunn, WOSC, RD1 Box 1067, Westport NY 12993 518-546-7985.

Cetec Stereo 10 console manual or copy for cash. SA Cislis, Orbit Radio/Video, 2405 Hermitage Way, Louisville KY 40241. 502-458-7420

UTC LS-49 or Chicago BD-2 audio xmtr or similar class B driver. M Carroll, So Bctg Svcs, 108 Wessington Ct, Hendersonville TN 37075 615-822-0082

CCC AMM-1T AM mod mon, gd cond, 1140 kHz, \$400. G Arroyo, WONQ, 2483 John Young Pkwy #R, Orlando FL 32804. 305-290-2020.

Micro-Trak cabinet space for 2 TTs, etc, gd cond, \$100. B Hoffman, WRTH, 7711 Carondelet Ste 304, St Louis MO 63105. 314-727-2160

Sears air compressor w/tank, \$100; anchor desk, credenza, etc, \$3500; Code-a-phone 180 automatic phone line message player, \$50, General DataCom modem mdl GDC 212A, \$100 J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

RCA 5 H, 10 ohm, 2 A mod choke, very heavy, free but you ship S Todd, 2911 Simpson St, Roseville MN 55113. 612-633-4458.

Ford Van, 1981 w/Onan 4 kW gen, Wilburt mast, air system, control 13500 BTU air, cell phone, sophisticated Alpine security system. S Costantino, DW Sargent Bdtc Svcs Inc, 804 Richard Rd, Cherry Hill NJ 08034. 609-667-8573

Sola 63-13-150, gd cond, constant line voltage protector & harmonic neutralizer, \$250/BO. BE cart rewinder, like new, \$200, Elgin ERL-19645-4, gd cond, \$75. P Wolf, WRCC, 2600 Pine Island, Cape Coral FL 33909. 813-574-5548.

Impedance matching transformers (5) for Sescom M17 & (1) UTC A27, \$15 ea or \$65/all P Cibley, Cibley Music, 138 E 38th St, NY NY 10016. 212-986-2219

Jack strip, 52 RTS, dbl closed circuit jacks, gnds normalled, gd cond, \$100/BO. UTC xmtrs A-21, (2) A-22, (2) A-24, (2) A-39 \$20 ea/\$120 all; (2) UTC A-33 20 dB magnetic shields, \$10/both; line xmtrs (2) EV 502; EV 502B; Shure A86A, \$12 50 ea/\$40 all; Pioneer JA-R102 rk mnt adaptor kit, \$7 E Helvey, Helvey Prod, POB 1357, Winchester VA 22601 703-877-1191

Equipment rack, BO C Haynes, WJMI, POB 31235, Jackson MS 39206 601-948-1515

Patch bays, 24 inputs (4), \$75 ea/all for \$225. Daven pots for volume controls, clean (8), take all, mounted, \$100. Canon plugs, almost 100, all for \$150. L Oliver, 304 W 89th St, NY NY 10024. 212-874-7660

Teletype 43 data terminal, weather wire. G Hornung, KRGI, POB G, Grand Island NE 68802 308-381-1430

Okidata 82A printer, fair cond, runs well, BO. K Browall, KTRZ, Box 808, Riverton WY 82501 307-856-2922

Harris 25 nitrogen tank regulator w/2 gauges, used 45 days, factory cond. K Browall, KTRZ, Box 808, Riverton WY 82501. 307-856-2922

ADC Propatch w/punch tool, BO T Dnggers, Drggers Bdtg, 818 Quail Ct, Healdsburg CA 95448 707-433-9370

Manuals & spec sheets from Ampexes 350-351. Neumann U47 & others, Gotham Neumann disc cutter & Gotham amps & many others L Oliver, 304 W 89th St, NY NY 10024. 212-874-7660

HP 440C VTVM, \$35 R Streicher, 545 Cloverleaf Way, Monrovia CA 91016 818-359-8012

Rack, 72" high standard 19" grey metal, w/screws & rackmount kits for Teac & Technics open reel decks, gd cond, \$150. J Sunier, Audiphile Audition, 21 Stetson Ave, Kentfield CA 94904 415-457-2741.

Traffic/acc't computer, 24 meg hard disk w/monochrome monitor, w/traffic for AM & FM, A/R, A/P payroll & general ledger, music scheduling & spread sheet, w/manual, \$6000 plus ship/handling, D Booth, KMJX, 11300 Rodney Parham, Little Rock AR 72212. 501-224-6500

Riders PA manual, Vol 1, \$65. B Woolf, 3986 Edidin Dr, Jacksonville FL 32211 804-744-1661

Equipment rack, new, 77" rack space, white, \$275.5" rack, fair cond, \$50. 77", great cond, \$100. M Banks, WSTH, 208 Main, Alexander City AL 205-234-2566

Outdated Broadcasting Yearbooks. P Hunn, WOSC, RD1 Box 1067, Westport NY 12993 518-546-7985.

Cetec Stereo 10 console manual or copy for cash. SA Cislis, Orbit Radio/Video, 2405 Hermitage Way, Louisville KY 40241. 502-458-7420

UTC LS-49 or Chicago BD-2 audio xmtr or similar class B driver. M Carroll, So Bctg Svcs, 108 Wessington Ct, Hendersonville TN 37075 615-822-0082

CCC AMM-1T AM mod mon, gd cond, 1140 kHz, \$400. G Arroyo, WONQ, 2483 John Young Pkwy #R, Orlando FL 32804. 305-290-2020.

Equipment rack, new, 77" rack space, white, \$275.5" rack, fair cond, \$50. 77", great cond, \$100. M Banks, WSTH, 208 Main, Alexander City AL 205-234-2566

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TFT 763 FM mod monitor w/76A-A tunable RF preselector. H.M. Dyer Electronics, 48647 Twelve Mile Rd, Novi MI 48050. 313-349-7910.

Gates 1970 M-4990 tuned to 1540 kHz w/manual, \$35 plus ship. S Blair, WKCB, Rt 550 West, Hindman KY 41822 606-785-3129.

TFT stereo monitor, like new cond, \$1650. R Dietterich, SBN, 411 Grande Plaza, Pittsburgh PA 15219. 412-471-2181.

Nems-Clarke 108E antenna monitor. \$40/BO; Gates M5240 remote xmtr monitor, \$50/BO plus frt. E Hudson, WIYD, 900 River St, Palatka FL 32077. 904-325-4556.

RCA (Moseley) BW-100B FM RF amp; McMartin MMR-1 AM EBS rcvr; McMartin TBM-2500 RF amp. M McKenzie, KALL, 312 E S Temple, Salt Lake City UT 84111. 801-364-3561

Gates MO-2639 AM, \$100; McMartin TBM-4500A FM, \$500; Collins 250 W AM xmtr, \$1200 firm; Gates GTM-88R FM RF amp, \$140; Gates M03 stereo gen, \$400; McMartin TVM-3500 FM mod mon \$100; Simpson 488 TV VHF meter, \$100 John, 315-487-2393

Want to Buy

McMartin TPM2500C FM monitors & remote unit 37R, \$2200 & \$3700 R Davis, KJHK, Univ of KS Flint Hall, Lawrence KS 66045 913-864-4746

CCA AMM-1D AM mod monitor; CCA AMF-1D AM freq monitor B Barry, WAMB, 1617 Lebanon Rd, Nashville TN 37210 615-889-1960

Equipment rack, BO C Haynes, WJMI, POB 31235, Jackson MS 39206 601-948-1515

Patch bays, 24 inputs (4), \$75 ea/all for \$225. Daven pots for volume controls, clean (8), take all, mounted, \$100. Canon plugs, almost 100, all for \$150. L Oliver, 304 W 89th St, NY NY 10024. 212-874-7660

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UTC LS-49 or Chicago BD-2 audio xmtr or similar class B driver. M Carroll, So Bctg Svcs, 108 Wessington Ct, Hendersonville TN 37075 615-822-0082

McMartin EBS receiver tuned to 94.7 or equiv. L Seidenderg, WSCT, POB 1350, Aberdeen NC 28387. 919-944-1350.

Manuals & schematics for GR731 mod mon & 475C/681B freq mon. S Todd, 2911 Simpson St, Roseville MN 55113 612-633-4458.

MOVIE PROD. EQUIP.

Want to Sell

Magnesync Moviola 3000 16mm record-er/reproducer. F Sinjuschkin, American Lutheran Church, 1568 Eustis St, St Paul MN 55108. 612-645-9173.

Auricon 16mm pro sound film camera w/amp, mic, cables&3 prime lenses, excel cond, \$475. H Deans, Deans Prod, 170 Grand, White Plains NY 10601. 914-949-5920.

Bolex H16 16mm, like new in case, \$250; Bolex 16mm reflex, 3 primes, sync cassette recorder in case, \$375; Canon 1014XLS Super 8mm snd camera w/boom mic & wireless mic, photo lens hood, like new in box, \$395. H Deans, Deans Prod, 170 Grand St, White Plains NY 10601. 914-949-5920

Kodachrome 16mm film, 100' rolls, Ektachrome, 100' rolls, recent or out dated stock, Super-8 cartridges, Kodachrome & Ektachrome. H Deans, Deans Prod, 170 Grand St, White Plains NY 10601 914-949-5920

Magazines, 2000' for Kodak Cine cameras & 400' for Bolex cameras H Deans, Deans Prod, 170 Grand St, White Plains NY 10601 914-949-5920.

Want to Buy

Kodachrome 16mm film, 100' rolls, Ektachrome, 100' rolls, recent or out dated stock, Super-8 cartridges, Kodachrome & Ektachrome. H Deans, Deans Prod, 170 Grand St, White Plains NY 10601 914-949-5920

Magazines, 2000' for Kodak Cine cameras & 400' for Bolex cameras H Deans, Deans Prod, 170 Grand St, White Plains NY 10601 914-949-5920.

RECEIVERS & TRANSCEIVERS

Want to Sell



Broadcast Equipment Exchange

RECEIVERS . . . WTB

SCA receiver, any make. P Hons, Mainline Comm, 100 Poplar St, Portage PA 15946. 814-736-3883.

REMOTE & MICROWAVE EQUIP.

Want to Sell

Laux System, (2) 8705 audio terminals, Laux LA: A LC0106, 70 MHz Laux downconverter, 2 runs of 25-30' ea of RG59U coax, 9' parabolic dish for 4 GHz, w/books, \$2200. T Dufresne, Foster Comm, 1 City Hall Plaza, San Angelo TX 76903. 915-653-3387.

Adcom Transtar AC satellite rcvr, 7550 mainframe w/7005 down converter, 7014 data stream & 7010 demod cards, gd cond, w/manuals, \$2900. S Sullivan, WGGG, 900 NW 8th Ave, Gainesville FL 32601. 904-376-1230.

Microwave Assoc Comm VR-3X satellite rcvr, \$300. T Dufresne, Foster Comm, 1 City Hall Plaza, San Angelo TX 76903. 915-653-3387.

Harris Satellite System, w/rcvr mdl 6550, approx 35' of RG 214 1/2" coax, 70 MHz downconverter, 12" dish, book, \$4000. T Dufresne, Foster Comm, 1 City Hall Plaza, San Angelo TX 76903. 915-653-3387.

S-A 9000 2.8 meter dish w/LNA, BO. J Gober, WVOK, 236 Goodwin Crest Dr, Birmingham AL 35209. 205-945-4646.

Moseley meter insertion unit & (3) new CIP-1 w/24 VDC latching & momentary relays, BO; Moseley TAU-2, TRC-15 AW/AR, BO; complete spare semi-conductor kits for PCL-505/C & TRC-15 AW STL/remote controls, new, BO. B Royster, KQM Bdcg, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

Moseley PCL505C composite STL w/subcarrier gen & demod, trade for Marti STL10 & 6" dish. W Blackwelder, KNUE, POB 7935, Tyler TX 75711. 214-581-0606.

Colorado Magnetics Transtar network switcher for cart machines, gd cond, \$500. S Sullivan, WGGG, 900 NW 8th Ave, Gainesville FL 32601. 904-376-1230.

Modulation Assoc BP-72 recr shelf w/power supply & (3) audio demods, D Garder, KDUZ, POB 10, Hutchinson MN 55350. 612-587-2140.

S-A 6680 sat recr, C band, 6.2/6.8 audio, 2-way video outputs, 70 MHz IF port (2); 360-2 LNC C band low noise LNC for 6650/6680 (2); 9530 w/362-2 LNC C band (1); 6330 TV modulators, 60 dBmV output (6); minicable rack, 4" w/shelves, panels, fan & AC power strip. R Ose, ACSI, 1 American Plaza Ste 310, Evanston IL 60201. 312-869-8001.

Microdyne 1100 PCDR-5 demod in SCPC terminal, \$2000/BO. M McVey, KMCD, 57-1/2 Court St, Fairfield IA 52556. 515-472-4191.

Wegener CNN Radio Network rcvr, mainframe, FM demod card for cable, 2 yrs old, avail 4/1/88, \$1000. R Miller, WRVI, Box 68, Virden IL 62690. 217-965-3388.

Fairchild Dart 384 digital rcvr, 2 program cards, 1 voice cue module, ABC/Westwood 1, \$5000/BO; ABC Network 32 pulse rcvr, \$400/BO. R Yoder, WJMU, 1184 W Main, Decatur IL 62522. 217-424-6369.

RCA AVQ-10 weather radar system, C-band, 75 kW peak power, R-T & accessory units have been recently bench tested & calibrated, radar has new magnetron. D Broek, KVDB, POB 35, Sioux Ctr IA 51250. 712-722-1090.

Marti RPT25 rec/trans & antenna, RPT-1 also, 450 MHz band, \$1800. C Bryson, Com-seld, 93 Robinhood Dr, Zeilenople PA 16063. 412-776-5204.

Oak Orion PD decoders (2); Drake ESR-24 sat rcvr (1); ISS M-1 TV modulator (1); Monroe 3000R-82/3185 DTMF controller; Leitch SPG-120 N sync pulse gen. R Ose, ACSI, 1 American Plaza Ste 310, Evanston IL 60201. 312-869-8001.

Avcom SCPC 2000C analog satellite rcvr, used 1 yr, Mutual crystals, BO. K Browall, KTRZ, Box 808, Riverton WY 82501. 307-856-2922.

S-A DAT 32 complete receiving system, \$9850. G Wachter, The Bcct Group, 631 N 1st Ave, Phoenix AZ 85003. 602-258-6161.

Gates M5863 complete, working when removed. R Ness, WCSJ, 105-1/2 E Main, Morris IL 60450. 815-942-0022.

M/A-com MA4001 receiver, 19" rack mnt, excel cond, \$550. T Crockett, Hot Tracks Recdg, POB 10501, Blacksburg VA 24062. 703-953-0222.

Marti KPT, gd cond, 1 W. 161.67 MHz, \$550. P Wolf, WRCC, 2600 Pine Island, Cape Coral FL 33909. 813-574-5548.

ITC FM-1 telco interfaces (3), never used, BO. K Browall, KTRZ, Box 808, Riverton WY 82501. 307-856-2922.

Moseley PBR15 needs work, \$275; McMartin TR55D SCA receiver, \$45. T Wortmann, WJAG, 309 Braasch Ave, Norfolk NE 68701. 402-371-0780.

Microdyne 1100 Series down converter for SPSC receiver, BO. J Kieler, WXVQ, Box 1777, DeLand FL 32721. 904-734-9386.

Want to Buy

Moseley MRC-2 SARTO remote control terminal; Moseley MRC-2 SART remote control system. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 306-743-2494.

Moseley MRC-2 CRT terminal; Moseley MRC-2 AL auto logger; Moseley MBB-1 plate current sample kit; Moseley CIP-2 relay interface panel; Moseley RMK-1 motor kit. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 306-743-2494.

Marti STL10 xmt & rcvr & 6" microwave dish, 950 MHz band. W Blackwelder, KNUE, POB 7935, Tyler TX 75711. 214-581-0606.

S-A 32 digital network receiver, compatible w/ABC, CBS, NBC & CHN. K Kuenzie, KSLQ, 102 Elm Ste 203, Washington MO 63090. 314-239-6800.

Wide band STL system. J Stromquist, WNCB, 2816 Hagberg St, Duluth MN 55811. 218-722-3017.

STATIONS

Want to Sell

FM Class A, AM daytimer, fully automated combo, 3 bedroom, std-office, 2800 sq ft, 750 sq ft xmt bldg all on 3 acres of land, retiring. \$350,000. JP Robillard, 1803 N First East, Haynesville LA 71038. 318-624-0105.

N Texas, 1 kW AM, FT, excel potential, real estate & apartment, \$130,000, \$60K down. D Stebbins, KZZN, POB 192, Littlefield TX 79339. 806-385-4474 (6-9 PM).

AM/FM radio station, class A FM, 250 W daytime AM in Indiana. J McPherson, 606-758-8525.

AM/FM stations, excel NW Colorado coverage, sacrifice by owner, terms/\$360,000. D Gayer, KKMx, Hayden-Steamboat Springs CO. 303-233-8433.

Richmond VA, 5 kW AM station at 1410 kHz in 10th fastest growing county in the country, must divest immediately. P Scott, 804-345-9395.

Want to Buy

Looking for AM, FM or CP in east for right price/terms. H Kozlowski, 703-631-0197.

Small to medium station(s) in Mid-Atlantic, or New England states. Underdeveloped AM's, FM's or combos with gd terms will be considered. Write to RW, POB 1214, Falls Church VA 22041. Attn: Box 1-1-88.

STEREO GENERATORS

Want to Sell

Harris MSP95 peak limit stereo gen combo in mainframe, \$400. M McVey, KMCD, 57-1/2 Court St, Fairfield IA 52556. 515-472-4191.

Moseley SCG-3T stereo gen, new SCG-9 stereo gen, new Harris TE-3 plug-in stereo gen, Orban 8000A, new, \$1750 firm. B Royster, KQM Bdcg, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

CCA SG-1D stereo gen & CCA direct FM exciter type FM 10DS for 94.7 MHz, \$400. T Dufresne, Foster Comm, 1 City Hall Plaza, San Angelo TX 76903. 915-653-3387.

Harris MSP-95 high freq limiter, stereo gen main frame, gd cond, w/manual & extender card, \$400/BO. M McVey, KMCD, 57-1/2 Cort St, Fairfield IA 52556. 515-472-4191.

Power Pak SMG 40 stereo gen, \$1500. J Scaggs, KGNZ, 542 Butternut, Abilene TX 79602. 915-673-3045.

Sparta 682 solid state gen, \$500; McMartin B-113R SCA, \$300. John. 315-487-2393.

Leader LSD 231 FM stereo gen, like new w/manual, \$170/BO. E Hudson, WIYD, 900 River St, Palatka FL 32077. 904-325-4556.

SWITCHERS (VIDEO)

Want to Sell

Vital production switcher, VIX 115 AZ w/dual chan Squeeze Zoom, \$15,000. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

Crosspoint Latch 6112BH 8 input, \$5000. W Norman, AV Industries, 15 E Mail, Plainview NY 11803. 516-753-9393.

Utah Scientific AVS-1 20 x 20 video, 10 x 10 stereo audio redundant power supplies & control processors, (3) CSP 20's, (2) CPD PL's, CSP10, SC150, CSP800R, \$17,000. B Weiss, Instant Replay Prod, 1349 E McMillen, Cincinnati OH 45206. 513-861-7065.

TAPES, CARTS REELS

Want to Sell

Audiopak AA-3, A-3 stereo carts, unrecorded in boxes, BO. B Royster, KQM Bdcg, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

We have largest quantity of reprocessed audio tape in the world. We also have the lowest prices! Sizes from 5" to 14" & 1/4" to 2", all brands, all types. We carry a full line of cassettes, broadcast carts, reels, boxes & related accessories at unbeatable prices. Call for our new catalog & more info. 1-800-331-3191/516-678-4414 in NY. Burlington Audio Tapes, 106 Mott St, Oceanside, NY 11572.

NAB reels, 10.5" metal 1/4", all in gd cond, 1-10, \$1.50 ea, 11-100, \$1.25 ea, 100+, \$1 ea. Falk Recd Svcs, 7914 Fegenbush Ln, Louisville KY 40228. 502-239-1010.

Oldies Rock-N-Roll, 1000 songs stereo library on Audiopak carts, perfect cond, used for trade show, \$4000. T Hall, Radio Prog Svcs, 3815 E Vintah, Colorado Springs CO 80909. 303-574-8628.

Top 100/200 songs or jingles from '36-'55, all or part on records or tapes, fire destroyed library. S Stevenson, Stevenson Corp, POB 735, Blaine WA 98230. 604-531-4576.

Light AC music library on stereo carts, \$3500. R Humphey, WLTJ, 1051 Brinton Rd, Pittsburg PA 15221. 412-244-7600.

Replacement record jackets, white, 50, \$10 plus shpg. E Helvey, Helvey Prod, POB 1357, Winchester VA 22601. 703-677-1191.

3M 206 1/2" (12) full, (2) partial hubs, 208 full hub, Ampex 406 full hub, \$5 per hub; (2) 1/2" metal 10" reels, \$3 ea, entire lot \$75. E Helvey, Helvey Prod, POB 1357, Winchester VA 22601. 703-877-1191.

3M 206 1" tape, (6) full on reels; (2) 208 full, one on reel, other on hub; Ampex 406, partial on hub, \$10/roll or entire lot for \$75. E Helvey, Helvey Prod, POB 1357, Winchester VA 22601. 703-877-1191.

U-Matic 3/4" video cassettes, (9) short lengths, 5-10 min, w/vinyl cases, \$2.50 ea/\$27 all. E Helvey, Helvey Prod, POB 1357, Winchester VA 22601. 703-877-1191.

R-R tapes, 10" (150), \$1.50. T Wortmann, WJAG, 309 Braasch Ave, Norfolk NE 68701. 402-371-0780.

Scotch 2500 1" (13) new, all \$150; Scotch 2500 1/4" (12) 206 new, all \$100; also 5", 7", 12" reels, cheap. L Oliver, 304 W 89th St, NY NY 10024. 212-874-7660.

TDK endless loop cassettes, still in shrink-wrap, 1 min, 5 min & 6 min, call for prices. M Masterson, KEOL, State College, La Grande OR 97850. 503-963-1397.

Various cart makes & lengths (120 approx), \$1 ea. K Wallace, KPCO, Box 11370, Quincy CA 95971. 916-283-1370.

Aristocarts, hundreds, selected \$2 ea, ROS \$1 ea. M Holladay, WCOS, POB 748, Columbia SC 29202. 803-256-7328.

Want to Buy

Scott Ross show & sim pgms, pre '78, any format, also debate between Dr Walter Martin & Madalyn Murray O'Hare. S Todd, 2911 Simpson St, Roseville MN 55113. 612-633-4458.

ITC WRA record unit Premium line, w/all tones, mono pref, but will consider stereo. B Surratt, WINA, POB 498, Charlottesville VA 22902. 804-977-3030.

TAX DEDUCT. EQUIP.

R-R, 10.5", 2 chan stereo recorder & 16mm film snd projector for religious education, tax deductible. Rev. J Acuna, POB 760273, OKC OK 73176.

Donations wanted, video D/A, proc amp, waveform mon, vector scope, test gen & rem cont, need not work, be repairable, will pay shipping. R Holler, WAQYVW, 1285 Houseman Rd, Colorado Springs CO 80950. 303-634-4896.

Donations of prod gear for non-profit FM. M Cohen, KDUR, POB 7339, Durango CO 81301. 303-247-8611.



FOR FREE LISTINGS IN BROADCAST EQUIPMENT EXCHANGE



CALL TOLL FREE 1-800-426-8434 15 LINES TO SERVE YOU

Free listings in Broadcast equipment exchange are offered to all United States Broadcasters AM/FM/TV and all Pro-Sound end users. BSW will accept up to three listings by telephone. For more than three listings BSW will send you an ad order sheet for your convenience. BSW will list each ad for a period of three full months.

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EQUIPMENT LISTINGS:

Radio World's Broadcast Equipment Exchange provides a FREE listing service for all broadcast and pro-sound end users. Simply call 1-800-426-8434 to place your listings courtesy of Broadcast Supply West. 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 800-336-3045 for details and complete display rates.

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 _____

BROADCAST EQUIPMENT EXCHANGE
PO BOX 1214
FALLS CHURCH VA 22041



Broadcast Equipment Exchange

TAX DEDUCT . . .

Eng student desiring donation of old bdcnt equip (anything in repairable cond, will pay all shipping charges. EE student at Purdue. C Gill, POB 371, Indianapolis IN 46206. 317-923-2800.

16mm equip for developing educ & ecological films, any equip accepted. Dr R Gerber, College of St Joseph, Windham ME 04062. 207-892-6766.

TEST EQUIPMENT

Want to Sell

McMartin TX-300A mod mon calibrator; McMartin pre-selector, both used, BO; Ivie Elect IE-20A & IE-10A portable, battery operated real time analyzer & portable pink noise gen, new, BO. B Royster, KQM Bdcntg, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

Nelson Ross TA-1000 spec analyzer, needs mic, \$200. A Allegra, Calvary Baptist Church, 1380 Valley Forge Rd, Lansdale PA 19446. 215-368-4440.

Potomac FIM-41 field intensity meter, 540 kHz to 5 MHz, excel cond, \$1900/BO. J Seaman, WWSA, POB 752, Harrisonburg VA 22801. 703-434-0331.

Tek RMS29 rack mount waveform monitor, \$300. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

Tentel tape tension meter for R-R decks; Fidelipac wow & flutter meter; Heathkit freq counter; Digimax microwave freq counter, BO; Potomac FIM-71 FM/UHF-TV field strength meter; TFT 753 AM mod mon w/755 preselector; TFT 763 FM mod mon w/765 preselector; TFT 734A stereo mon; TFT 730A 67 kHz SCA mon, BO. B Royster, KQM Bdcntg, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

Eico audio gen, \$50. S Weber, KGRV, POB 1598, Winston OR 97496. 503-679-8185.

Sound Tech 1000A, 1100A, 1710A, 1200A, all new, BO. B Royster, KQM Bdcntg, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

Tek waveform monitors. BO. C Haynes, WJMI, POB 31235, Jackson MS 39206. 601-948-1515

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Heath SG-18A, gd cond, Heath assembled, \$100/BO. P Wolf, WRCC, 2600 Pine Island, Cape Coral FL 33909. 813-574-5548.

B&K 850 color analyst, \$25. S Weber, KGRV, POB 1598, Winston OR 97496. 503-679-8185.

Weston 640 0+3 RF amp panel meters, brand new, \$5 ea; Daven attenuators (14), \$400 for all. S Barkowski, WEDC, 4923 W 28th, Cicero IL 60650. 312-294-6523.

Multitester 1480 w/meter, \$50; Presto in/out dummy load w/meter, \$50; Heath scop B Mountjoy, Custom A/V, POB 1240, Elizabethton TN 37644. 615-543-5849.

TRANSMITTERS

Want to Sell

RCA BTF20E FM 20 kW FM, w/BTE 115 exciter, 7 yrs old w/excel current proof, power increase prompts sale. BO L Vandam, Peninsula Bdcntg, POB 152, Newberry MI 49868. 906-293-5114.

LPB RC-25C, needs repair, w/manual & most spare tubes, \$75 w/ship. S Todd, 2911 Simpson St, Roseville MN 55113. 612-633-4458.

Wilkinson FM 1500E, FME-10 exciter & stereo gen, all in new cond, \$10,000. J Gerard, WIHS, POB 117, Middletown CT 06457. 203-346-3846.

Harris/Gates Type M 6095 stereo exciter, tube type, also stereo gen M6146, in working cond, BO. R Farrelley, 815-963-6080.

RCA 1R1 AM xmtr, avail 30 days, 1000/500 W, buyer arranges shipping. A Aymer/J Thomas, WLEW, 935 S Van Dyke, Bad Axe MI 48413. 517-269-9931.

Gates FM1C 1 kW xmtr plus exciter, in use as standby, gd cond, \$2200. C Cage, WERT, POB 487, Van Wert OH 45891. 419-238-1220.

CCA AM 2500D, 2.5 kW AM xmtr, excel cond, tuned to 1190 kHz. C Frodsham, KVSU, POB 7, Beloit KS 67420. 913-738-2206.

Want to Buy

Low-band chan 4+ VHF xmtr, 10-30 kW w/VSF & harmonic filters; low-band VHF xmtr, 10-30 kW, retuneable to chan 4+. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

FM xmtr, 3-5 kW, old & cheap but workable. M Dailey, Dailey & Assoc, 311 S Gloucester, Tupelo MS 38801. 601-841-1506.

AM xmtr for 100/50 W operation. P Hunn, WOSC, RD#1 Box 1067, Westport NY 12993. 518-546-7985.

Xtal ovens for RCA BTE 10B exciter, 120 V heaters, freq not important; also junk 10B exciter, must have gd T103, PA tube cage, O-scope cover & gd L105 helpful. S Todd, 2911 Simpson St, Roseville MN 55113. 612-633-4458.

Short wave xmtr, 50 or 100 kW. G McClintock, WWCN, 3314 West End Ave, Nashville TN 37203. 800-238-5576

FM xmtr, 2.5-5 kW, donation or reasonable price, tax deductible. R Yodes, WJMU, Millikin Univ, 1184 W Main, Decatur IL 62522. 217-424-6369.

FM xmtr, 1.5-2.5 kW. M Gaunt, WHCB, POB 2061, Bristol TN 37621. 615-878-6279

Harris MW-10 or similar 10 kW AM no later than 2/88. H McDonald, KKMT, POB 710, Ennis MT 59729. 406-682-7171/406-252-4391.

FM xmtr (2) for educ chnls, 5-10 kW in gd cond. V Baker, POB 889, Blacksburg VA 24060. 703-552-4252.

5 or 10 kW AM & 20 or 25 kW FM. B Zuela, KWSA, 1415 Laverne, Klamath Falls OR 97601. 714-636-5040.



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Gates 2.5 H3 or other 2 to 5 kW FM xmtr. J Ganley, WWWW, 1333 Washington, Columbus IN 47201. 812-372-9933.

FM xmtr, 5 kW, Moseley 606C STL & remote control system. J Stitt, WIOK, 7075 Industrial Rd, Florence KY 41042. 606-727-0800.

LPTV xmtrs, 100-1000 W, also need diplexer/filterplexer for chan 24. N Davis, 107 E Bruce, DeFuniak Springs FL 32433. 904-892-4038 (collect).

FM xmtr, 2.5 or 3 kW w/exciter. T Driggers, Driggers Bdcntg, 818 Quail Ct, Healdsburg CA 95448. 707-433-9370.

Collins 20V xmtr. R Smith, 2245 Felspar St, San Diego CA. 619-483-9331.

TUBES

Want to Sell

3CX2500A3 \$300; 4CX10,000A3, \$500. J Ortiz, WHOY, POB 1148, Salinas PR 00751. 809-864-0122 eves

Bdcnt camera pickup tubes, Vidicon 4809, 4811/8:34 from RCA TK 27, 28; Vistacons BC 4922B, 4993R, 4994G, from TK45s Good Sound 171 Drexel Ave, Lansdowne PA 19050. 215-626-9322

Industrial number rcvg tubes, some WE, all new in makers box. Good Sound, 171 Drexel Ave, Lansdowne PA 19050. 215-626-9322

EIMAC 8877, (2) new, \$450 ea. D Talmage, DT Engr, POB 8042, Marion OH 43302. 614-488-5993

100 misc tubes, cheap or swap, few oldies avail, SASE for list/call. J Mathes, WYNU, 115 Devonshire Sq, Jackson TN 38305. 901-668-9201

RCA 6166 (10) 10 kW tubes for FM or TV, \$1500. G Torres, GT Int'l, 48 W 46th, NY NY 10036. 212-730-7114.

Tubes, new 807's, \$4.95 ea. N Carlson, Mobile Snd Group, 721 W Melrose, Chicago IL 60657. 312-871-7459.

Assorted tubes, call for list. B McGregor, McGregor Assoc, 1428 Lansdowne, Denim Sp LA 70726. 504-665-9808

Want to Buy

Tubes, 6072/6072A, need 1000 pieces. R Katz, Allegro Snd, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-766-9101.

Xmtr tubes, 833A & other small xmtr tubes. JB Salazar, MRC, POB 3246, Laredo TX 79044. 512-722-6832.

TURNTABLES

Want to Sell

Panasonic Technics SP-10 MK II in factory base w/Audio Technica tone arm; SL-1100A & SL-1200 MK II TTs; Stanton 310 TT preamps, new (2), BO. B Royster, KQM Bdcntg, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

Rek-O-Kut lathe, in original case, built-in recorder amp & speaker. D Sofonia, WTCM, 314 E Front, Traverse City MI 49684. 616-947-7675.

Presto 6N disc cutter lead screws, 224/104/106 lines per inch, \$50 ea/all \$125. Rek-O-Kut CVS12 speed variance. L Oliver, 304 W 89th St, NY NY 10024. 212-874-7660.

Rek-O-Kut B12H deluxe, w/arms, headshells & Stanton 500 cartridges, \$40/both. S Todd, 2911 Simpson St, Roseville MN 55113. 612-633-4458.

Audiometrics TP 84, 6 mos old, excel cond, \$175; BE QRK 12C (2), excel cond, has Micro-Trak 300 tonearm w/new Stanton cartridges, 600E model, \$500 for all. M Banks, WSTH, 208 Main, Alexander City AL. 205-234-2566.

Rek-O-Kut B-12-GH 3 speed, gd cond, in base w/extra Shure tonearm, \$100/BO. E Hudson, WIYD, 900 River St, Palatka FL 32077. 904-325-4556.

Rusoco Studio Pro (2), (3) Sparta, some w/one arms, also misc preamps. A Somers, KBBY, Box 5600, Ventura CA 93003. 805-656-6300.

Technics SL1200 MKII w/Stanton 310 preamp, Stanton 680EL cartridge, excel cond, \$400. S Twitchell, Twitchell Prod, POB 982, Columbia MO 65205. 314-875-6715.

SME 3012R (5) 16" tonearms, new, \$200 ea; Gates 16" CB500 TT & pedestal, \$95; QRK 12", \$75. M Holladay, WCOS, POB 748, Columbia SC 29202. 803-256-7328.

QRK 3 speed w/Rek-O-Kut tone arms & head, vgc cond (2), \$150 ea; Gates CB77 w/Grey tonearm & head in vgc, \$100; RCA TT, plays up to 14" discs & has 2 tonearms, one for old transcriptions & one for regular recordings, 45, 78 & 33-1/3 speeds, vgc, \$250. L Bergman, Universal Snds, POB 18716, Spokane WA 99208. 509-328-0766.

Want to Buy

Technics SL1200MKII, gd cond, under \$400. B Gray, Gray Audio, 223 W Mtn Rd, West Simsbury CT 06092. 203-658-6941.

Technics pro TTs & parts, bad/non-working okay. M Steven, WPON, 2222 Franklin Rd, Bloomfield Hills MI 48013. 313-332-8883.

Tonearm, & 16" TT, 78, 33-1/3, 45 speeds, in working order, compatible w/home stereo unit. D Barlow, AG Edwards & Sons, POB 93, Columbia IL 62236. 618-281-5588.

TV FILM EQUIP.

Want to Sell

Gates/Harris TE-201 color film camera on TE-202 multiplexer w/Selectroslide Spectrum 32 slide projector, \$3000; Athena 4000 film projector, \$600; B&H 2592 16mm projector, \$200; RTI film editor, Cinescan II, \$2000; RTI film cleaner, \$1000. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494

Eastman 16mm projector, w/spare parts, \$500; GE PE-24 color film camera (2), \$500, RCA TP-6 projector w/spare TP-6 for parts, \$500. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

VIDEO PROD. EQUIP.

Want to Sell

Q Lock 310.3 machine lockup system w/key-board, gd cond, \$3500; BTX 4500 synchronizer (2), gd cond, \$350 ea. E Luciani, Natl Recdg Stds, 460 W 42 St, NY NY 10036. 212-279-2000.

Quanta Sel 7-3 character gen, \$3000. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

Microtime T-100 TBC, \$3000. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

Microtime 2100 video processor, \$2000; 3M P-100 video proc amp, \$200. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

Grass Valley 900 frame & pwr supply plus (6) 910 pulse DA's, \$250 plus shpg; Sony DA-101 pulse DA, \$50 plus shpg; Sony PSA-101 subcarrier phase shifter, \$50 plus shpg; Lenco PFM-300 mdl 300 frame & pwr supply; Lenco PGS-315 sync gen substitute; Lenco PVD-354 variable delay video amp, \$250 plus shpg; Ampex/JVC VPR-4400 3/4" field recorder, needs audio stack, full doc, \$200 plus shpg; Wheel-It video cart w/spring head & (2) shelves, \$50 plus shpg. K Knowles, Knowles Video, POB 12127 Tallahassee FL 32317. 904-575-6689

Sony VP-1000 & VP-2000 3/4" players, fair cond, as is, \$200/both; Panasonic 8310 camera control unit, \$75; RCA fullsize bdcnt multiplexer for film chain, \$275; B&H 2580 16mm snd movie proj, excel, \$275. G Ormrod, GFO Prod, 432 East X St, Tumwater WA 98501. 206-352-8028.

Digital Phasor IIA TBC w/freeze frame & drop out comp, \$2500. R Kragen, Box 397, Roosevelt NJ 08555. 609-448-4739.

JVC RM 70U remote control for CR6650U w/45 pin cable, BO. P Cibley, Cibley Music, 138 E 38th, NY NY 10016. 212-966-2219.

Panasonic 9" color monitor, \$225; Panasonic twin B&W monitor, \$295; Telemation sync gen, \$500; Video Prod special effects switcher, \$795. C Haynes, WJMI, POB 31235, Jackson MS 39206. 601-948-1515

Panasonic NV-B50 AC adaptor, \$15; Panasonic WJ111 color sync gen, \$200; Sony ACP-220 AC pack, \$50; Sony PSA-101 phase shifter, \$100; (3) visual video DA's, rough, \$50/lot; visual switcher mechanism, as-is, \$30. M Holladay, WCOS, POB 748, Columbia SC 29303. 803-256-7328

Want to Buy

JVC TM-R9U 9" color monitor; Belar TMV-1 TV aural mod mon. ch 4+ or any VHF chnl. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

VIDEO TAPE RECORDERS

Want to Sell

RCA TR-60 2" quad, w/full docs. Great for spare parts, \$500 plus shpg. K Knowles, Knowles Video, POB 12127, Tallahassee FL 32317. 904-575-6689

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Panasonic NV9500, NVA950 editor & edit controller, excel cond \$1000. R Larson, Metropolis Video Prod, 316 S Maple, Oak Park IL 60302. 312-848-3172

NEC VC-9207 3/4" VCR players, like new, \$795; JVC 5200U 3/4" VCR player, like new, \$895. C Haynes, WJMI, POB 31235, Jackson MS 39206. 601-948-1515

Sony VO2860 3/4" editing system w/2 VO2860 editing VCR's & RM430 editing controller, \$2000. C Haynes, WJMI, POB 31235, Jackson MS 39206. 601-948-1515

Want to Buy

BVU 820 or 950 w/slo-mo, trade 1956 Mark II Lincoln for 1" C format editing system. J Harsh, Country Club II, HCR1 Box 117E, Oakley KS 67748. 913-672-3428

RCA TR800's & access, need not be working. H Henson, Henson Prod, 4569 Havencrest Rd, Winston-Salem NC 27106. 919-924-8717.

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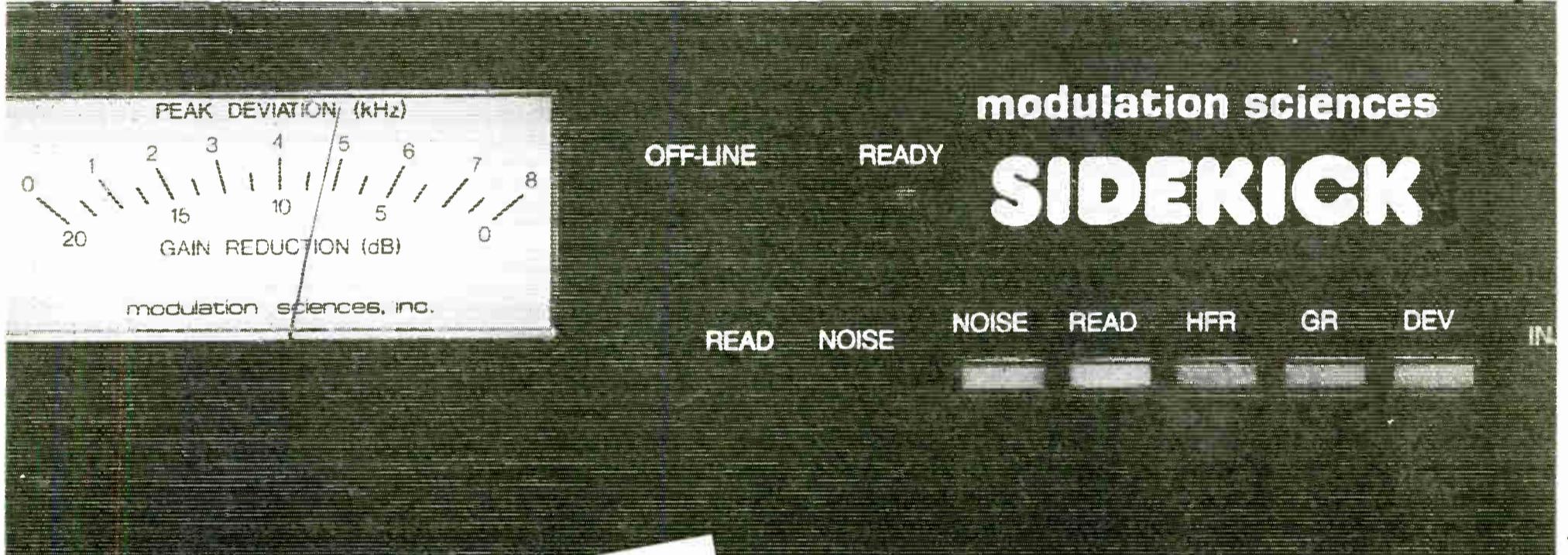
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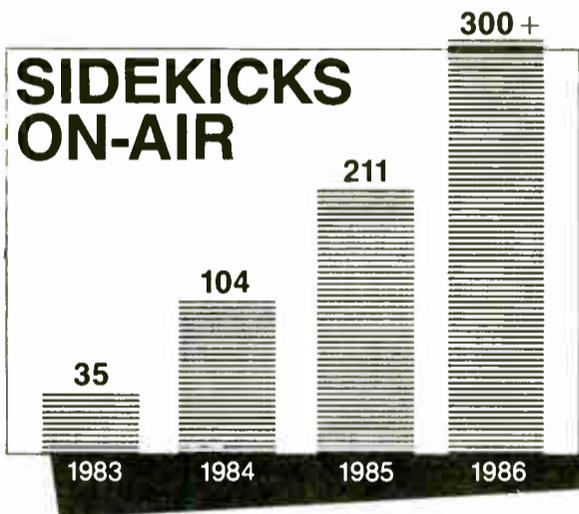
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