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March 1, 1988

Volume 12, Number 5

FCC AM Policies Draw Fire

by Alan Carter

Washington DC ... Broadcasters are urging the FCC to take a more aggressive role—rather than relinquishing its power—in controlling the AM airwaves, according to comments filed in the agency's comprehensive review of AM assignment criteria.

Comments filed for the 1 February deadline address assignment criteria, emission limits and the examination of the National Radio Systems Committee (NRSC) pre/deemphasis curve. The topics are covered in sections II and III of the FCC Notice of Inquiry (NOI) issued in July 1987.

A second series of comments focusing on antenna issues and more subjective audio listening studies, sections I and IV, are due 17 June.

Major group owners, engineering con-

sultants and the NAB were among almost 20 who chose to comment on the Commission's technical standards for allocating AM stations.

Most cited serious interference problems as reasons that AM has been losing listeners to FM over several decades (recent surveys have put AM's share of the audience down to 23%).

Many blamed the FCC's outdated policies for contributing to conditions where interference can occur.

When the Commission released its

NOI, Docket 87-267 last July, it proposed several changes to present allocation policies for AM.

Among issues covered in the February filing are whether interference should be permitted in areas subject to preexisting interference, and whether applicants should be allowed to receive interference overlapping normally protected contours.

The NOI also asked if the FCC should allow individual stations to negotiate their own interference rights.

Under related technical issues, the NOI sought opinions on whether unattenuated transmitted audio frequencies should be further restricted in order to reduce adjacent channel interference.

Two other sections covered skywave propagation, where the FCC has proposed a latitude-dependent skywave model, and calculation methodologies, particularly whether the current procedures using the root-sum-square (RSS) 50% exclusion principle should be maintained.

FCC blamed

The NAB challenged the FCC on many of the docket's proposals, charging they would "contribute significantly to the levels of intolerable interference now experienced by radio listeners."

The NAB called on the Commission to freeze grant applications for new AM stations and major changes to existing stations (see related story, this issue).

"We want the Commission to stop what it's doing; reverse itself and adopt new rules of policy that are designed to preserve and improve the quality of service rendered by today's AM stations," said Michael Rau, VP of Science and Technology for NAB.

The NAB said the proposals focus on ways to expand opportunities for new stations or to increase the flexibility of existing ones, policies the association blames for current interference levels.

"NAB now urges ... a reversal of this policy as it applies to AM broadcasting," the comment stated. However, the NAB continued, "We do not oppose the introduction of new station opportunities that have the potential to serve AM listeners in unserved communities and/or without creating or receiving additional interference."

Skywave

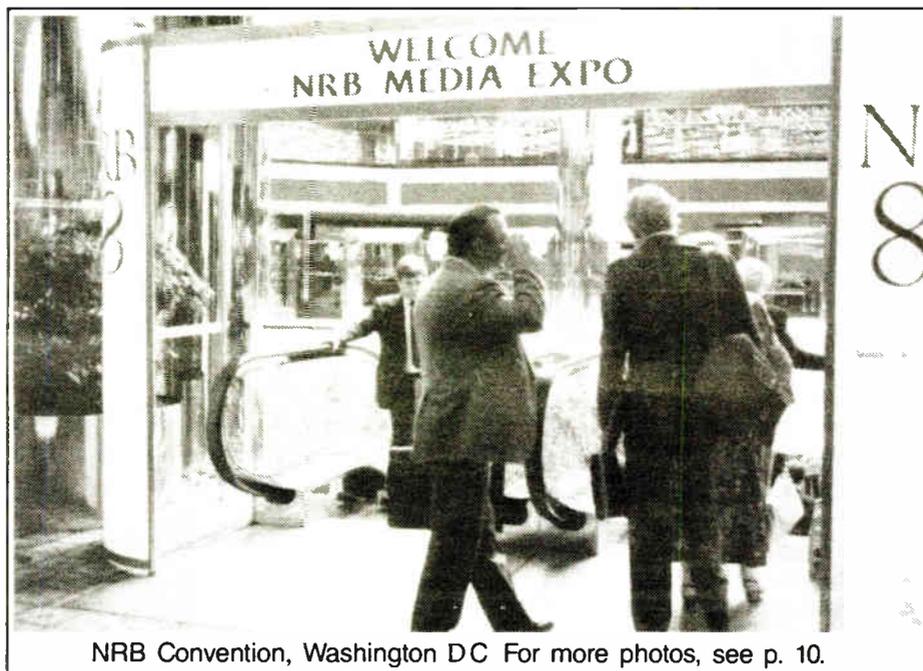
Skywave service issues were among the AM concerns which received the most extensive comments. Many, especially those from clear channel station owners, oppose massive changes in skywave protection.

But Dallas-based Crawford Broadcasting, which owns six radio stations, made a radical proposal to eliminate skywave altogether for clear channel stations.

"Deletion of such skywave protection would open avenues for nighttime operation by Class II stations that are presently located within the 0.5 mV/m 50% skywave contour of co-channel Class I (clear channel) stations," Crawford argued.

Crawford said clear channel stations served their purpose when radio stations were sparse, but now local service is available in almost every community. "The provision of local programming rather than programming from afar is

(continued on page 8)



NRB Convention, Washington DC For more photos, see p. 10.

NAB Asks for Freeze on AMers

by David Hughes

Washington DC ... The NAB, joined by other broadcasters including Capital Cities/ABC, has called on the FCC to put a freeze on granting new AM stations and major change applications at existing AMers.

The association's request came 1 February in comments it filed on the Commission's Notice of Inquiry to examine AM technical standards. NAB President Edward Fritts also requested the freeze in a letter to FCC Chairman Dennis Patrick.

"The FCC should change its policies and technical standards for AM radio to reduce interference," the NAB said. "While those changes are being considered, the FCC should freeze all grants of new station and major change applications."

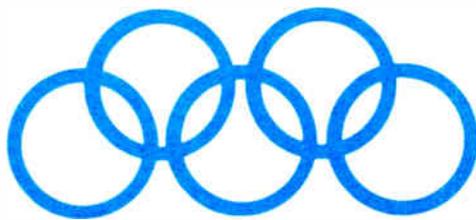
"Blind adherence"

In its filing, the NAB said that "the Commission's blind adherence to the goal of 'creating additional opportunities for new and improved service to the public' is based on fictional 'public benefits' where such 'opportunities' merely contribute to an interference environment so egregious that no new listeners and fewer pre-existing listeners are attracted to the new band."

"The AM band as a whole has been degraded as the inevitable result of previous FCC allocations policies and

(continued on page 11)

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REGULATORY NEWS

FCC Files

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AM Technical Deregulation

Broadcasters filed comments in February on the FCC's July 1987 Notice of Inquiry which reviews the technical assignment criteria for AM broadcasting. In the comments, broadcasters generally supported then National Radio Systems Committee's (NRSC) pre/deemphasis standard, as well as urging the FCC to more forcefully enforce technical criteria.

In an effort to reduce interference on the band, in its comments the NAB called for a freeze on the new AM station grants, as well as on major change applications for daytimers. For more information on the comments see the related stories in this issue.

A formal review of the AM assignment standards was initiated by the FCC in July 1987. The review addresses the question of whether to overhaul rules which set the degree of interference protection for AM stations, as well as those that establish service areas.

A second round of comments is due to be filed on 17 June on sections of the Notice of Inquiry dealing with antenna issues and audio listening studies.

According to Wilson LaFollette, of the FCC's policy analysis branch, the Commission will release a series of specific rulemaking proposals on AM assignment criteria after studying the comments.

The docket number is MM 87-267. Contact Wilson LaFollette at 202-632-5414.

AM Stereo

On 14 January, the FCC Commissioners voted 3-0 not to pick a US AM stereo standard. The Commission also refused to require the manufacture of

multimode receivers or to protect the pilot tones of AM stereo systems.

The FCC formally dismissed three pending petitions. One, filed by Texar, had requested that the Commission select a single AM stereo standard. Two others, one filed by Press Broadcasting and the other by Washington DC engineer Winfield Standiford, asked the FCC to require multisystem circuits for AM stereo receivers.

The Commission indicated that "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."

Motorola, the developer of the C-QUAM system, which is in use by more than the 70% of the 10% of AM stations that have gone stereo, called the FCC action a confirmation that a defacto standard had been reached and that it was C-QUAM. Leonard Kahn, developer of the opposing Kahn ISB system, and proponents of his system view the FCC's action as a sign that a stereo decision should be left up to individual broadcasters to decide for themselves.

The FCC's AM stereo contact is William Hassinger at 202-632-6460.

AM Daytimers

In November 1987, the FCC approved a plan to allow certain qualifying daytimers operating on regional channels and on 940 and 1550 kHz to add nighttime operations. The ruling permits affected daytimers to operate at night with a maximum power of 500 W, "reduced as necessary to avoid interference to ex-

isting full-time stations."

The FCC action is the latest in a series of rule changes allowing increased nighttime operations for daytimers. In the past, the Commission has also allowed daytimers on foreign (Canadian and Mexican) clear channels to add night operations.

In another development, the FCC in late 1987 amended its rules to allow daytime-only AM radio stations to start daily pre-sunrise operations at 6 AM with a minimum power of 10 W, as long as no interference is caused to ground-wave contours of clear channel stations.

The daytimer forces are now directing their attention to obtaining night operations for daytimers on US clear channels.

The regional channel daytimer plan is contained in FCC docket MM 87-131. Contact Louis Stephens at 202-254-3394.

Dial-up remotes

The FCC, at an October 1987 meeting of the Association of Federal Communications Consulting Engineers (AFCCCE), unveiled a list of potential clarifications to its dial-up remote control transmitter rules.

The 11 points, which Commission officials say may be released as a public notice in the future, cover a wide range of remote functions. They specify that the use of dial-up circuits is legal for metering, adjustments and control. But they also indicate that EBS monitoring and backup control must be provided.

The FCC said it would study any comments it received on the clarifications and then decide whether to issue a public notice or some form of rulemaking procedure. As of early February, no additional action had been taken.

Contact John Reiser at the FCC: 202-632-9660.

Synchronous Transmitters

The FCC is continuing its investigation on whether to allow widespread use of AM synchronous transmitters. So far, several stations have been granted authorizations for experimental syn-

chronous transmitter operations.

The Commission, as well as the NAB, is waiting for test data from several on-air experiments such as one taking place at KROL in Laughlin, NV. No date has been set by the FCC for an action on the proposal, which was announced in early 1987.

The issue is contained in docket MM 87-6. Contact Jay Jackson at 202-632-9660.

Broadcast Auxiliary

In December 1987, the FCC rejected a plan which would allow "more flexible" operating and licensing procedures for a variety of broadcast auxiliary services, such as remote pick-ups.

The plan called for blanket frequency authorizations for mobile or portable operations on any frequency in bands the services are permitted to use.

Even though comments filed last summer with the Commission generally supported the plan, the FCC said the industry should continue its work to develop the structure of a frequency coordination forum and then resubmit a plan for changes in auxiliary services.

The FCC said that the "focal point for frequency coordination should be an industry-created and operated forum, such as the National Frequency Coordinating Council," instead of with the Commission itself.

The FCC docket number is MM 86-405. Contact Hank VanDeursen at 202-632-9660.

FM translators

During a meeting with NAB officials in late 1987, FCC Chairman Dennis Patrick indicated that the FCC would issue a rulemaking effort in early 1988 that will address a number of issues surrounding the use of FM translators.

The FCC said that the item will examine the use of translators to extend a station's coverage well beyond its 1 mV/m coverage area, as well as so-called "third party" translators, which are not owned by the station they relay.

The NAB has maintained that the Commission's translator rules are being "abused" when stations in one market hire translators in another market to relay their signals, thereby creating unfair competition for the primary, local sta-

(continued on page 6)



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Support For Mandatory NRSC

by Alan Carter

Washington DC . . . Support is growing for a petition asking the FCC to make mandatory the transmission portions of the National Radio Systems Committee (NRSC) AM preemphasis standard, based on comments filed with the FCC.

The NAB filed a Petition for Rule Making in November 1987 asking the Commission to adopt the transmission section of the NRSC standard, currently a voluntary standard. The Commission sought comment by February 1 as part of its comprehensive review of AM technical standards (see separate story this issue for full report on the review).

The standard includes a 75 μ s preemphasis limit and an audio bandwidth specification limiting stations to 10 kHz—instead of the 15 kHz allowed in the Commission's occupied bandwidth specifications.

The NAB argued in its comments on AM technical standards to the Commission that the 10 kHz audio bandwidth will reduce second-adjacent channel interference and foster the creation of NRSC high-fidelity receivers.

Capital Cities/ABC, owner of seven AM stations, noted that the NRSC standard is not the total answer but the adoption of the proposal "would go a long way toward restoring AM service to parity with FM service."

Other support for a mandatory NRSC standard came from Crawford Broadcasting, owner of six AM stations, who said the move would increase spectrum efficiency, fidelity and intelligibility of AM station audio.

"Steps (also) should be taken to encourage receiver manufacturers to implement the characteristics of the NRSC standard in production receiver design," the company continued.

Group W called for immediate adoption of the standard. Group W AM Engineering Manager Glynn Walden said the proposal would solve the frequency

response problems of current AM receivers.

CBS also endorsed the standard and noted that stations using it voluntarily report decreased adjacent channel interference and a higher quality signal.

Tighten control

CBS also stated its support for more stringent restrictions on presently permitted amplitude carrier modulation, in order to restrict further the effects of heavy clipping on negative peaks now employed by stations to prevent over-modulation.

Gannett, owner of seven AM stations throughout the country, limited its entire Docket 87-267 comments to the NRSC standard, endorsing the proposal as "a standard which offers the AM broadcasters improved fidelity, maximized population coverage through reduced interference, and promotes spectrum efficiency."

The Consumer Electronics Group, representing receiver manufacturers, also endorsed adoption of the NRSC standard with an effective date of 1 January 1990, as proposed by the NAB.

The Association for Broadcast Engineering Standards stated in its support for the standard that such a move would encourage receiver manufacturers to spur production of high fidelity receivers.

"Adoption of a standard preemphasis curve," the association continued, "would result in a more uniform broadcast station signal characteristic and permit manufacturers to more effectively design sets for a better quality receiver and greater competitiveness with other audio type signals."

WGN Broadcasting, whose parent company Tribune Broadcasting owns three AM stations, also reiterated its support for the NRSC standard and wrote that it would reduce AM interference "while promoting the further development and availability of higher-quality,

wider-bandwidth AM receivers."

Other support for a mandatory standard came in comments filed under the NAB's Petition for Rule Making, Docket RM-6174. Susquehanna Radio, Orban, Fisher Broadcasting, NPR, the SBE, Delta Electronics and Motorola all argued favorably to make the NRSC an FCC rule.

Opposition

Support for the NRSC standard was not unanimous, however.

Bonneville International, a Salt Lake City-based owner of five AM stations and one of the initial opponents of the NRSC standard, proposed a "gentle boost and then a gentle roll-off to 15 kHz" to reduce first and second adjacent channel interference.

"This also will cause no second adjacent channel interference," Bonneville argued, "and sounds better than harsh NRSC processing."

In its comments, Bonneville questioned whether the 5 kHz broadcasters would be giving up if the NRSC was made mandatory could ever be recovered in the future. "If receiver manufacturers move to 10 kHz," the Bonneville comments noted, "how will it be possible to move back to 15 kHz bandwidth?"

Bonneville stated that the current 15 kHz bandwidth and the future 15 kHz

goal in the NAB petition "will be lost forever" if a mandatory 10 kHz bandwidth limitation is adopted.

Another argument by Bonneville is the contention that the second adjacent problems are experienced only in the eastern US, "the result of stations improperly authorized under former Commission tradeoff policies." The firm said it operates KSL-AM in Salt Lake City with 15 kHz audio bandwidth without problems.

"Bonneville submits that any problems should be addressed specifically where they exist," the company wrote. "It does not believe the solution is to create additional problems for AM stations in the western United States."

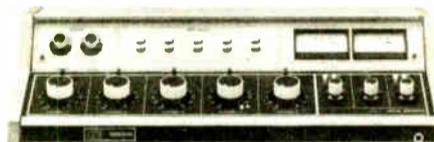
Noble Broadcasting, a San Diego, CA-based owner of four AM's and five FM's, and Jacor Communications, a Cincinnati, OH-based owner of five AM's and seven FM's, also expressed their opposition to the NRSC standard. Their comments were filed under the NAB's Petition for Rule Making.

"Although restricting the audio bandwidth to 10 kHz certainly reduces the degree of interference to second adjacent channels, which are most vulnerable," Noble noted, "it is not clear that the elimination of the 10 to 15 kHz range, which would result, is a negligible

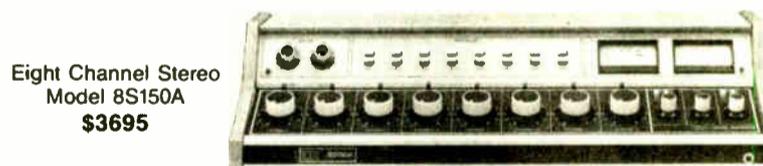
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15 Console Models Mono or Stereo

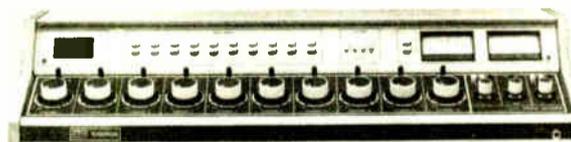
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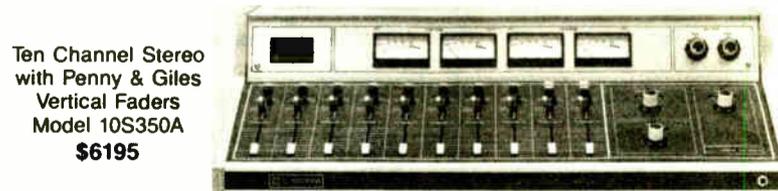
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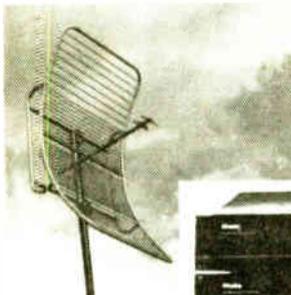
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"Heavy" Support Rallies for NRSC

by Judith Gross

Falls Church VA ... The FCC is busily sorting through the first round of comments on AM technical standards and trying to decide what stays and what goes when it comes to interference protection, skywave and the like.

Broadcasters were especially vocal about the NAB's petition to make the NRSC a mandatory rule. There were more for than against, but the most impressive, kind of overwhelming, comments filed came from CRL, in a spiral-bound book weighing several pounds.

The processor manufacturer has been an NRSC participant and supporter of the standard since the beginning. But CRL didn't just rely on its own opinions to convince the FCC that the standard would be good for AM.

The company sent out two mailings asking stations to indicate their support

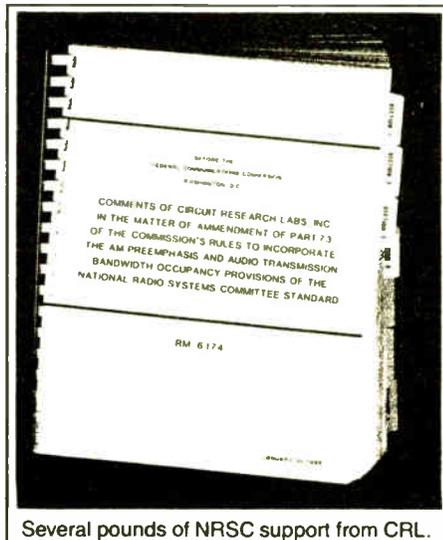


(or opposition) to the NRSC standard by saying whether they would make the switch.

The first letter lamented the death of good AM receivers and then told stations they had a chance to change all of that with their conversion to the standard.

How many stations responded? A total of 1215—24% of all AM stations! CRL says the response alone shows there are more concerned broadcasters in the industry than anybody realized.

Of the stations responding, 94%—more than 1100—said they intended to comply with the standard or already had. That's more than the NAB's official count, which stands at about 587.



Several pounds of NRSC support from CRL.

Comments from broadcasters about the standard were also encouraging.

"The audio quality is as good, if not better than before," one station reported.

Another said, "The next morning the announcers were asking me what had I done to the audio, it sounded much better."

This should all be good news to receiver manufacturers contemplating the design and marketing of new AM radios. And CRL is going to make sure that the news is heard. The company forwarded broadcaster responses to 45 receiver companies to help rejuvenate their interest in AM broadcasting.

And now the support from the stations is on the record at the Commission as well. It's great to see definite sentiment on the part of AMers to reduce interference and clean up their own act.

And it's great to see an equipment vendor like CRL show support for broadcasters without trying to sell them something (there was no sales pitch in the mailings).

Now let's see the receiver manufacturers respond with those new radios.

☆☆☆

For anybody wondering what's been going on with CSI Electronics, the word

is out. After bidding by a number of contenders, CCA Electronics Inc. has acquired all the assets of CSI Electronics, in a bankruptcy proceeding.

CCA president Ron Baker made the announcement, and is making sure that CSI customers are taken care of. He says that CSI transmitter owners may now purchase parts and request service through CCA's subsidiary, Broadcast Parts and Service.

The contact if you need the parts or service is Jayson Albright at 404-964-3764. It's been an interesting year for the transmitter companies, hasn't it?

☆☆☆

It was a good time of the year for a gathering of engineers.

It was too warm for snow but well before the lightning storm season. So about 150 radio and TV CEs showed up for the Virginia Association of Broadcasters engineers' seminar and trade show in February.

The attendance was predominantly radio, and there were about 15 companies showing their wares.

This was the first time the VAB tried it this way. In past years their annual meet was a Virginia Beach affair mostly for GMs. It had a business-plus-resort atmosphere.

The VAB seminars seemed to center around the theme of keeping the FCC happy. Attendees heard from Dan Emrick, of the FCC's Norfolk office on common engineering problems stations can avoid.

Then several consulting engineers from duTreil, Lundin & Rackley, Inc., including Bob duTreil, talked about compliance with FCC regulations.

Later on, new tech was the focus. Greg De Priest from the Association of Maximum Service Telecasters talked about planning for HDTV.

But when he saw that radio attendees outnumbered their TV counterparts, he threw in a few Gary Hart jokes just to keep their attention from wandering.

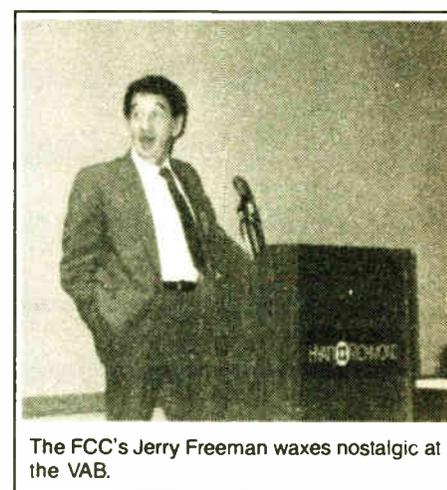
De Priest was a tough act to follow, but the NAB's VP of Science and Technology, Mike Rau, let attendees hear for themselves how the NRSC standard cuts second adjacency interference in a demo played from the NAB's very own R-DAT machine.

R-DAT is not the point of it, of course, the benefits of the standard are, and the difference between a simulated second adjacency problem with and without the NRSC filter was dramatic.

Rau said the first NRSC receivers—from Delco—should be appearing on the market in "late 1989."

☆☆☆

But the highlight of the afternoon was a trip down memory lane with Jerry Freeman, FCC Engineer-in-Charge, who reminisced about the time when rules



The FCC's Jerry Freeman waxes nostalgic at the VAB.

were rules and CEs lived in dread of the day when the field inspector knocked on the transmitter door.

Freeman talked of a time when station employees played practical jokes by calling up the CE at some odd hour and announcing in solemn tones that the FCC guy was at the station.

He mentioned the RF radiation concerns of the current era. "I remember," he said, "when transmitters were so big engineers slept inside them." Looking around at the luncheon crowd he added, "We're all worried about RF radiation, but I see a lot of old engineers out there."

"Yeah," came a voice from the back of the room, "but we aren't having kids anymore."

And Freeman replied, "And you're going to blame that on RF?"

He said he remembered a time when the FCC had better equipment than the station shops did. Ah yes, those were the days ... but is anybody really mourning them?

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OPINION

Readers' Forum

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No cause for despair

Dear RW:

I can understand the nature of Jim Bradley's predicament, (1 December RW "Readers' Forum") but I also agree with the editor that hand-wringing and despair are not the solution.

The FCC has bungled the AM stereo issue about as badly as it could have been done.

Maybe it was a fear of standardizing a less than optimal technology; maybe it was a lot of confusing noises from proponents of the various competing systems.

In any case it now appears the industry has voted in the C-QUAM system as the AM stereo standard.

The real deficiency now is the lack of AM stereo receivers. They are almost nonexistent—even specialized retailers seldom stock them.

Is that cause for despair? No, of course not. There are some receivers being made and the decline in number of models can be reversed.

Hey, AM stereo broadcasters, why not pool your resources, pick a good, reasonably priced model, buy a whole boat-load of them and put on a free radio give-away contest promotion of some sort?

It might do wonders for improving their availability in the stores and thus further expand your potential audience beyond what the initial promotion might do.

Give-away promotions are nothing

new to this business.

And it doesn't have to be prohibitively expensive if you get the sets in bulk through an industry association.

Some of the set makers may have loads of them sitting around in warehouses; they might make a very good deal or even go in on the promotion.

Of course, you better have something worth listening to for this kind of promotion to do any good in the long run. And that means both in terms of sound quality and program content.

Andy Melnyk
Holden MA

Contracting horror story

Dear RW:

First, let me say how much I appreciate *Radio World*. Down to earth technical news and events for the engineer/technician. Thanks!

Now for the business of this letter. This concerns the appalling state of broadcast in my neck of the woods here in Kentucky.

I guess I was spoiled, getting into radio in the mid-sixties as a First Phone.

I first worked for a couple of stations (WAVE AM-TV and WAKY AM) in the Louisville area. These stations both had chief engineers of the old school.

Do it right and do it legal or do it somewhere else! This is the kind of atmosphere in which I learned broadcasting.

If something was out of tolerance, it was reported and if this tolerance was specified in the license, the offending gear was repaired immediately and so noted in the logs.

After 10 years I left WAVE to go into business on my own. This business is not closely related to broadcasting, but to keep my hand in, I occasionally do maintenance work at radio stations out in the country.

I'm getting used to hearing: "Who do you think you are, charging \$50 an hour to fix my transmitter! I can get the guy over at the TV repair shop in town to fix it a lot cheaper!"

When asked why I was called in to do the emergency fix of a sloppy haywire done by the TV guy, all I get is "He was too busy" or "I couldn't get in touch with him."

In my travels, beginning with deregulation, I've been witness to some stations which I can call horror stories. It seems that with deregulation has come the wheeler-dealer in radio properties.

The prices paid for some of the stations I've seen are scary and I've seen more than one new owner go under because the station couldn't earn enough money to make the payments on the note.

Along with the "El-Gyppo" syndrome, the new crop of owners aren't familiar with either the equipment or the laws under which it operates. I've seen cases of "Run it 'til it quits, no matter what the meters say," and "Don't tell me it's running illegally, I don't want to know!"

Owners can't relate their broadcast

The NAB's request to the FCC to freeze grants for new AM stations and major changes pending review of its technical allocations is dramatic.

Hopefully it's a move born of good intentions aimed at stemming AM's problems and declining listenership.

But like many of the NAB's stands on policies which would mean an increase in the number of stations, it smacks of an attempt to maintain the status quo.

In fact, the NAB Board recently asked its staff to prepare a white paper criticizing the FCC's attitude that the public is best served by licensing more and more stations.

The NAB seems to be endorsing the idea that the number of radio stations should be fixed, with no further competition desired from new licensees.

AM Needs No Freeze

While overcrowding and the resultant interference on the AM band may have been by-products of FCC allocations policies, there is no hard evidence that links an increase

in new stations to the decline of AM listenership.

Several hundred new applications and major change requests would be affected by a freeze. Since the the FCC is not known for its swiftness, it could be months or years before the Commission completes its allocations inquiry.

There's a possibility that a "temporary" freeze, once in place, might never be rescinded and become permanent.

In addition, fear of an impending freeze on AM grants could force a panic which would flood the FCC with a mass of applications for new stations and major changes in a desire to get in before the freeze takes effect.

The FCC's approach to granting as many stations as the marketplace will support is a healthy one. More stations mean more diversity and a growing—albeit competitive—industry.

If the current method of allocating stations causes interference then the Commission should be encouraged to change the technical specifications.

The FCC should disregard the NAB's request for a freeze and get on with the important job of reevaluating its allocations and interference criteria, and making the changes that will truly benefit the AM band.

—RW

equipment to their cars. If properly maintained on a more or less regular basis, it will run reliably and economically.

If you run it till it quits, it will cost you a tow job and major repair expense as well as the loss of transportation for the duration of the repairs. What's the difference between a car and a transmitter?

On more than one occasion I've been called to work on a plant that was actually scary to see. One station had been operating illegally for 24 hours a day for almost a year because the remote control had quit.

Someone had just gone to the transmitter site (eight miles from the studio) and switched the transmitter to local control.

If the transmitter tripped-off, someone had to drive the eight miles and restart it. The owner didn't know that he was required to be in control of the transmitter at all times and have some vague idea of what it was doing!

The owner also didn't know he was required to have some semblance of an EBS receiver and procedures!

The owner lived in another town about 50 miles away and his only full-time employee was required to live in the apartment above the studio.

After 5 PM, the employee simply switched the output of the satellite switcher to the program line and left for the night, not returning until the next morning. The station was left unattended for the night!

If you think this is bad, what caused me to be called to the station in the first place was to move the transmitter from the building in which it was then housed to a new building adjacent to it.

The transmitter building was located

in the country about 100' from the intersection of a farm road and a county road.

The owner of the property wanted to get rid of the eyesore building they were renting to the station because the station wouldn't maintain it and it was a derelict.

The owner of the station had been putting off the move for over six months and I was called after the landlord had gotten disgusted with waiting and demolition had been started.

When I got there, most of the building had been torn down except for the part of it which housed(?) the transmitter. No door kept out the casual visitor, just a piece of plastic sheeting!

The transmitter, virtually trashed by poor or idiotic maintenance, had a piece of cardboard taped over the opening where the original exciter had been removed.

You could move the cardboard and get all over the HV power supply!

Add to this the fact that there was *no fence at all* either around the tower base or the transmitter building! There had apparently never been a fence!

When told of the major infractions, the owner asked for a quotation for getting the station legal.

After writing a lengthy report covering only the fixing (not repair) of the most gross violations of FCC regs and giving what I thought was a reasonable price for these repairs, I heard nothing until a couple of weeks later when I got a call from the employee.

It was a Monday morning, drizzling a late fall rain. The guy said that the transmitter was off the air and when he tried to put it back on he got a fireworks dis-

(continued on page 9)

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FCC Files

(continued from page 2)

tions in the other market.

No time frame for the new rulemaking effort had been announced.

In a related issue, there has still been no action on the FCC's Notice of Proposed Rulemaking to allow noncommercial FM translators to be fed by satellite or land-based microwave, after more than a year. The FCC indicated that there is no timetable for action on this issue.

Released as docket MM 86-112 by the FCC in April 1986, the proposed rule change came in response to several previous requests from Chicago's Moody Bible Institute (MBI). Many broadcast groups oppose MBI's requests, maintaining such a change would produce "objectionable" interference on TV Channel 6 and might result in a "de facto" network of translators.

Contact Marcia Glauber at the FCC: 202-632-6302.

RF Lighting

RF lighting devices, which are believed to cause interference to AM broadcasting, will continue to be regulated by FCC standards for industrial, scientific and medical equipment, the Commission announced in late 1987.

The standards, the FCC said, are sufficiently effective in preventing interference to telecommunication services from the lighting devices.

Docket number is GEN 83-806. Contact Liliane Volcy at 202-653-7316.

FM2

The firm that owns a New Jersey AM daytimer has asked the FCC to allocate a portion of the UHF-TV band for a second FM radio band. In late 1987, Radio New Jersey (RNJ) proposed that the FCC reallocate 578 to 596 MHz (UHF TV channels 32-34) for the creation of 90 new FM radio channels.

Originally, RNJ had asked the FCC to set aside 225-230 MHz for its "FM2" band, which would be used by AM daytimers and interference plagued AM fulltimers. Eventually, the plan says,

when the stations move out of the AM band they would not be replaced, thereby reducing band clutter for the AMers that remain.

However the FCC in 1987 turned down the 225-230 MHz plan because it is allocated for military purposes.

As of early February, the FCC had not acted on the plan. A time frame for action had not been set. Contact Larry Tighe at RNJ: 201-850-1000.

Cuban interference

In November 1987, officials from US and Cuba held talks in Mexico City to "delink" the ongoing broadcasting dispute between the two nations from other issues, such as immigration.

The delinking action, FCC officials say, still is far from resolving all the issues of Cuban AM band interference. However, they say they hope that future meetings, which could take place this year, may produce some results.

In a related issue, the NAB has expressed fear that a study to create a TV version of the existing Radio Marti serv-

ice may aggravate the situation. Radio Marti is the VOA produced Spanish language service beamed to Cuba. Congress has earmarked funds for an early 1988 study of the feasibility of TV Marti.

One issue that awaits resolution is Cuba's demands to retaliate for the Radio Marti service with an English language AM service beamed from Cuba to the US.

The FCC contact is Wilson LaFollette at 202-632-5414.

Ownership limits

At press time, no further action had been scheduled by the FCC regarding its proposal to relax duopoly and one-to-a-market rules.

In early 1987, the FCC proposed allowing ownership of UHF stations with AM and FM stations in the same market. Ownership of AM stations with either UHF or VHF television stations would also be permitted.

Current rules prohibit cross ownership of radio or TV properties if the service contour of the purchasing facility completely encompasses the community of license of the station to be purchased.

The Commission's proposed relaxation of the rules has earned the support of

a number of broadcasting concerns. Recommendations from broadcasters who filed comments with the FCC ranged from case-by-case evaluation of station combinations to lifting restrictions entirely.

Contact Andrew Rhodes at 202-632-7792.

FM Regulations

In August 1987, broadcasters filed mixed comments on a plan to allow increased use of FM directional antennas in some short-spaced situations.

The FCC inquiry, issued earlier in 1987, considers the authorization of FM directional antenna systems to reduce the distance separations between an FM station's transmitter site and adjacent and co-channel stations and allotments.

The NAB commented that the widespread use of directional antennas would increase clutter and interference on the FM band. However, other groups, such as the Association of Federal Communications Consulting Engineers supported the use of directional antennas on a limited basis.

No date has been set for FCC action. The issue is contained in docket MM 87-121. Contact Bernard Gorden at 202-632-9660.

Support Shown for NRSC Standard

(continued from page 3)

fidelity consequence."

Even though the upper portion of the audio spectrum is "indeed beyond the capabilities of today's receivers," future developments in AM receiver design may yield methods of achieving full audio bandwidth with less or no pre-emphasis, thus rendering a 10 kHz cutoff unnecessary, Noble continued.

"Although much has been made of the second adjacent channel interference reduction that would result from imposing a 10 kHz response limit, the fact is that current narrowband receivers are relatively insensitive to interference 5 kHz away and provide extreme rejection for interference 20 kHz away."

Noble expressed its reservations that if proposed NRSC receivers are not accepted in the marketplace, or if better

technology requiring different transmission characteristics is developed, broadcasters and receiver designers will have very little flexibility because rule making on technical parameters is a slow process.

"Despite all of the good intent on the part of interested parties, there appears to be the very significant risk that adopting NRSC as a mandatory standard could actually have the effect of impeding AM improvement rather than promoting it as intended," Noble concluded.

In its comments, Jacor said NRSC testing at two of its stations proved that the NRSC standard "sounds bad." The company maintained that the stations' audio lost its fullness, the high end became strident and the stations fared poorly in subjective AM/FM comparisons.

Jacor argued that mandatory use of the NRSC standard could lead to a further decline in AM's share of the radio listening market. Today's broadcasters manipulate audio processing and equalization to achieve the sound they want—much like a chef uses herbs and spices to season a dish, the company stated.

Mandating uniform equalization would "be similar to sending the AM listening audience to the same restaurant day after day after day."

Doubts about receivers

Bonneville also commented that it seemed inappropriate for the NAB to ask the FCC for mandatory transmission standards that restrict AM bandwidth, without also "asking or requiring" receiver manufacturers to complement that transmission standard.

"Despite the NAB's sanguine outlook, there appears to be no incentive for receiver makers to complement the NRSC standard," Bonneville noted. "This is demonstrated by manufacturers having second thoughts about implementing their half of the NRSC standard."

William Loveless, VP engineering for Bonneville, claimed that recent reports about the marketing of NRSC show that no senior management (of receiver firms) has committed to the standard, "only staff."

He said Bonneville has not seen a "firm commitment as to a date (when) we'll have a product on the market."

However, Delco design engineer Bill Gilbert, one of the co-chairmen of the NRSC, has confirmed the company's decision to build and market NRSC receivers when enough AMs have converted to the standard.

But Loveless maintained, "an engineer doesn't count; it's got to be a marketing type guy."

Reply comments on the full review process are due March 1.

The FCC docket for the review process is MM 87-267. Contact Wilson LaFollette at 202-632-5414. The FCC docket for the NRSC Petition for Rule Making is RM-6174.

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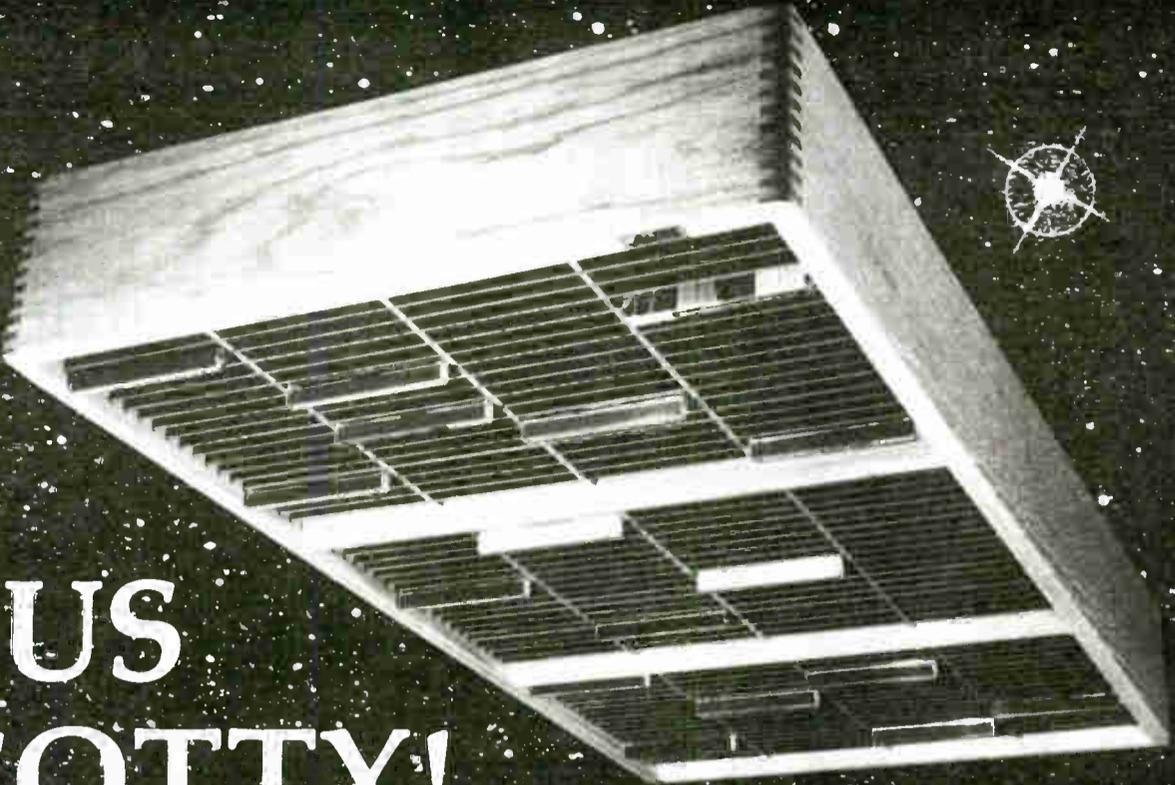
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AM Policies Criticized

(continued from page 1)

the heart of the Commission's . . . obligation," Crawford noted.

Clear Channel Broadcasting Service, an informal association of clear channel stations that benefit from the current skywave propagation model, stated that Docket 87-267 may actually show that "skywave service requires a higher degree of protection than that now accorded it."

CCBS urged the Commission not to move forward with changes in the methods for predicting propagation. The group expressed reservations about the "modified method" for determining skywave propagation based on latitude.

CCBS claims its adoption "could lead to massive disruption of the AM band as interference and service areas are recalculated."

Yet, CBS, Bonneville International and the Association of Federal Communications Consulting Engineers (AFCCE) were among those urging the FCC to pursue work on a "modified method" for determining skywave propagation.

CBS asked for a rulemaking to examine further this "modified method" skywave model. But CBS insisted that the Commission "should not adopt any propagation model that would reduce the protections afforded by the existing allocations standards."

Bonneville, based in Salt Lake City and operator of five AM stations, also endorsed the "modified method." It stated it believes that the improved model should be used in determining protected contours as well as in calculating interference levels.

Both Cap Cities/ABC and the NAB supported the "modified method" as well.

Negotiated interference

There was strong opposition to the FCC's idea to permit negotiated interference. But as in skywave propagation, Crawford took a different stand and supported negotiated interference,

provided limitations "assure the public a quality signal from all stations concerned."

However the NAB argued, "We do not believe that allowing more interference in the AM band, by agreement among licensees or otherwise, 'improves' AM broadcasting as would be perceived by the listening public."

The association, however, would not be opposed to "one-way" interference negotiations. "We wouldn't mind allowing a licensee to purchase some service area that would result in the improvement of the level of service to the listeners," said NAB's Rau.

CBS and Bonneville opposed negotiated interference partly on the basis that the Communications Act of 1934 established the Commission to regulate the airwaves, and in their opinion it could not relinquish that authority.

Bonneville charged that such a move by the FCC would be an "abdication of Commission responsibility," and added, "It is unclear that the Commission can, consistent with its mandate . . . adopt proposals which permit private parties to determine the levels of interference the public should accept."

CBS continued with this point, stating "the Commission cannot delegate either the federal licensing power . . . or the obligation imposed on the FCC . . . to assure that the distribution of licensees, frequencies and power is 'fair, efficient, and equitable' among the several states and communities."

The Consumer Electronics Group (CEG) opposed negotiated interference because it claimed that it would have an effect opposite that of the NRSC standard, namely that it would worsen interference on the band.

AFCCE also opposed negotiated interference. "The important consideration of negotiated interference if it is established as an allocation tool is to uphold the 'public interest' factor and that can only be administered by an independent body such as the FCC," the

group explained.

Capital Cities/ABC opposed the move with or without Commission supervision. "In short, because of the complexity involved in such a system and the service that will be lost (even if the affected stations agree to it), the proposal is a bad idea, one which will penalize the public no matter how conscientiously it is administered," the network wrote.

Group W, which owns seven AM stations, presented a variation to the negotiated interference, a proposal that AM Engineering Manager Glynn Walden called "negotiated elimination of interference." Under the proposal, a broadcaster would pay an interfering station to modify its transmitter or tower.

Interference received

On the proposal of allowing new stations to accept interference, the NAB voiced opposition echoed by many others. The NAB called the idea an extension of the FCC's existing policy that is "at least partially responsible" for existing interference.

"The unquestioned consequence would be that even more listeners would experience AM interference and would be dissuaded from continued listening to the AM band," the NAB argued.

Bonneville agreed with the NAB stating, ". . . This proposal would simply create new stations with small coverage areas subject to severe undesired interference from existing stations and incapable of generating sufficient revenue."

Overall, allowing new stations to go on the air with a certain amount of interference would create "crippled AM stations of no benefit," Bonneville noted.

Group W agreed. "The Commission should be devising ways to eliminate present interference conditions, not creating new pockets of interference," its comments noted.

Crawford said not allowing a new station to go on the air with some interference "no longer makes sense" because interference will be "in portions" of the protected contours. Its comments maintained that there still can be an area served that is interference free.

Crawford, however, said the action

cannot be taken in a vacuum and that other stations affected should be allowed to comment.

On the issue of overlapping interference contours and the so-called "go/no-go rules," NAB urged the FCC to continue using the normally-protected contours in making allocation decisions.

"There should continue to be a contour value as a means to determine presence or absence of interference," explained NAB's Rau. "We're not suggesting at this point . . . what the value of that contour should be, but we are suggesting that they should continue to use the concept of a normally protected contour to control interference."

CBS opposed any relaxing of the go/no-go rules of absolutely prohibited contour overlap. "Rather than protect the contour normally defined as the 'protected contour,' this proposal would only grant protection to an 'interference limited contour.'"

Related technical issues

A majority of the comments supported the NAB's Petition for Rule Making asking the Commission to adopt the transmission portion of the NRSC voluntary preemphasis standard.

The only opposition came from Bonneville (see separate story in this issue).

On the subject of calculations for nighttime skywave, many parties including the NAB, argued the root-sum-square (RSS) 50% exclusion principle is no longer appropriate.

Although the FCC suggested use of a 25% RSS exclusion, NAB declined to make any recommendation pending an ongoing technical standard study by Harrison Klein.

Cap Cities/ABC blamed the present condition of the AM band on the RSS 50% exclusion method.

"There is an awful lot of interference that is not included within a 50% exclusion limit," explained ABC Licensing and Allocations Manager Ken Brown, "so the station is really much more restricted in its coverage area at night than the 50% exclusion limit would show."

When 10 or 20 stations occupied a channel at night, the 50% exclusion was an accurate rule to follow, he said. But now the number of stations on a channel has surpassed the effectiveness of this percentage.

Group W called for putting the demarcation point between 25% to 35%. The company also suggested freezing nighttime interference limits at current levels and future total aggregate increases limited to 1 dB.

Bonneville also favored eliminating the 50% exclusion method and changing the rules to allow RSS calculations for undesired signals for all classes of stations except Class IV.

In the area of the groundwave propagation, most comments called for improvements in the accuracy of groundwave propagation models.

The NAB recommended that the Commission proceed with revisions to the ground conductivity map, "Map 3," that is known to be "a very imperfect guide," according to the NOI. Other issues addressed in the NOI that the NAB supported are revisions to include groundwave propagation curves and various propagation factors.

CBS proposed a rulemaking on the issue, and Group W suggested a thorough upgrading.

Reply comments on Docket 87-267 are due March 1. The contact at the FCC is Wilson LaFollette at 202-632-5414.

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RAC to Guide AM Listener Tests

by David Hughes

Washington DC ... The Radio Advisory Committee (RAC) continues its efforts to develop criteria for the NAB's planned "psychoacoustic tests" to determine what technical quality consumers want from AM radio.

Two RAC subgroups—one dealing with allocations, the other dealing with technical matters—met 27 January to "discuss formatting" the listener tests, according to Louis Stephens, chairman of the allocations subgroup.

The RAC is examining a wide variety of listener test study parameters, including which types of music to use, which parts of the country the tests should be given in, and different types of listeners, he said.

The overall size of the sample will also be examined, Stephens added.

Study important

Stephens, who is the FCC's special adviser of international law, said that the listener studies are "very important" in the Commission's ongoing assessment of its AM technical assignment criteria.

"Before we can change any rules, we have to produce guidelines that indicate the concepts of acceptable service," he said. "Before we can revamp the allocation rules, we need listener studies. They are very important."

The task of performing a psychoacoustic study of listeners was authorized by the NAB in November 1987. The association has earmarked \$60,000 for the study, which is scheduled to be completed by the spring.

Expanded band

In other news, the two RAC subgroups discussed plans for the Region 2 (Western Hemisphere) Administrative Radio Conference (RARC), which will be held in Rio de Janeiro, Brazil 28 May to 11 June.

The prime issue will be the expansion of the AM band in the Western Hemi-

sphere from 1605 to 1705 kHz.

Stephens said the FCC is in the process of developing a Notice of Inquiry to get public comment on specific broadcasting uses for the new band segment.

Also, in coming weeks, the RAC technical subgroup will be examining the comments filed with the Commission on docket 87-267, which is examining a broad range of changes in the FCC's technical allocation methods (see related stories, this issue).

The RAC, which is composed of FCC and industry officials, did not have any future meetings scheduled as of early February.

For more information on the RAC contact Louis Stephens at the FCC: 202-254-3394.

More Mail

(continued from page 5)

play from somewhere inside.

I asked if they had gotten it moved to the new building and he said that it was now sitting on a small piece of floor with plastic draped over it! The rest of the building had been demolished.

I asked when it had gone off, before or after the rain had started. He didn't know! He'd been out of town for the weekend! Being the big dummy, I asked who had been there when it quit.

He answered: "No one. The owner wouldn't hire anyone to relieve me and, when I asked for a couple of days off, he said to go on, just leave the station on the air and lock up." The guy had left early Saturday morning, returning Monday morning!

Not wanting to just go up there and run up what they owed me, I told the employee to get in touch with the owner and have the owner call me to work out the details of my getting paid.

The call came within a few minutes. The owner said he wanted me to get up there and get the station back on the air as soon as possible. When I mentioned payment, in advance, he decided he'd have to get back to me. OK by me!

An hour later, he called and tried to talk me into going up there on the promise of payment. Nothing doing. He said he'd be ruined. I was nice and sympathetic but adamant. No money, no work! It'd serve him right for trying to run such a dump!

Just to see what happened I tuned a receiver to the station, just barely in range and, as I worked on a project, listened to the hash on the channel. Late that afternoon, they were back on the air again. He must have found a sucker.

After that experience, I'm thinking of cutting all my ties to broadcasting!

It hurts my conscience a little to think that someone could be killed at that transmitter site while the owner, knowing full well the problems and hazards, continues to operate the station apparently making a little money at it!

The moral dilemma is: should I blow the whistle on the guy (and others like him) or will it do any good? Will I get into trouble for doing it? These people seem to be good at hiring attorneys, and I don't need any lawyers breathing down my neck!

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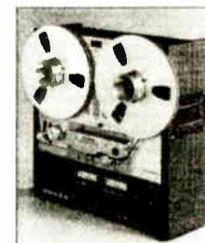
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Religious broadcasters survey equipment at the NRB (top). Shown were Continental's 4.3 kW FM transmitter (above), Radio System's console (above right), QEI's FMG-1000 (right) and Broadcast Electronics' Mix Trak 90 console (far right).



Class A's, NAB to Talk

Washington DC . . . Despite the failure to reach an agreement with a group of New Jersey Class A FMers on a blanket power increase for Class A's, the NAB will continue to talk with the group.

NAB Radio Board Chairman Jerry Lyman said the association's executive committee has been in contact with the New Jersey Class A group and plans to meet with them to discuss differences in a proposal for a power increase for all Class A's.

The New Jersey Class A Broadcasters Association asked the FCC to begin a rulemaking to allow Class A's to raise their power level from 3 kW (or the equivalent) to 6 kW (or the equivalent).

However, despite negotiations with the NAB in late 1987, the association's board in January decided not to back the NJ group's plan.

After a recommendation from its FM Transmission subcommittee, the NAB board in January said it would support Class A increases on an individual rather than blanket basis, along with different mileage requirements that would, the NAB claimed, offer more protection to Class B's and Class C's.

At the time, the NAB Board also said it would form an engineering subcommittee to examine alternatives for the Class A power hike plan.

However, Mike Rau, head of the NAB's Science and Technology Department, said a new subcommittee may not be needed now that the executive committee has scheduled a meeting with the NJ group.

Rau also pointed out that the NJ Class A stations would probably not get much

benefit from the NAB's individual hike plan for Class A's, because stations in the densely populated northeastern states are already packed in tightly with Class B's and C's.

Bob McAllan, president of Press Broadcasting, one of the New Jersey Class A's, confirmed that the group will discuss the power hike plan and continue to try to solicit NAB's support.

"We have a reasonable position; it's been thoroughly researched," McAllan maintained, "we're still hoping NAB will support us." However he added, "But with or without their support we're going ahead with our plan to get relief for Class A broadcasters."

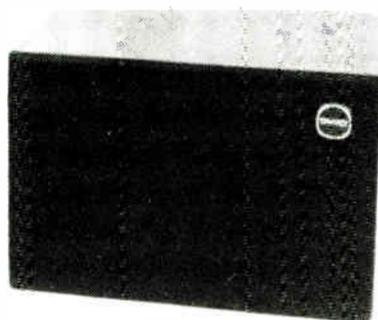
Lyman wouldn't speculate whether the discussion with the New Jersey Class A group would result in any change in the NAB's position. He very clearly emphasized that the executive committee "is standing by the Board's (January) decision."

But he noted that the Class A situation was the most extensive topic discussed at the January meeting of the full Board and added, "I think the NAB has addressed this issue as thoroughly as any."

Lyman stressed that the NAB wanted to remain fair and open to the concerns of the Class A's, but that they also have to consider the concerns of the Class B's and C's.

The meeting between the NAB executive committee and the New Jersey Class Broadcasters was set to take place in early March.

For more information contact Mike Rau at 202-429-5346 or Robert McAllan at 201-774-7700.



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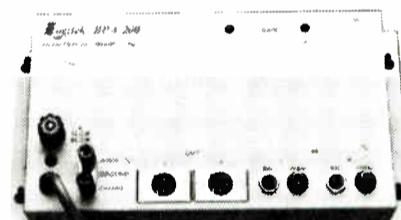


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Freeze on AMs Sought by NAB

(continued from page 1)
decisions," the NAB stated.

In his letter to Patrick, Fritts said, "There are serious flaws in existing Commission policies and rules for AM broadcasting. Indeed, many observers consider these technical standards—and related FCC allocations policies—as the primary causes of the excessively high levels of AM interference."

Fritts added, "While we are on the path toward genuine AM improvement

NAB also indicated that the FCC's past policy "has concluded that the public interest is best served by (the) creation of additional station opportunities and more flexibility for existing stations."

Reversal urged

"The NAB now urges, in the strongest possible terms, a reversal of this policy as it applies to AM broadcasting. We believe that there is no public interest benefit in the creation of new or flexible serv-

Capital Cities/ABC, in its comments, did not go as far as asking for a freeze on all AM grants, but commented that some changes in the Commission's allocations policies were warranted.

"We can't be as bold as to say that there should be no major changes," said Al Resnick, director of engineering for Capital Cities/ABC radio, in response to the NAB request for a total freeze.

Freeze on applications

Cap Cities, which owns seven AM stations, called for a freeze on applications for new or improved facilities that would result in second adjacent channel overlay of the 2.0 mV/m contours of the stations involved.

Resnick said technical assignment criteria for the AM station depends "almost wholly" on station allocation—the interference criteria between stations.

"So, if that is the case, then how can the Commission go on with business as usual in granting station applications if they are granting and casting in stone, applications which will, in essence, make it very difficult for future improvements to service?" Resnick added.

Other possibilities

While also stopping short of calling for an all-out freeze, Group W said in its

comments on AM technical standards that "new substandard stations should not be authorized."

The radio group owner indicated that the FCC's notice "raises the question of whether the existing limited exception permitting the licensing of a daytime facility, even though it would receive interference up to its 1.0 mV/m contour, should be expanded to encompass any AM station."

Group W said it "does not believe this is a wise proposal. While it may have some superficial appeal in the sense of permitting further opportunities for new stations, it is not a spectrally efficient approach."

"The Commission should be devising ways to eliminate present interference conditions, not creating new pockets of interference," Group W said.

Other broadcasters focused their comments on the reduction of protected skywave services.

One group owner, Crawford Broadcasting, stated that "continued protection of such skywave services is simply not justified." (See related story, this issue).

The FCC docket number of the AM technical review is MM 87-267. For more information contact Wilson LaFollette, 202-632-5414.

There are serious flaws in existing Commission policies and rules for AM broadcasting.

there seems to be no communications policy sense in putting new AM stations on the air, or making major changes to existing AM stations, under the same rules and policies that clearly have led to the current problems on the band."

"I urge you to concur with our strongly-held view that the Commission should not make interference matters worse at a time when it and the broadcast industry are engaged in a significant and coordinated effort toward reducing such interference and ensuring the long-term potential of AM broadcasting," Fritts said in the letter to Patrick.

In its filing to the Commission, the

ice opportunities in an AM broadcast band with a continuously declining share of the national radio listening audience," the NAB said.

The NAB pointed to ratings figures that show a "steady decline" of the AM band's national listening audience. "These statistics clearly point to the public dissatisfaction with the listening environment of AM broadcasting."

The association advised that if there is still a need to create new AM stations in some areas, that they be placed in the new AM band expansion of 1605-1705 kHz, which is slated to be opened up in the 1990s.

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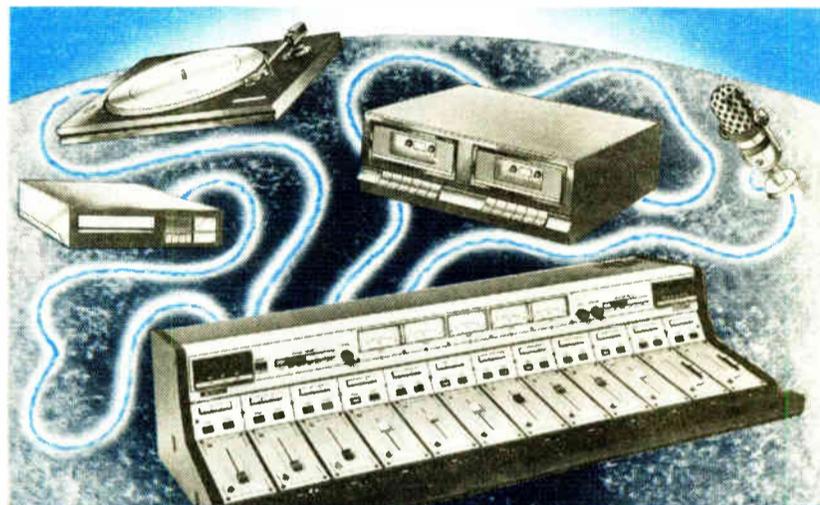
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Indecency Decision Challenged

by Alan Carter

Washington DC ... Seventeen broadcast and industry watchdog groups, including the NAB, NPR and the three major networks, have petitioned an appeals court to set aside, modify or reverse the FCC's recent actions on indecent broadcasts.

The petition, filed 28 January in the US Court of Appeals for the District of Columbia, is in response to a Commission order on 24 November 1987 that affirmed an indecency decision against three radio stations. Many broadcasters find the ruling too vague.

Broadcasters need some clarification "so they know what the rules really are, especially if their licenses might be in jeopardy," said NAB Joint Board Chairman Wallace Jorgenson, president, Jefferson-Pilot Broadcasting, Charlotte, NC.



... broadcasters should reflect their communities' mores and exercise good judgment...



Jorgenson's comment came during a press conference after an executive board meeting here in February.

The FCC ruled that broadcasters may air "blue" material between midnight and 6 AM, providing they give appropriate warnings.

The Commission also broadened its concept of indecent material from the George Carlin list of "seven dirty words" to the generic definition of broadcast indecency approved by the Supreme Court in 1978.

In that decision indecency is defined as "material that depicts or describes, in terms patently offensive as measured by contemporary community standards for the broadcast medium, sexual or excretory activities or organs."

Filing for the court ruling are Action for Children's Television, Association of Independent Television Stations, Capital Cities/ABC, CBS, EZ Communications and Infinity Broadcasting. Also filing are Motion Picture Association of America, NAB, NBC, National Public Radio, The New York Times Co. and Peo-

ple for the American Way.

Other petitioners include Post-Newsweek Stations, Public Broadcasting Service, Radio-Television News Directors Association, Reporters Committee for Freedom of the Press, Society of Professional Journalists and Sigma Delta Chi.

The NAB's Joint Board of Directors called the FCC ruling "vague and confusing despite apparent establishment of a 'safe-harbor' of post-midnight."

The board, however, emphasized that it does not challenge the Commission's "right to act in this area." The board also reiterated its concern that "broadcasters should reflect their communities' mores

and exercise good judgment in selection of material."

"The way the Commission has written its indecency guidelines does nothing more than confuse broadcasters who are trying to act within the provisions," Jorgenson said in a prepared statement.

The NAB called on the court to "correct" the situation, he added.

The parties are expected to file briefs to explain their positions once the court sets a hearing schedule. The petitioners also asked the court to expedite the hearing and proposed that the first comments be filed early this month.

The FCC's most recent action on in-

decency involved stations KPFK-FM, Los Angeles; WYSP-FM, Philadelphia and KCSB-FM, Santa Barbara.

The Commission held that the stations had broadcast indecent material, although the broadcasts did not necessarily use the seven dirty words that the FCC previously used as its informal indecency standard.

The ruling against the three stations was based instead on the more generic definition handed down by the Supreme Court in the landmark ruling, the FCC noted.

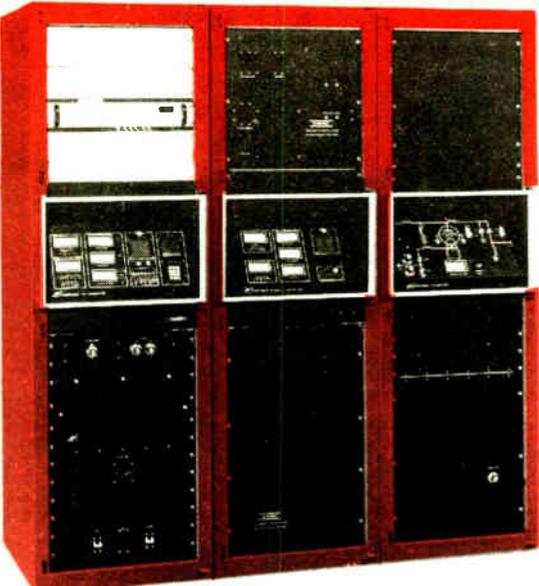
The contact at the NAB is Bob Hallahan, 202-429-5350.



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The New Reliabilities



A Second Look at Cheerleading

by Tim McCartney

Boise ID . . . Past articles I've written for *Radio World* are great for lots of terrific response. I've heard from other engineers, manufacturers, DJs, vendors and GMs.

The greatest response I have received has come in the form of phone calls from around the country after technical articles on 18 and 23 GHz STLs.

But the most interesting comments by far center around an article I wrote advising "Be Your Station's Cheerleader" (See 1 October RW).

I chronicled several stories of announcers who chose to publicly criticize the management of their stations on the air!

Such antics clearly are not limited to the people with whom I have worked.

Two GMs—one from New Jersey and another from Idaho—called to discuss their situations.

The conversations were therapy sessions of sorts among colleagues who understand what it's like to manage a staff majoring in "bloated ego syndrome." In addition, a publication aimed at commercial station PDs asked for permission to reprint the article.

So perhaps it's an undercurrent in the industry. Announcers who know it all assume that management is a bunch of thick-headed thugs with underworld ties who are, even today, incapable of understanding that Lynyrd Skynyrd

lives on, man!

Let's hope they remain in the minority, but these calls indicate that this minority may be alive and well.

The most enlightening call came from a manager who cited his own frightful list of announcer stories.

For instance, this MOR station had a problem with rock records getting on the air despite the format, rules, memos, warnings, etc.

One announcer who had been fired enlisted the support of a "surviving" announcer to conduct an on-air straw poll aimed at bringing back the fired DJ.

Still another announcer went to a congressman to complain about internal sta-

tion restrictions.

My caller explained that the stories in my article were "verbatim true" at his station; so much so that his staff had accused him of ghost-writing the article.

It turns out that my example precisely paralleled the gender of the offending announcer on his staff who had committed the exact same sin described in the article. I guess it was just too much coincidence for the staff to swallow.

Another GM said the stories I had recounted were right on target with his experience—in religious broadcasting yet! I was surely one-upped on this one.

Somehow the main argument in the article is forgotten amid all of this response.

The point is that we should not behave in a manner which even comes close to this style. Rather, it is our responsibility to be our stations' number one fans—cheerleaders for our companies.

The fun in getting to this point is the chance to fully discuss how not to behave.

While I may have already used some of my best stuff, I'll bring out a few more to add to the lot.

Upon cleaning the pinch roller of a cassette deck, I discovered chocolate "caked-on" only as time and a capstan can do. I learned in this process that water needs to be used to remove food, not the usual cleaning liquids.

So, after cleaning the roller, I posted a little note asking that food be kept away from the cassette machine.

The response from some unrespectful soul? An entire bag of potato chips was crammed down inside the cassette machine, and the bag placed on display in front of the deck—a new lubrication strategy for extended head wear no doubt.

Then there was the announcer who learned that his program—heavy metal—was being cancelled. He lashed out on the air at management for this travesty and appealed to his local following for massive protest.

He wrote profanities on the program director's memos about the various program changes. Upon being fired, he proceeded to surprise no one by
(continued on page 24)

RADIO *Classics*

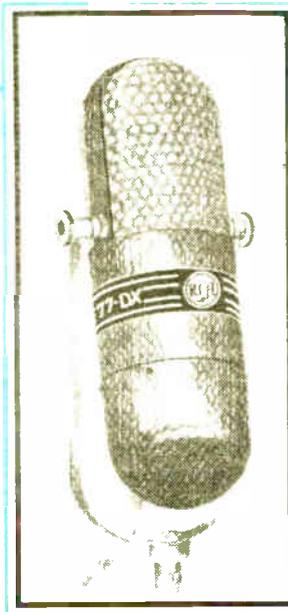
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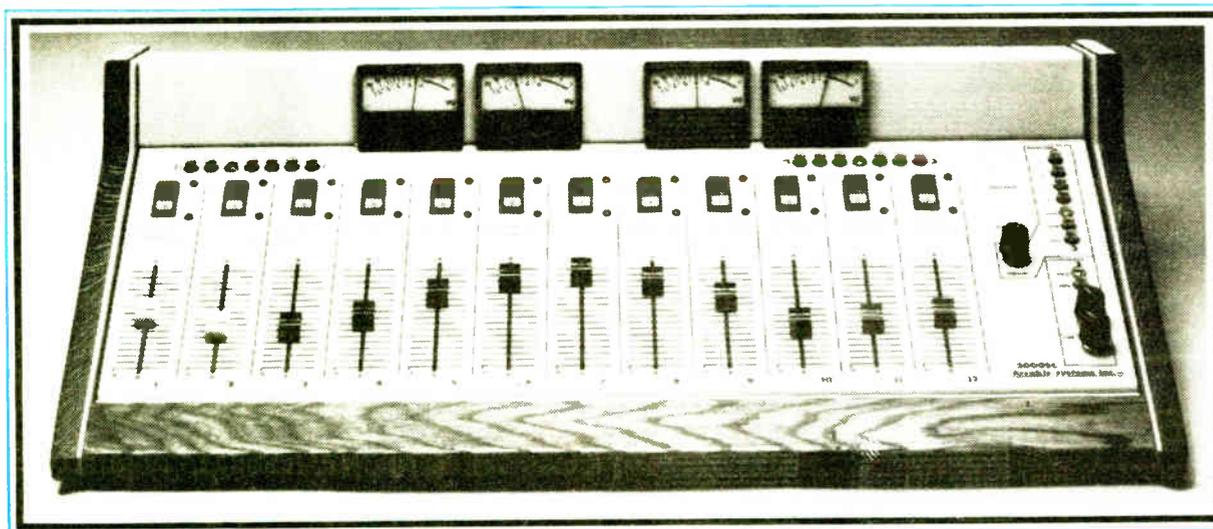


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Circle Reader Service 36 on Page 23

Understanding FCC ATS Rules

by Harold Hallikainen

San Luis Obispo CA ... Last month I said we'd next cover station log requirements.

But I'd like to delay that for a month so we can cover one subject that is related to remote control: ATS—Automatic Transmission Systems.

Several years ago, the FCC authorized stations to use an Automatic Transmission System. They encouraged stations to use ATS by reducing the transmitter logging requirements and the transmitter inspection requirements.

As I recall they also reduced the operator licensing requirements, but I can't find this in my old rulebook today.

The original ATS rules were rather complex. They outlined the measurement procedures the system was to use for measuring modulation and power.

Insight on Rules

The modulation measurement system disallowed the use of the peak detector on any FCC approved modulation monitor (they were approved back then). Further, the rules allowed ATS use only on FM and nondirectional AM stations.

A while later the FCC revised the operator requirements, inspection requirements and logging requirements to be the same whether ATS was used or not. This revision removed most of the incentive for using ATS.

Removing incentives

In 1986 the Commission revised the ATS rules. We refer to the Federal Register, Volume 51, Number 8, 15 January 1986, page 1374 (call me for a copy).

This rule change authorized ATS operation for TV and directional stations and "deregulated" the ATS requirements.

The current rules are quite simple, although it is now more difficult than it was to determine whether a station is in

compliance.

The ATS rules now start with a basic definition:

"An automatic transmission system consists of monitoring devices, control and alarm circuitry, arranged so that they interact automatically to operate a broadcast station's transmitter and maintain technical parameters within licensed values" [73.1500].

Assuring compliance

No prior FCC authorization is required to operate under ATS but someone technical must certify in writing that the system has been installed, tested and fully complies with the rules.

There may be more than one ATS

operator point. Each must always be able to turn off the transmitter.

The FCC must be notified of the use of an ATS operator point (other than the studio or transmitter) within three days of the initial use of that point.

This notification is not required if "responsible station personnel" can be contacted at the transmitter or studio during ATS operation from elsewhere.

The ATS must shut down the transmitter if it is unable to correct an interference-causing condition within three minutes.

The transmitter must be manually activated at the beginning of each broadcast day. You cannot have a clock turn on the transmitter whether there is an

operator there or not!

I believe the Commission's intent in establishing the ATS rules was to allow the use of less skilled operators while insuring that interference-causing conditions do not exist.

Under the old logging requirements operators were pretty much forced to insure that the operating power and directional array parameters were within limits.

Even with "First Phone" operators it was difficult to get them to properly read limit charts, especially for DAs.

With an ATS the system reads the operating parameters, checks limits, makes adjustments, alarms anything that it could not adjust and then shuts down the transmitter within three minutes of an interference-causing parameter variation.

(continued on page 18)



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DIGITAL DOMAIN

Advancements in Digital Audio:

by Skip Pizzi

Washington DC ... Digital audio products continue their march into the radio station. Two manufacturers have begun to implement digital audio storage media into automation systems.

One is Schafer Digital, in La Jolla, CA, using Beta HiFi format VCRs with Sony PCM-601ES pseudovideo processors, optionally supplemented with a Dyaxis hard disk system.

Typical configurations in this product line use from eight to 32 VCRs, interfaced with two PCM processors for the music programming, and a 30 minute hard disk system that downloads spots from two other VCRs and one processor.

The hard disk rather than Beta is used for spots because the spots' shorter running times require the disk's random access capability, in order to have the next spot ready when the preceding spot ends.

An NEC Powermate (AT) computer is the brains of the system, allowing advance programming of a week or longer. Traffic, accounting and syndicator/playlist software may also be integrated.

A separate production station is included for dubbing original program material onto the Beta cassettes. A system like this, with eight VCRs, lists for around \$60,000.

For lighter spotloads, the hard disk package can be eliminated, cutting the

system's price in half.

The manufacturer quotes storage capability of up to 10 hours per cassette (hence 80 hours in the typical configuration detailed above), but this maximum figure uses both the PCM pseudovideo digital and the Beta HiFi tracks, on an L-830 cassette at BIII (slowest) speed.

“*Digital technology has a natural application in audio routing switchers.*”

My experience would recommend nothing longer than L-750 cassettes, at BII speed, and little or no use of the Beta HiFi (perhaps for spots only).

Nevertheless, this purist approach still gives 24 reliable, high quality hours from an eight-VCR system. Most automated stations I'm familiar with could work well with this capacity. (For additional information on this system, contact Paul Schafer of Schafer Digital, a sharp and very accessible person, at 619-456-8000.)

Another digital audio automation system, this one using the R-DAT format, comes from Concept Productions of

Roseville, CA. A typical system here incorporates 10 "very slightly modified" Sony consumer R-DAT decks (DTC-1000ES), controlled by a Turbo-XT computer.

With R-DAT's fast access time no hard-disk download system is required for spots. Three decks are assigned to spots, with up to 100 spots on each two-hour cassette.

They claim a one-minute end-to-end rewind time on the cassette, so back-to-back spot breaks should be possible, unless you run a lot of less-than-30s.

Four decks are assigned to music (eight hours total capacity) with one deck for "personality" (i.e. announcer tracks—this company started out as and still is primarily a programming supplier).

There is also one deck for "custom" material (spots, promos, PSAs, jingles, etc.), and a utility/production deck, on which programming is dubbed to the R-DAT cassettes.

Programming may be scheduled several days in advance, with overnight "walkaway" operation capability at present.

This sort of system, complete with rack package and software runs \$24K. The company expects to be delivering its first products this spring (for further details on this system, call Dick Wagner at 916-782-7754).

Other automation system manufacturers are currently working on adapting digital audio sources to their exist-

ing hardware, so we may just be seeing the tip of the iceberg here.

Routing switchers

Digital technology has a natural application in audio routing switchers. Here we are still talking about digital control of analog signal paths, but it's only a matter of time until the audio paths become digitized as well.

The folks at the Canadian Broadcasting Corporation have found that for very large switchers, say 100x100 or greater, digital audio products will soon start to be competitive with analog audio devices.

Smaller systems will be a bit pricey in the digital realm, but all indications point to this differential decreasing with time.

Nevertheless, digitally controlled analog switchers have some great advantages for the present, namely the space, reliability, speed and noise savings accomplished by eliminating the patch bays and distribution amplifiers they replace, and the automated features they can implement.

The additional advantages of totally digital switchers are less radical, and this therefore will likely defer their implementation until the inputs and outputs they connect are mostly digital themselves.

The use of a digital switcher will then supplant D/A and A/D conversion steps, *(continued on next page)*

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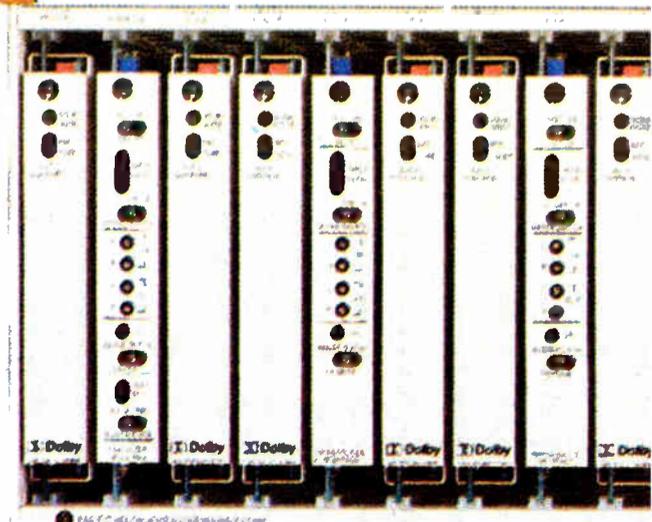
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DIGITAL DOMAIN

The March Into Radio Stations

(continued from previous page) as well as automatically convert between different digital formats if necessary (you can bet it often will be).

New products

Meanwhile, although several companies like McCurdy and others have been making custom products (mostly for network customers) for a while, ITC seems to have gotten the furthest in the relatively new "off-the-shelf" digitally

which is a comprehensive adaptation of a console assignment/routing system from one of their large Westar consoles.

Akai also makes a less expensive, smaller, PC-like audio routing system, the DP3200.

Telephone interfacing

Telephone interfaces have not escaped the digital juggernaut. The first of these was the Telos 10, designed by Steve Church, who himself is somewhat of a

However, the digital devices employ technology similar to that pioneered by the telephone industry in its echo-canceller work (used on satellite long distance calls), to optimize the hybrid's nulling effectiveness.

At around \$3,000, they still remain mostly in the domain of the station that devotes a lot of time to talk-radio, but for them, the cost-to-performance ratio is high, and many of these types of stations have already implemented them with successful results.

R-DAT update

I had the privilege of partaking in the National Bureau of Standards tests of the Copycode system, the anti-copying scheme that has been proposed in pending legislation for consumer R-DAT recorders to be imported into the US.

By the time you read this, the NBS report should have been released, although at press time it is still cloaked in secrecy.

But I can tell you that to my ear in these tests, the Copycode notch is, while subtle, indeed audible much of the time.

Most notably, although it certainly didn't make the music intolerable to listen to, I was rather easily able to "learn" how to hear the notch more and more over the course of a three-hour listening session.

Extrapolate that to the general public listening to it for decades. Just because it wouldn't bother most people today

doesn't mean it won't rile them in the future.

When the first Ampex 300's were rolled out, listeners claimed they couldn't tell the difference between the live and recorded sound. We've come a long way, baby, and it's not about to stop anytime soon. The trajectory is set, and the curve is steep.

I must add how impressed I was with the NBS tests, both from a statistical and an audio point of view. I look forward to reading the Bureau's report, and seeing what Congress does with it.

While I sympathize with the artists, producers and record companies, I sometimes suspect the latter's motives here, and I feel that better ways of handling the problem have been proposed, both on the technical and the legal/economic fronts.

Then there are those strict-constructionist First Amendment supporters, who adamantly feel that once purchased, a recording is the property of the owner, who is free to do whatever he/she wants to with it, short of selling copies of its copyrighted material for personal gain.

Admittedly a tough issue... let's hope Congress acts wisely.

Next time, some early thoughts on digital broadcasting.

Skip Pizzi is the training coordinator for National Public Radio's Program Engineering Department. He can be reached at 202-822-2483.

“... the Copycode notch is, while subtle, indeed audible much of the time.”

controlled analog switcher market so far.

The company has a well-designed and well-constructed product, relatively cost effective at that, known simply as The Audio Switcher.

Of course, it's still custom-configurable, and it features a compact mainframe, very large capacity, easy installation, excellent specs, and flexible, user friendly operation at the mainframe or via multiple remote control units, each with LCD status displays.

Mitsubishi also features a product here, the ACS Audio Crossbar System,

legendary phone-freak in broadcast circles.

Recently it has been joined by a product from Gentner, called the Digital Hybrid.

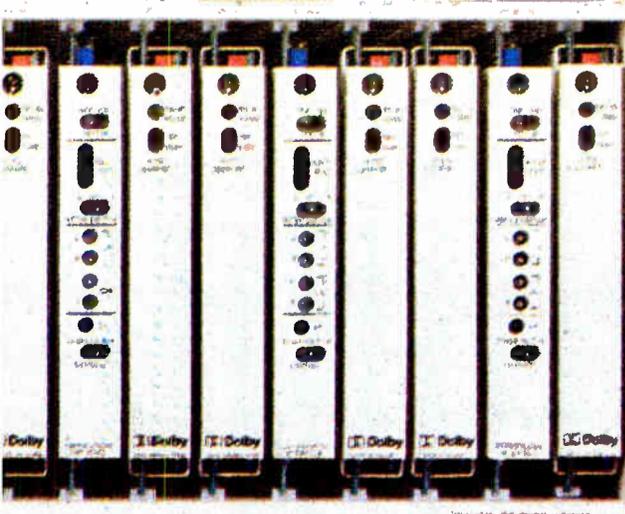
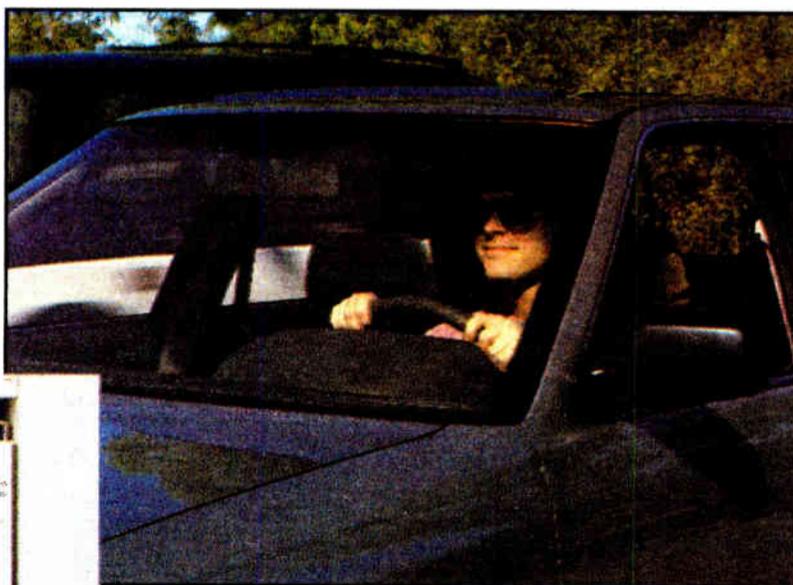
Both of these products utilize digital signal processing to maximize trans-hybrid loss, usually obtaining figures 10 to 15 dB better than the best of their analog counterparts.

Like some of the latter, they use adaptive techniques, such that the hybrid is balanced to the impedance of the particular phone line in use.

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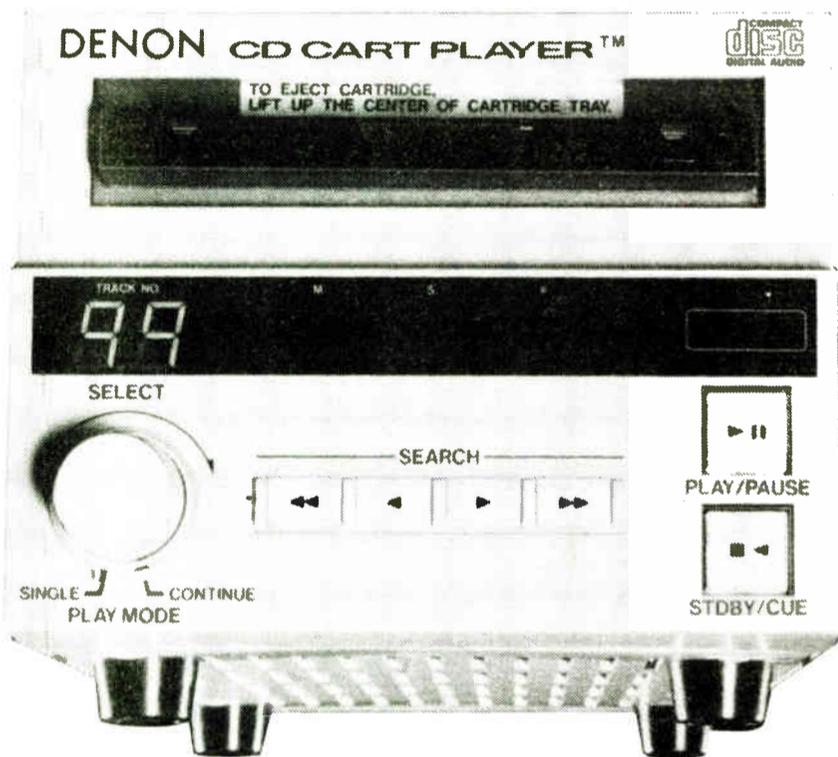
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Keeping On Top of ATS Regulations

(continued from page 15)

Reviewing some of the comments reprinted in the Federal Register we find that ABC had requested that ATS requirements not include "automatic adjusters" on directional arrays.

The Commission removed all the "burdensome technical requirements which are not required to prevent interference".

Also, CBS and Innovative Automation suggested that current technology would allow the unattended operation of broadcast transmitters utilizing ATS.

The Commission pointed out that the Communications Act of 1934 required broadcast stations to have operators.

The main problem I see with the current ATS rules is one of vagueness.

ATS requires some unspecified operating parameters to be monitored, adjusted, alarmed and the station to be shut down if the parameter variance can cause interference.

New parameters

The old ATS rules specified which parameters were to be monitored (power and modulation). The new rules leave it up to the licensee to determine which parameters require continuous monitoring.

As such, it would appear difficult for the Commission to cite a station for improper ATS operation unless the station was found to have some operating parameter (whether ATS monitored or not) outside licensed limits which potentially caused interference.

Note also that the FCC does not require every monitored parameter to be automatically adjusted.

For example, directional array parameters should probably be monitored since slight errors in these parameters can cause interference, but the ATS need not automatically adjust the DA tuning system.

Should a monitored parameter go outside authorized limits, the ATS should adjust the parameter (if you want to have the ATS do that for this parameter), alarm the out-of-tolerance condition and shut down the transmitter in three minutes (if it's interference-causing).

I'm sure that many stations are operating their transmitters just short of ATS through the use of intelligent remote control systems.

Manual shutdown

When an inside limit on a parameter is exceeded the parameter is adjusted.

When an outside limit is exceeded the parameter is alarmed.

At this point many stations deviate from the ATS requirements by not having the system automatically shut down the transmitter.

Instead operator interaction is required, with the operator deciding if the alarm condition merits a transmitter shutdown.

Such operation is not ATS as far as the Commission is concerned. It may be called something like automatic transmitter control, but without the shutdown it is not ATS.

Since ATS does not give the benefits of reduced inspections, logs or operator requirements, operating with less than ATS does the station no harm. It may do some good in preventing shutdowns due to sampling errors.

The use of operators with less technical training is handled by the operator calling the designated chief operator (DCO) for advice on how to handle the alarm condition.

I imagine that in many cases this results in interference being caused for more than the three minutes authorized by 73.1500(e).

While the DCO is being called the station is probably violating 73.1410(e) by not shutting down immediately on detection of operation beyond the terms of the station license.

Automatic power control

Some transmitters (especially FMs) have a built-in automatic power control.

Many stations utilizing these transmitters are determining their power by the indirect method while the automatic power control determines the power by the direct method.

In some cases this results in the transmitter adjusting itself such that the plate voltage and current are outside the legal limits.

We have too many ways of determining power, and we do not know which one is right. It's similar to the person with one watch knowing what time it is, but the person with two watches never being sure.

Next month we will look at station logs and see what was and is required, audit trails, and other such interesting stuff. I'll look forward to your comments.

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

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Circle Reader Service 7 on Page 23

Finding Effective Field Strength

by Ron Nott

Part II of III

Farmington NM ... In the last installment, we examined antenna fields for AM directional arrays. We looked at two separate EM fields, one from each of the two antennas, to determine effective

field gain.

Now it gets more complicated. Between the four compass directions are field strength values that constantly change with azimuth, following precise mathematical rules.

If you draw this configuration to scale and carefully measure the effective spacing between the elements as the azimuth increases from zero to 90°, you will see that every ten degrees, for example, the effective spacing between the elements changes, and not at a linear rate.

This can be done with basic trigonometry also, as each change in azimuth forms a triangle with dimensions that may be determined by calculation.

The effective spacing varies from 180 to 0° as you progress in this manner.

You can then pick an azimuth angle and see how the two induced currents from the two elements add or subtract.

This will give the resultant current which then determines the effective field strength at that point.

Because the field strengths of the two elements are the same, the vectors would continue to be of the same length, but they would be at some angle to each other, depending on their phase relationships.

The effective field strength at a specific azimuth would be the third side of a triangle drawn from the tips of the vectors as shown in Figure 1. Nothing to it, right?

Effective, not true

Just remember that this is effective field strength and not the true EM field

strength. True EM field strength will remain essentially constant throughout the compass directions.

In a real world DA system the power ratios will seldom be the same so the

dividual fields are all there at full strength.

ERP and FM antennas

Because the physical size of a dipole at the FM frequencies is relatively small, two or more of them may be "stacked" vertically to provide an effective gain in radiated power.

The more dipoles that are stacked up, the greater the ERP! Dipoles placed in this configuration are known as a colinear array.

The dipole elements share the same vertical line. Most FM antennas are now circularly polarized by some variation of the dipole, but the dimensions and spacing are approximately the same.

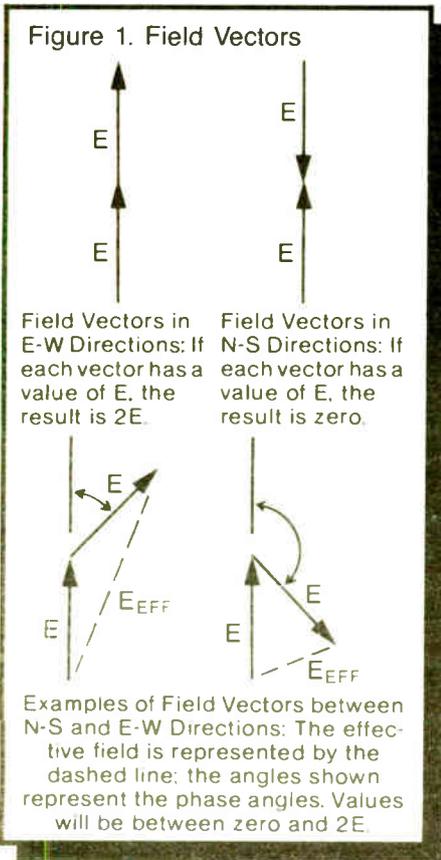
To keep it simple, a multi-element antenna with vertical dipole elements will be used here. The results will be similar with a CP antenna.

The field from a single dipole is a broad blob in cross section, but the real shape is toroidal or doughnut-shaped as in Figure 2.

The EM field travels outward like an expanding doughnut, some of it going up in the sky, some of it going toward the ground.

The rest of it travels more or less parallel with the surface of the earth where

(continued on page 23)



“ True EM field strength will remain essentially constant throughout the compass directions. ”

lengths of the vectors will change accordingly.

The monitor points of an AM directional array are usually located in nulls, with limits set by FCC rules and regulations.

Limits are usually established at so many mV/M for a particular point.

An engineer taking these readings is in the midst of a set of fields, a separate one from each element in the DA.

But the relationships of the phases and amplitudes are all integrated within the antenna of the field strength meter which indicates the algebraic total of them for the value at that point.

Even if the meter reads zero, the in-

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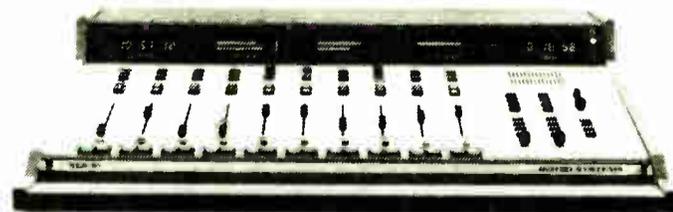
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Big News: The Senator's Visit

by John "Q" Shepler

Part I of II

Rockford IL ... News director Wiley Cohen shook the telephone receiver excitedly over his head.

"Listen everybody," he shouted through the newsroom doorway, "Senator Corquebaro is coming through here next week. This is the greatest."

"Say, now, that is news," piped Norm Ungar, CE. He could smell a technical challenge coming. Up to now the station was pretty blasé about election coverage.

They did some talk shows from the news studio on Saturday mornings and a few extra interviews during the news beats, but nothing out of the ordinary.

This would be different. Senator Corquebaro was a hometown boy who had done so well in Washington that now he was a leading contender for the Vice Presidential nomination. This homecoming would be a biggie.

Norm's mind started to race with thoughts of all the equipment they'd need to do this campaign visit justice.

His head swam with visions of remote pickups, two-way coordination, reporters shaking their broken recorders in his face and screaming and mic cable tangled everywhere.

Norm smiled to himself. "Hey, Wiley, when does the fun begin?"

The plan

Everyone crowded into the newsroom for the 3 PM strategy session. Wiley "The Coyote" Cohen was pacing back and forth nervously.

He had started smoking again only that morning and the rest of the crew hoped he would hold it down to one cancer stick for the meeting.

"Norm, we're going to need a lot of special help," he puffed.

Norm stared through the gray cloud of smoke and made contact with Wiley's beady eyes. "Well, what all do you need?"

"Everything we've got now working perfectly, for starters. Plus press conference coverage at the airport ... plus mobile coverage for the motorcade to party headquarters ... plus the dinner speech ... plus an interview show here

with six positions and a live phone ... plus state and network feeds ... plus ... " He paused a second and winced.

"Plus there's a press plane coming in with him so we have to accommodate network and local TV during the interview show. Oh, and don't forget the next day is the primary so we need the remote setup ready to roll at the Grand Ballroom right after the Senator takes off from the airport."

Norm swallowed hard. "That it?"
"Yup, that's it for technical." Wiley then proceeded to lay out the reporting assignments for the rest of the news team.

Getting ready

Norm spent a busy week turning their mild-mannered news capability into a network contender.

Q-Tips

He rounded up all of the cassette recorders and ran them through a quick checkout. New batteries, head alignment, new mic cables and most importantly, some professional mics.

They had about half a dozen RE-10 mics that a former PD replaced with what he had called "snarper response" Sennheisers in the on-air studios.

These would be perfect for high quality news recording, being far more rugged and much better sounding than the toy mics that came with the recorders. An afternoon was spent making XLR to mini-phone plug mic cables.

Next came the newsmobile. The station wagon was still a little singed from being part of Wiley's live barn fire broadcast.

Norm checked the transmitter forward and reverse power and tweaked the transmitter tuning. The new rooftop whip antenna was working perfectly.

He cleaned the battery terminals to make sure the connections were as low impedance as possible. He ran a response check through the mobile mixer and added two extra mics with cables.

He also added a 500' extension reel of mic cable to the trunk just in case they couldn't get close enough with the car

for interviews.

The news team would also need air monitors. They had some AM/FM headphone receivers which got new batteries and a checkout.

Lines of communication

Norm also rounded up some Walkman-style receivers and headphones originally intended for giveaways. These would be comfortable to wear and it was much better to have twice as many as needed than run short.

The news conference at the airport could be done with a mic run to the car, but that made it tough to join the motorcade in a hurry.

He could borrow another RPU transmitter on the same frequency but the airport people weren't too crazy about broadcast transmitters so close to the tower.

He decided that the best solution in this case was a telephone link using the frequency extenders they already had for ball games.

Getting a line on such short notice was another matter, but Wiley's 19th hole golf relationship with the airport manager finally paid off—guaranteeing them access to a private office phone.

The dinner speech from party headquarters and the primary election returns would also be done via phone line, but they had jacks installed at these locations already.

It just meant shuffling some equipment, since the phone interfaces and mixers weren't that abundant. Norm made sure the telephone equipment had

new batteries and was working as advertised.

Communication between the teams would be primarily over the air using the phones before the broadcasts. Norm readied a couple of walkie-talkies, sure that they would also find use.

In-studio preparations

Their news broadcast studio was small but contained its own mixing board, recorders and cart machines. They could squeeze in the interview participants all right. However, they were short on mics and headphones.

Norm added half a dozen more headphone jacks in case anybody else wanted to crowd in, and another mic mixer that also drove the telephone hybrid. Once again, more mic cords.

He left the real challenge for last. What to do about those network reporters? This was the first time Norm was involved in such a production and he needed to know what facilities would be suitable. Together, Wiley and Norm called the network office for particulars.

It seemed that the network camera crews were used to plugging into something called a "mult" box—a metal suitcase with a line input and many mic level outputs.

Each output was to an XLR connector so that the sound engineer could unplug a camera mic and plug the mic cable into the mult box. Standard XLR wiring with Pin 1 grounded was needed.

Norm went back to his desk in the shop and began sketching a diagram for **(continued on page 24)**

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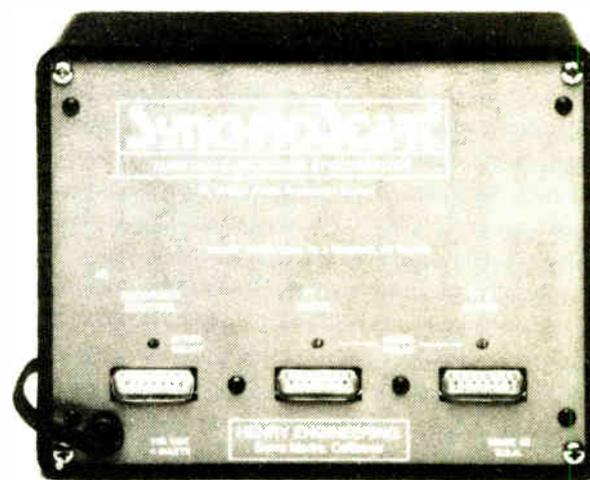
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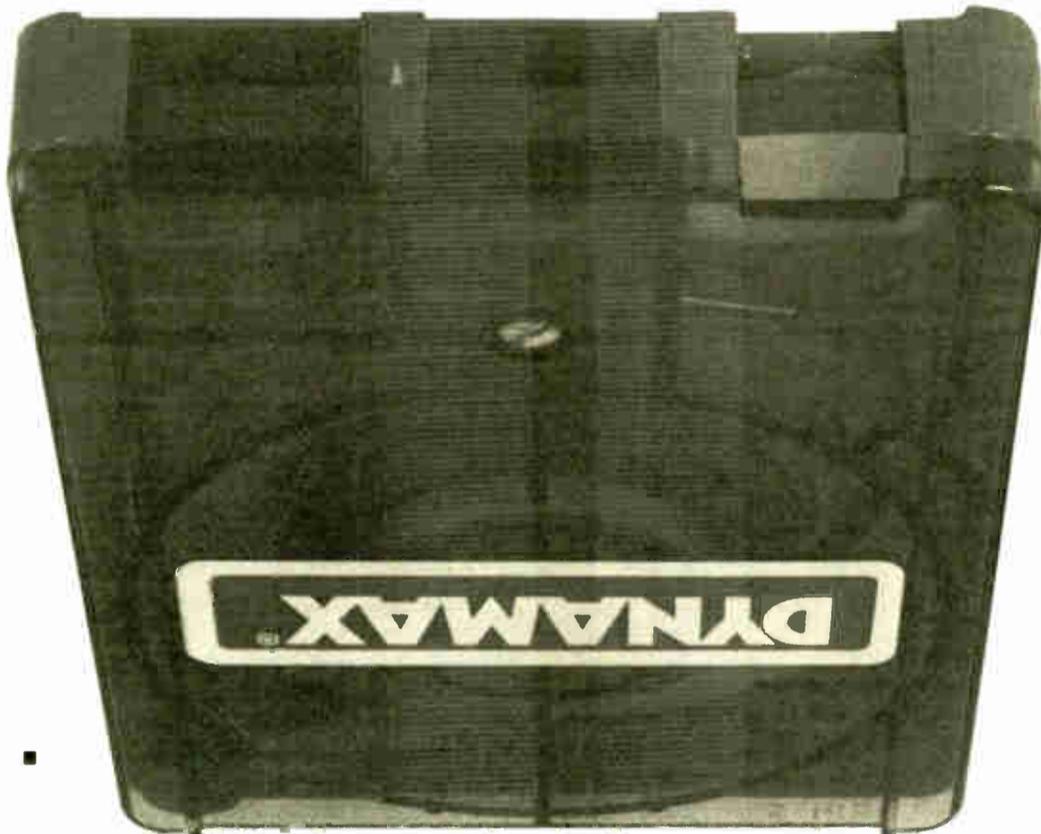
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Calculating Effective Fields For AM and FM

(continued from page 19)

it may be intercepted by the antenna of a radio receiver and be converted to audio or other intelligence.

If two or more such dipoles are stacked vertically at an optimum spacing and fed equal quantities of RF energy and in the same phase relationship, each dipole element will still generate a separate doughnut-shaped field just as a single element does.

Therefore a twelve-bay antenna does not have a single field from it, but rather twelve separate fields radiating away from it.

The patterns shown in the advertising literature of antenna manufacturers are "effective fields," showing the result of adding all the individual fields.

Again, the receiving antenna integrates the currents induced by all the fields into a single current to the receiver input.

As stated previously, part of the dipole field travels down toward the ground.

Depending on the ground conductivity, part of the field may be reflected and then travel along with the useful field, although somewhat delayed.

In general the nearer to the ground (or other reflecting objects) that the antenna is, the worse this condition is.

Reflection problems

Again, the receiving antenna is an integrating device and if the reflected signal arrives approximately 180° (or an odd multiple of 180°) later than the desired signal, there may be fading of the signal in certain areas.

It can be seen that flat terrain will aggravate the situation because of the reflection angle if the antenna is mounted at a low elevation.

Also, each element of a multi-bay antenna may have a slightly different reflection angle in this case. This can cause complex results in the effective field.

Irregular terrain, such as a mountain-top transmitting site, generally minimizes the effect.

This happens because the slope away from the site normally does not provide reflection angles that will cause problems at a distance, so antenna supporting structures atop mountains may be relatively short without ill effect.

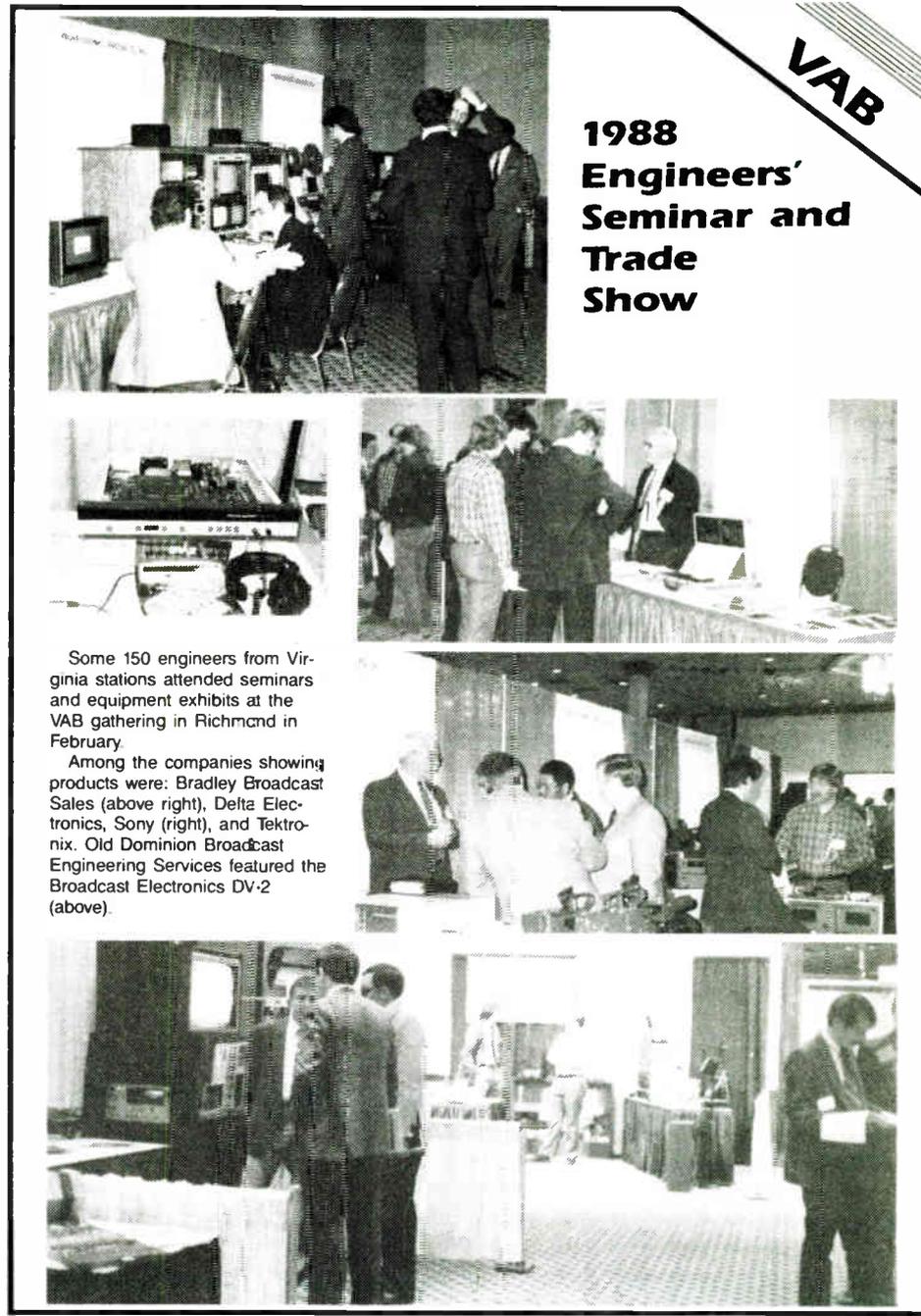
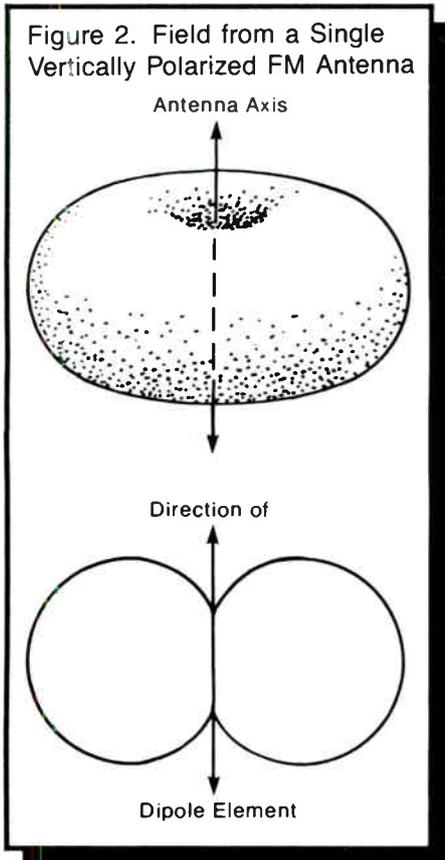
When the structure on which a transmitting antenna is mounted is a substantial part of a wavelength in cross section, it can intercept the EM field and then re-radiate causing undesired directivity.

In that case the desired EM field from the antenna arrives first and then the re-radiated EM field arrives at a later time depending on the physical spacing between antenna and structure.

If the fields arrive at the receiving antenna at or near opposite phase angles, the effective field may be decreased.

If the fields arrive with near 360° relationship, the fields will be approximately in phase, integrating in the receiving antenna with greater effective strength.

As in the AM antenna described above, each element of the FM antenna



1988 Engineers' Seminar and Trade Show

Some 150 engineers from Virginia stations attended seminars and equipment exhibits at the VAB gathering in Richmond in February.

Among the companies showing products were: Bradley Broadcast Sales (above right), Delta Electronics, Sony (right), and Tektronix. Old Dominion Broadcast Engineering Services featured the Broadcast Electronics DV-2 (above).

generates its own field in the shape of a toroid or doughnut.

Even though a field strength meter may indicate only a small value in the area below a multi-bay antenna, the individual fields are still there.

If there is anything that may reflect them they will be reflected, the angles of reflection depending on the relative height and position of each antenna ele-

ment and the geometry and conductivity of the reflecting surface.

Very complex situations may develop if such reflection occurs. In the next and last part of this look at antenna fields we'll consider an antenna that actually makes use of re-radiated effects.

Ron Nott is the president of Cortana Corp. He can be reached at 505-325-5336.

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Live Pre-Election News Remote

(continued from page 21)

a multibox he could build in time for the event. It had to be something like a distribution amp, but with line level from the board and only mic level needed, it could be a passive circuit.

Norm settled for bridging the board output with a resistive divider for each output and adding a small 1:1 transformer to isolate each XLR audio output.

Norm retrieved his last virgin Bud box from the parts bin and worked well into the night cutting metal.

When connected to the news board via a 10' shielded umbilical cord, the aluminum chassis and its six mic connectors

were a thing of beauty. "I wonder if this will fool the networks?" he mused.

The big day

On the morning of the Senator's arrival Wiley was a barely controlled basket-case. He buzzed from studio to studio in the station, making a pest of himself with his equipment checks and double checks.

Norm arrived half an hour early sporting a jacket and tie. He grinned sheepishly as Jerry O'Brian, finishing the night shift in worn jeans and a pitted-out Grateful Dead T-shirt, pointed at him and made faces.

"I suppose this means Senator 'Pork barrel' is going to pre-empt our opening day remote from Crystal Lake?" Jerry whined.

"Your bikini contest has been rescheduled," Norm replied, hurrying past to check the news studio one last time.

Wiley wrapped up the morning report and segued to network news. The first story was about Senator Corquebaro's imminent arrival at his hometown. Wiley popped another antacid tablet.

Just as Norm entered the studio, ace news reporter Christine Cacciatore called in from her assigned position at the airport. "Stand-by, Wiley, I think I see the

plane." Norm noted that the RPU's SNR was excellent.

The indicator light for the private news line flashed. Reporter Buzz Sawyer was checking in from the temporary press room in the terminal. "Get ready, Wiley, they just told me ten minutes or less."

Ready and waiting

Norm slipped quietly out of the studio but continued to watch through the double windows and listen to the news intercom conversations.

The air-check recorder was running for posterity. The news feed mixers and cassette players were ready on the desks.

In an hour, all of the news phones would be tied up with feeds to other stations in the area. For now, the news team was in position and ready to follow the action.

As the Senator's plane turned for its final approach Wiley raised his right hand to cue the morning announcer for a special bulletin.

Buzz could hear the sound of the approaching jet in his headphones via the open podium mic. Christine switched the wagon's RPU transmitter from PTT to ON and patiently waited for her cue.

Norm felt his own stomach tighten as he quietly prayed for Murphy's law to be suspended for just a few hours. The drama had begun.

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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Today, after hundreds of hours of discussion and study, the standard finally exists that will allow receiver manufacturers to increase and flatten their frequency response without risk of increased interference. But for them to do this, broadcasters must implement the standard: a "modified 75µs" pre-emphasis specification brightens up the sound on older radios while minimizing interference to adjacent stations, while a sharp-cutoff 10kHz low-pass filter specification protects the second adjacencies by limiting occupied bandwidth.

Receiver manufacturers have stated their willingness to replace their current AM receiver designs (with their telephone-quality fidelity) with AM receivers having full 10kHz frequency response—but *only* if and when the NRSC standard is fully adopted by broadcasters. For the NRSC standards to be successful, broadcasters must change over *quickly*. If the new high-fidelity receivers generate complaints of interference caused by stations not complying with the new standard, the receiver manufacturers will revert back to the present low fidelity 3kHz designs! *Everyone* will lose.

Orban was the first to propose and implement AM pre-emphasis and low-pass filtering, and we were heavily involved in the Committee work and research. We strongly endorse the new NRSC standard. It's good engineering *and* good business, and we are making it easy for all OPTIMOD-AM owners to comply.

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Circle Reader Service 27 on Page 23

World Radio History

A 2nd Look At Loyalty

(continued from page 14)

threatening the manager.

Later, after some sort of reassembling of common sense, he returned to request reinstatement of his program with him as host.

As it turned out, his dramatic on-air appeal had been partly successful. Over 100 prisoners in the local penitentiary had signed a petition to "bring back Mr. Metalhead."

Then, many of these savory characters supplemented this support with letters of threat to station management, complete with full usage of the only language they could partially spell—multiple four-letter sagacities.

Arlo Guthrie, in a GM's shoes, might have said "it's a bit much to take such abuse from a convicted murderer when your only crime was changing the format."

Perhaps my favorite among this class of story comes from a galaxy far away.

Here's the scenario: a public radio station joins National Public Radio and begins a regular format of news and public affairs. The licensee is a state university.

On-air wonder Dr. Spock II loses his music program and both of his listeners. He is devastated!

He writes a letter to the editor in the local newspaper demanding a return to music, and an abandonment of news. He pleads "Let us be ignorant!"

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 master's degree in human resources development. He can be reached at 208-385-3760.

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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. KOM Bdtg. 1019 Cordova St. San Diego CA 92107 619-223-3413.

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

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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 Burdgaard. KLKS. POB 300. Breezy Point MN 56472. 218-562-4884

SMC (5) Carousels & (3) Revox w/Aitken Brain R Swan. WROY POB 400. Carmi IL 62821 618-382-4161.

SMC 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 optimizer in factory case. BO B Royster. KQM Bdtg. 1019 Cordova St. San Diego CA 92107. 619-223-3413.

SMC 452 Carousels (3) stereo. Auditronics 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) Audiofiles 1 stereo 2 mono (2) Control Design Carousels. (2) Beehive terminals. (3) ITC 750. 25 Hz tone gen. Automated Bdtg Control time announce & numerous parts. for sale or lease \$25,000/BO. D Digneress. 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 ESP-1, gd cond. w/many options. \$6000/BO P Wolf. WRCC. 2600 Pine Island. Cape Coral FL 33909 813-574-5548.

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

Want to Buy

Roland Compu-Editor CPE 800 w/VCA800 module M Anderson. Jerec Records. 1469 3rd Ave. New Brighton PA 15066 412-847-0111

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

CAMERAS (VIDEO)

Want to Sell

RCA TK-44 (2) w/Canon lens & mounts. 10' camera cable. BO. (2) RCA film projectors. pre TP-66. BO. Jim or Fred. WLIO-TV. 419-228-8835

JVC KY210 camera. 10.2 Fujinon lens. case. AC adapter. \$2995. JVC KY1900 camera. 10.1 lens. case. battery. AC adapter. \$1995. Harris 690 TVC frame sync. corrects 3/4". 1/2" & 1". 9 bit proc. latest factory upgrades. excel. \$4895. D Brennan. Custom Video Labs. 3596 Lorna Ridge Dr. Birmingham AL 35216 205-823-0088.

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. Turnwater WA 98501 206-352-8028

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

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.

Underwater camera, custom made by Fujinon & Sony. gd to 1,000'. \$30,000 W Norman. A/V Industries. 15 E Mall. Plainview NY 11603. 516-753-9393.

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 11603 516-753-9393

CART MACHINES

Want to Sell

ITC WRA record amp. P James. Allstar Bdtg. POB 7007. Defiance OH 43512 419-782-8591

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

RCA RT-125 mono PB. \$350/BO. RCA RT-126 mono recorder. \$500/BO. J Swett. 4025 Lugano. Flagstaff AZ 86001 602-526-1975

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Ampro CT-4500B stereo R/P. gd cond. 4400. (2) Gates Criterion 80 mono R/P. gd cond. \$200 ea. ITC 3-deck mono. gd cond. \$500 D Kiker. WCOA. Box 12487. Pensacola FL 32573. 904-456-5751

ITC Delta I & IV. \$1500 & \$2000. P Hawkins. New Life Prod. POB 19073. Louisville KY 40219. 502-968-9316.

RCA RT-27 mono (6). all tones. +4 dB audio. (5) completely refurbished & one needs work. (2) BA-27 record amps for 2 of the decks. \$750/all or cash/trade for RCA 77DX/44BX mics. F Vobbe. 706 MacKenzie. Lima OH 45805.

ITC Delta, 3 deck stereo. play only. perfect cond. BO. R Sweatte. KZZU. South 5505 Regal St. Spokane WA 99223 509-448-5555

Tapecaster 700-RR, excel cond. w/extra motor. \$325/BO J Klauk. WSAM. 200 Bloomfield. W Hartford CT 06117 203-726-9083

BE 5500B stereo audio cart machine. 2.5 yrs old. new motor 7 shaft recently installed. \$2200 Bob or Jeff. KJ108. POB 1203. Grand Forks ND 58206 701-746-1417

Audicord E-21, gd cond. \$550. CE. WRCC. 2600 Pine Island Rd. Cape Coral FL 33909 813-574-5548.

Sparta MC-104 4 deck mono play only. \$400. J Phillips. All Star Bdtg. 414 Washington. Defiance OH 43512. 419-782-8591.

Tapecaster 700RP stereo R/P. gd cond. \$600. K Peckham. WMTV. 615 Forward Dr. Madison WI 53711. 608-274-1515.

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

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 Bdtg. 1019 Cordova St. San Diego CA 92107 619-223-3413.

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

Tapecaster 700RD delay cart machine. will take A-B size carts. also will work in a normal mode. \$100. R Dietterich. 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. Bdtg 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. KRIA. 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

Want to Buy

Gates Criterion, 150 Hz record & playback boards & cans. also Microset head mounting assemblies. C Brescia. WNBZ. Box 211. Saranac Lake NY 12983. 518-891-1544.

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.

ITC mono PB, fair price for excel machine. B Anthony. Rt 3 Box 185. Cornelius OR 97113 503-357-6120.

Cart machines or Carousels K Thompson WWIC. 815 W Willow. Scottborough AL 35768 205-574-2198.

ITC stereo cart PB only machines P Martin. WZUU. 4359 S Howell Ste 106. Milwaukee WI 53207 414-482-2638

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

Manual & schematic for Visual Elect 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 sold machines J Lackness. KRIA. 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

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Teac A7030 1/2 or 1/4 trk. needs work or use for parts. \$300/BO. S Biddle. Hot Spots. 727 Fletcher Rd SE. Palm Bay FL 32909. 305-729-8576

Ampex 300C, \$100; Ampex 300, \$100; Ampex AA620, 3 part portable. \$700. C Stillman. Bdtg Foundation of America. Hill Rd. Califon NJ 07830. 201-832-5269.

Ampex AG-440, 1" 8 trk. fair cond. w/roll about stand. \$1000; Ampex AG-440, 1/4" 2 trk. gd cond. w/roll about stand. \$1000. K Har-nack. WEZL. 6080 Mt Moriah Rd. Memphis TN 38115. 901-365-2032.

Wollensak portables (2), works fine. no cards. \$55 ea incl ship. P Salois. KPCR. Hwy 54 East. Bowling Green MO 63334. 314-324-2283.

Inovonics 375 recorder elects. \$150/BO. J Swett. 4025 Lugano. Flagstaff AZ 86001. 602-526-1975.

Revox PR99 low miles. excel cond. \$1200/BO J Chidester. KSPN. POB 1224. Aspen CO 81612. 303-925-5776

JVC KD3030, recently factory overhauled. needs work on pause circuit. \$150/BO. C Brescia. WNBZ. Box 211. Saranac Lake NY 12983 518-891-1544.

Crown SX811 mono FT w/remote for rack mount D Geocaris. Concept Prod. 7878 Big Sky Dr. Madison WI 53719 608-833-8273

Otari MX5050-8 1/2" 8 trk. gd cond. \$2800. Teac X7R 2 trk. like new. \$300 D Huettnner. Dynamic. 358 Bell. Neenah WI 54956 414-722-7228

Sony TC-K6 cassette. solenoid assist. mint cond. \$150; Ampex 1450 reel deck. as is. \$35. W Laughlin. KDCV. 2636 N 56. Lincoln NE 68504 402-466-8670.

Ampex ATR100 2 trk w/stand & remote. call for details. \$4000 D Glasser. Air Show Inc. 5727 N 25th Rd. Arlington VA 22207 703-237-8312

Tascam 80-8 1981 8 trk. very low hrs. w/lor w/ NR. BO. M Baykian. Granny's Kitchen. 6689 Orchard Lake Rd. Ste 151. W Bloomfield MI 48322. 313-737-0751.

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Ampex 2 trk head stack nest for AG-440 reel machine. needs R&PB heads. \$75. N Bealy. 3438 N Galeston Ave. Indianapolis IN 46236.

Pioneer CT-F900, 3 head. solenoid transport. micro proc control. front panel bias & output pots. needs new belts, w/service manual & original box. must sell. \$125/BO A Tucker. Foothill Prod 70 W 83 St. NY NY 10024. 212-877-0973.

Liberty C-W-20 tape winder. \$175; Electro-Sound ES 100 cartridge & cassette winder w/tape time. \$300 D Lundy. Lundy Recdg. POB 408. Heidrick KY 40949 606-546-6650

Ampex ATR 700, 2 trk stereo. BO R Sweatte. KZZU. South 5505 Regal St. Spokane WA 99223 509-448-5555

Ampex 300-8 8 trk 1". vintage tube machine. excel cond. BO: Ampex 351 tube elect (8). excel cond. BO. R Kaufman. Kaufman Recdg Slds. POB 46227. Garland TX 75046 214-271-7625.

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 Bdtg. 1019 Cordova St. San Diego CA 92107 619-223-3413

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

Uher 4000 Report-S, comp overhauled w/service manual. \$350 plus shpg. T Vernon. Vernon Assoc. 1001 Dale Pl. Carlisle PA 17013. 717-249-1230.

Pioneer RTU11 1/2 or 4 trk w/2 head stacks. remote control. factory road case. \$850 G Ernst. Bayside Snd. POB 166. Lincoln City OR 97367 503-996-6020.

Ampex 850 2 trk R/P w/transport (2) w/manuals. \$450 ea; Ampex AG 440B R/P. Inovonics record amp 2 trk w/transport. \$800. J Whitney. WXPY. 55 St Paul St. Rochester NY 14604. 716-325-5300.

Ampex 351 tube-type elect (3). \$400 ea. T Dufresne. Foster Comm. 1 City Hall Plaza. San Angelo TX 76903. 915-653-3387.

Ampex 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.

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Ampex 351 elect (8). all in gd working order. BO R Kaufman. POB 462247. Garland TX 75046. 214-271-7625.

Ampex 300-8 8 trk 1". gd cond. new heads. cheap R Kaufman. POB 462247. Garland TX 75046. 214-271-7625.

Marantz PMD-430 (2) port. stereo. 3 head. cass rec. w/Dolby B & dbx. vinyl padded cases. straps. AC/PS. limiter. vari-speed. all tape configs. VU meters. mic attn. 1/4" stereo phone jack. mic/line inputs. 3 lbs w/batt. excel cond. \$350 ea E Helvey. Successtrax. POB 1357. Winchester VA 22601 703-877-1191

Ampex parts, 350 transport w/FT heads & 7.5/15 ips capstan motor. \$200; (2) Ampex 350 elect w/PS. \$50 ea; Custom wood console w/casters. doghouses for 7" & 14" of elect. \$100/BO. E Helvey. Successtrax. POB 1357. Winchester VA 22601 703-877-1191

Concertone 90 FT. 7.5/15 ips transport & elect. rk mt. as is. \$100/BO. steel recorder/equip rack w/casters. gd cond. \$50. E Helvey. Successtrax. POB 1357. Winchester VA 22601 703-877-1191

Ampex 3200, 5 slaves 1 master. \$2000 F Sinuschkin. American Lutheran Church. 1568 Eustis St. St Paul MN 55108 612-645-9173

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Scully 280; Ampex AG-440; Ampex AG-350; Alpha 21; VSC Soundpacer C-4. E Helvey, Helvey Prod. POB 1357, Winchester VA 22661 703-877-1191.

Ampex remotes for 350-351, \$100 ea. Mr. Oliver, 212-874-0274.

Otari ARS100 reproduce, gd cond, (4), \$900 ea. M Holderfield, WOLF, POB 1427, Dothan AL 36302. 205-792-1149.

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Scully 100 24 trk. w/16 trk heads, spares, decs. R Robinson, TNA, Box 57, Wallingford CT 06492 203-269-4465

Revox B-77, 1/2 trk \$1100. Revox B-77 1/4 trk. \$900. Sony TCR-81 stereo. \$200 Sony TC 770-2 portable. \$00 R Streicher 545 Cloverleaf Way Monrovia CA 91016 818-359-8012

Ampex 350-2 2 trk 7 5/15 ips tube elec w/several sets new spare tubes spare capacitor motor, spare head cluster & manual \$500/BO S Morton, KBBI, 215 E Main Ct Homer AK 99603 907-235-7721

Teac A3340, rebuilt, heads, guides, rubber, 55CB/BO G Knight, Creation Video, 711 Soft St West Dundee IL 60118 312-426-5363

Ampex AG600 & Ampex AG600B both solid state w/cases & books, one works one needs work, could make one gd machine \$390 plus shipboth S Blair, WKBC, Rt 550 West, Hindman KY 41822 606-785-3129

Want to Buy

Presto PT-900 or RC-7 portable recorder & corresponding elects. B Leslie, Pro Recording Svcs, 13709 Mapleleaf Dr, Garfield Heights OH 44125. 216-662-1435.

Ampex 350 console for 350 machine. B Sauber, WFRA, POB 908, Franklin PA 16323. 814-432-2188.

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 Hertzburg, 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.

CONSOLES

Want to Sell

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Interface 300 recording & mixing console. 24 x 16 frame w/20 in 8 out, also talk back & set-up tone, vgc. \$2200 D Lundy, Lundy Recdg, POB 408 Heidrick KY 40949 606-546-6650

BE 4M50 4 chnl std mixer in excel cond. \$500 also 5 chnl mono board looks like BE board, vgc, changeable circuit boards, \$350 L Bergman, Universal Svcs, POB 18716, Spokane WA 99208 509-328-0766

Biamp 1282, 12 chan stereo prod board, separate 3 band EQ, reverb effects & pan buss/chan, slide pots, \$550 C Stevensen WFEC, 507 S Main, Williston FL 32696 904-528-4622

Sound Workshop 1280, 12XX8 x 2 mixing console, \$1000 K Harnack WEZL, 6080 Mt Moriah Rd Memphis TN 38115 901-365-2032

ADM ST-160 MKII on air/prod console, timer talk-back 4 trk mix 2 EQ mod, 2 mic/10 SLI mods rack power supply manuals vgc J Book WOC, 3535 E Kimberley Rd, Davenport IA 52807 319-344-7000

Harris Stereo Executive, 10 chan gd shpg, \$2150 B Evans, WOXE, POB 1357, Elizabethtown KY 42701 502-737-8000

Yamaha PM1000, 16XX4 mixing console, gd cond, \$1000/BO. D Geocans, Concept Prod, 7878 Big Sky Dr, Madison WI 53719. 608-833-8273.

Tapco 8201B portable 8 chnl stereo mixer w/48v phantom pwr, manual/schematic, needs work, \$250. J Saaco, WDAV, POB 1540, Davidson NC 28036 704-892-8900.

Gates Stereo 80, 8 chan stereo w/manual, \$1000/BO. D Flewelling, WREM, POB 160, Monticello ME 04760 207-538-9528.

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.

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Shure M-68 mic mixers (2), used, Autogram IC-8 8 chnl stereo console, BO B Royster, KQM 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

Biamp 1642 16 x 4 x 2 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 micline inputs, 4 out, eff. monitor, talkback, pan pots, EQ each input, vgc, \$800 E Helvey, Successstrax, 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 Svcs, 1775 Bartlett, 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

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 complete 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.

UREI 1681, trade for 4 output prod mixer of like quality. M Cohen, KDUZ, POB 7339, Durango CO 81301. 303-247-7261.

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, Esanacanaba MI 49829 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 reasonable price, tax deductible R Yoder, WJMU, Millikin Univ, 1184 W Main Decatur IL 62522 217-424-6369

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dbx RM155, gd cond. \$750 D Huettner, Dynamic, 358 Bell, Neenah WI 54956 414-722-7228

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E/V Sentry 100A (2), \$275/BO, E/V EVM15B Series II (2), \$225/BO R Cobb, POB 5332, Sun City Center FL 33570 813-634-1940

JBL 4301B, excel cond, \$100, JBL 2345 w/15" W & horn in excel cond, \$250 L Bergman Universal Svcs, POB 18716, Spokane WA 99308 509-328-0766

Fairchild 658-A echo chamber, \$75. D Lundy, Lundy Recdg, Box 408, Heidrick KY 40949. 606-546-6650.

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 shpg. W Laughlin, KDCV, 2636 N 56, Lincoln NE 68504 402-466-8670

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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

Want to Buy

EV 100A Sentry speaker system J Fuehrer NTV Network Box 220 Kearney NE 68848 308-743-2494

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Gates Sta-Level, cond unknown, \$25 R Dieterich, WAMO, 411 7th Ave, Pittsburgh PA 15219 412-471-2181

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Marti CLA 40-H compressor/limiters (2) BO J Saaco, WDAV, POB 1540, Davidson NC 28036 704-892-8900

Orban 424A comp/limiter stereo de-esser, \$695. D Jackson, WGCH, 1490 Dayton Ave, Greenwich CT 06830. 203-869-1490

ATI Emphasizer audio processor, \$850 M Tai, Tai Recdg, 1347 S Capital St SW, Wash DC 20003 202-488-3905

Harris 994-7059-002 AM limiter, asymmetrical 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

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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 Multimiters & Multimax's, BO B Royster, KQM Bdctg 1019 Cordova St, San Diego CA 92107. 619-223-3413

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Ampex Compellor in superb cond. B Matla. 5001 Baum Blvd. Pittsburgh PA 15213. 412-683-2020.

Orban 8000A, \$1800. B Downs, KJCS, Box 11111, Nachadoges 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.

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Allison Research Gainbrain 700 K Smith, Smith Eng Svcs, RR 3 Box 483A, Gorham ME 04038. 207-929-6129

Optimod 8000. P Martin, WZUU, 4359 S Howell St 106, Milwaukee WI 53207 414-482-2638

Orban 8000. M Dailey Dailey & Assoc, 311 S Glouster, Tupelo MS 38801 601-841-1506

Harris MSP100. E Harrell, WRHT, POB 1019, Moorehead City SC 28557. 919-247-2002

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AKG V19E; Shure 545L, BO. P Cibley, Cibley Music, 138 E 38th, NY NY 10016. 212-986-2219.

RCA KU3A (2) w/yokes & wooden case & (3) BK5B's ribbon mics, all re-ribboned from RCA, excel cond, \$1000/pr of KU3A's & \$300 ea for BK5B's. P Chance, Univ of UT, Salt Lake City UT 84132. 801-581-8943

EV RE-15 excel cond, \$100. L Bergman, Universal Svcs, POB 18716, Spokane WA 99308. 509-328-0766.

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 MD421/U mics, (2) new, EV RE-20 mic; EV 635A mic; EV rolloff filters, plug-in, Luxo mic spring arm. BO. B Royster, KQM Bdctg, 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 Duvall, 84 Martens Rd, San Rafael CA 94901. 415-456-7106.

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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

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Custom made 19" equip rack, table model, black in vgc, \$75. L Bergman, Universal Svcs, POB 18716, Spokane WA 99208. 509-328-0766.

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.

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, Successtrax, 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, Successtrax, POB 1357, Winchester VA 22601. 703-877-1191.

Studer hybrid. F Sinjuschkln, 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

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Sears air compressor w/tank, \$100; anchor desk, credenza, etc, \$3500; Code-a-phone 180 automatic phone line message player, \$50. General DataCom mod md GDC 212A, \$100. J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494

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RCA or Dumont TV equip inc manuals & catalogs. A Weiner, Weiner Assoc, 178 Lawrence Pk Terr, Bronxville NY 10708. 914-337-4554.

Radio Antenna Engineer textbook by Ed Laporte, pub by McGraw Hill, \$50 for good copy, \$75 if mint. J Glass, WNIU, N IL Univ, Dekalb IL 60115. 815-753-0212.

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 Cislser, Orbit Radio/Video, 2405 Hermitage Way, Louisville KY 40241. 502-458-7420.

UTC LS-49 or Chicago BD-2 audio xlmr or similar class B driver. M Carroll, So Bctg Svcs, 108 Wessington Ct, Hendersonville TN 37075. 615-822-0082.

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Sansui T60 AM/FM stereo, mint cond, \$60/BO. S Schneider, WKRL, 2 Corp Dr # 550, Clearwater FL 34622. 813-579-9790.

Dymek AM-5 wideband tuner & DA-5 amp antenna, BO. B Royster, KQM Bdctg, 1019 Cordova St, San Diego CA 92107 619-223-3413.

Realistic C-Quam AM stereo tuner, \$40. R Humphrey, WLTJ, 1051 Brinton Rd, Pittsburgh PA 15221 412-244-7600.

Wilson WE-800, 144-148 MHz, synthesized transceiver, 1 W/12 W, 12 VDC or internal NiCad batt, w/spkr-mic & hand-tooled leather case, mobile mnt, \$200/BO; ICOM IC-280, 144-148 MHz, synthesized transceiver, 1 W/10 W, 3 memory chan, mobile mnt, Drake 1525 touchtone pad mic, \$175/BO. E Helvey, Helvey Prod, POB 1357, Winchester VA 22601 703-877-1191

Want to Buy

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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

S-A 9000 2.8 meter dish w/LNA, BO. J Guber, WVOK, 236 Goodwin Crest Dr, Birmingham AL 35209 205-945-4646

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sound, presently DE of small group. Looking NYC, Boston, Philly, Baltimore. Jim, 1449-I Devon Ln, Harrisonburg VA 22801. 703-434-5926.

Short-term, 2-12 mons, interim GM seeks position. A Swan, Box 3, Palmyra NJ 08065. 609-829-1770.

CE Radio now! Former CE, Boston, Houston, Miami, Ft Lauderdale, FCC Genrl, ASEE, non-drinker, ham, M Gottesman, 3377 Solano Ave #312, Napa CA 94558. 415-221-2000.

I have designed, built & maintained many radio stations, including Radio New York Intl, what can I do for you? A Weiner, Engr, 178 Lawrence Park Terr, Bronxville NY 10708. 914-337-4554.

Bdctr looking for right FM-CP to buy or help build. RNS & Assoc, POB 50124, Austin TX 78763. 512-346-5056.



Broadcast Equipment Exchange

REMOTE . . . WTS

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.

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 Bdcgt, 1019 Cordova St. San Diego CA 92107 619-223-3413.

Moseley PCL505C composite STL w/subcarrier gen & demod, trade for Marti STL 10 & 6" dish. W Blackwedder, 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/pwr supply & (3) audio demods D Garder, KDUZ, POB 10, Hutchinson MN 55350. 612-587-2140

A new way to avoid the high price telephone loops with your existing Marti system. For complete details, diagram and information where your Marti Loop will only cost you \$2.00 per month, send \$24.95 to:

Satellite TV
P.O. Box 759
Scottsboro, AL 35768

Wegener CNN Radio Network rcvr, mainframe, FM demod card for cable, 2 yrs old, avat 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. \$500/BO; ABC Network 32 pulse rcvr, \$400/BO R Yoder, WJMU, 1184 W Main, Decatur IL 62522. 217-424-6369

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, ACSL, 1 American Plaza Ste 310, Evanston IL 60201 312-869-8001.

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 magnatron 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, Comseld, 93 Robinhood Dr, Zelenople 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, ACSL, 1 American Plaza Ste 310, Evanston IL 60201. 312-869-8001.

Avcom SPC 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 Bdc 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 Recgd, POB 10501, Blacksburg VA 24062. 703-953-0222.

Microdyne 1100 PCDR-5 demod in SCPC terminal, \$2000/BO, M McVey, KMCD, 57-1/2 Court St, Fairfield IA 52556. 515-472-4191.

Want to Buy

Moseley PCL-606-C composite stereo system, gd cond, will consider others, K Lincoln, WIZN, Stevens House, Vergennes VT 05491. 802-877-6800

Moseley PCL-600C w/antennas, coax & connectors, also Marti remote equip, P Mart n, WZUU, 4359 S Howell Ste 106, Milwaukee WI 53207. 414-482-2638

Moseley MRC-2 SARTO remote control terminal, Moseley MRC-2 SART remote control system; J Fuehrer, NTV Network, Box 220, Kearney NE 68848. 308-743-2494.

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. 308-743-2494

Marti STL10 xmt & rcvr & 6" microwave dish, 950 MHz band W Blackwedder, KNUE, POB 7935, Tyler TX 75711. 214-581-0606.

S-A 32 digital network receiver, compatible w/ABC, CBS, NBC & CNN, K Kuenzie, KSLQ, 102 Elm Ste 203, Washington MO 63090. 314-239-6800

STATIONS

Want to Sell

LPTV-CP South CA coastal city, large market, \$50,000. G Erway, 805-688-0249.

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).

Want to Buy

Rather than sell at below market prices, let our turnaround team evaluate & re-organize your station, services pay for themselves in 6 months, contact: Consultants, POB 81, Westhampton NY 11977

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 TE3 stereo gen, gd cond, \$750/BO, CE, WRCC, 2600 Pine Island Rd, Cape Coral FL 33909. 813-574-5548.

McMartin BFM-1521R & BFM 1514R, matching set, stereo gen amp, FM stereo limiter, Maxi 1, \$250 pr. R Dietterich, WAMO, 411 7th Ave, Pittsburgh PA 15219. 412-471-2181.

Moseley SCD-2P & SCG-4T SCA gen & det set 185 kHz, \$600. B Sadler, WFSI, 918 Chesapeake Ave, Annapolis MD 21403. 301-269-6500.

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 Bdcgt, 1019 Cordova St, San Diego CA 92107. 619-223-3413

Utah Scientific AVS-1 20x20 video, 10x10 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.

RCA 16" music transcription library, BO R Bellevia, WSBG, 4949 W Belmont, Chicago IL 60641. 312-282-9722

Audiopak AA-3, A-3 stereo carts, unrecorded in boxes, BO, B Royster, KQM Bdcgt, 1019 Cordova St, San Diego CA 92107. 619-223-3413.

TAPES, CARTS & REELS

Want to Sell

Aristocart & Capital A2's, (350), w/plastic wall mounting shelves for 200 carts, \$250 for lot or 75¢ ea, K Peckham, WMTV, 615 Forward Dr, Madison WI 53711. 608-274-1515

Want to Buy

Aristocarts for rebuilding, 25¢ ea. B Anthony, Rt 3 Box 185, Cornelius OR 97113. 503-357-6120.

Library of instrumental music on 10" reel, 1/2 trk or full trk mono, pay or trade for broadcast equip. B Mountjoy, Custom A/V Svcs, Box 1240, Elizabethton TN 37644. 615-543-5840

A & D CARTRIDGE REBUILDING SERVICE
3380 Blakely Ave. • Eau Claire, WI 54701 • Ph.(715) 835-7347 • Ph.(715) 835-8676

Qty	Length	Standard Tape	High Output Low Noise Tape
100	10 sec	2.15	2.25
100	100 sec	2.30	2.50
100	2 min	2.70	2.80
100	4.5 min	2.90	3.00
100	5 min		
100	8 min		
100	8.5 min		
100	10.5 min		

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Send This Order Form - 10% OFF Your Order

Call Letters _____ Total Carts Shipped _____
Street _____
City _____ State _____ Zip _____
Telephone _____ Return Attn. _____

SWITCHERS (VIDEO)

Want to Sell

Richmond Hill EVS-7, 1 ME 7 input switcher w/12 pattern SEG, title keyer, color background gen, black burst gen, w/books, clean, complete, \$350. H Ruh, WQVR, 540 Oakton, Des Plaines IL 60018. 312-803-8443.

Crosspoint Latch 6112BH 8 input, \$5000. W Norman, A/V Industries, 15 E Mall, Plainview NY 11803. 516-753-9393.

We have the 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, Ocean-side, 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.

Fidelipac 300's, 330 min, 405 qty, slight use, \$1 ea. J Moss, KTCL, POB 2049, Ft Collins CO 80522. 303-493-5330

Transtar, complete oldies library, over 1200 carts, \$2100/BO. M St Cyr, Goodrich Bdcgt, 2517 E Mt Hope, Lansing MI 48910. 517-487-5986

Fidelipac 300 carts, (3) boxes of various lengths, at least 250+ carts, BO plus ship F Vobbe, 706 MacKenzie, Lima OH 45805.

Inexpensive carts needed from 2 to 5.5 min except for Fidelipacs. K LNI, 94-539 Puahu St, Waipahu HI 96797. 808-671-6500

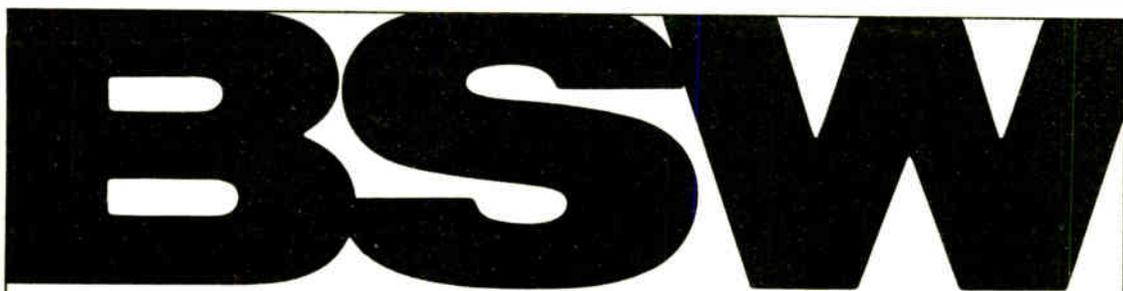
Scott Ross show & sim pgms, pre '78, any format, also debate between Dr Walter Martin & Madalyn Murray O'Hare. S Todd, 2911 Simpson St, Roseville MN 55113. 612-633-4458.

TAX DEDUCT. EQUIP

16mm sound & film equip for developing educ & ecological films, any equip accepted. Dr R Gerber, College of St Joseph, Windham ME 04062. 207-892-6766

Eng student desiring donation of old bdcgt equip (anything) in repairable cond, will pay all shipping charges. EE student at Purdue C Gill, POB 371, Indianapolis IN 46206. 317-923-2800

SCA subcarrier receivers, any condition, for non-profit radio reading service. T Vernon, Penna Assn for the Blind, 1800 N 2nd St, Harrisburg PA 17102. 717-238-2531



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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

Donations of video, audio & lighting equip. Any condition for non-profit religious group in North CA, will pick up or pay freight. R Scott, 1701 S. Box 125, Canby CA 96015, 916-233-5155.

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

TEST EQUIPMENT

Want to Sell

Lambda LNS424 power supply, \$85 P Cibley, Cibley Music, 138 E 38th, NY NY 10016, 212-986-2219.

SWR 6681 field strength meter, \$20 J Kiauck, WSAM, 200 Bloomfield, W Hartford CT 06117, 203-726-9083.

Goldline ASA10, \$125/BO R Cobb, POB 5332, Sun City Center FL 33570, 813-634-1940

Heath IM-4110, gd cond, Heath assembled, \$100. CE, WRCC, 2600 Pine Island Rd, Cape Coral FL 33909, 813-574-5548.

HP AC voltmeter 400EL, \$300. HP attenuator set 350D, \$150; G-R oscillator type 1310A, \$150; Data Royal wavform sweep gen F230A, \$600. R Branske, WLOO, 875 N Michigan Ave, Chicago IL 60611, 312-440-3100

Plastic Cap power supply, HV50-403A, new, \$250. R Branske, WLOO, 875 N Michigan Ave, Chicago IL 60611, 312-440-3100.

QEI 691-1 mod monitor w/SCA card, Potomac AT51 audio test set, Sencor SC61 scope, gd through 100 MHz & misc test gear, J Phillips, Allstar Bdctg, 414 Washington, Delance OH 43512, 419-782-8591.

Potomac FIM-41 field strength meter, excel cond, some cosmetic damage to case, 6 yrs old, \$1900/BO J Seaman, WWSA, POB 752, Harrisonburg VA 22801, 703-434-0331.

Wavetek 860 VHF, UHF, IF sweep gen, marker gen, RF output w/attenuator, no book but clean & complete, \$150. H Ruh, WOVR, 540 Oakton, Des Plaines IL 60018, 312-803-8443

OVER 110 AM AND FM TRANSMITTERS

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BESCO INTERNACIONAL
5946 Club Oaks Drive
Dallas, TX 75248

214-630-3600
214-276-9725

McMartin TX-300A mod mon calibrator, McMartin pre-selector, both used, BO, lve Elect IE-20A & IE-10A portable, battery operated real time analyzer & portable pink noise gen, new, BO, B Royster, KQM Bdctg, 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 RM529 rack mount wavform monitor, \$300 J Fuehrer, NTV Network, Box 220, Kearney NE 68848, 308-743-2494.

Sound Tech 1000A, 1100A, 1710A, 1200A, all new, BO, B Royster, KQM Bdctg, 1019 Cordova St, San Diego CA 92107, 619-223-3413

Tek wavform monitors, BO C Haynes, WJMI, POB 31235, Jackson MS 39206, 601-948-1515

Tentel tape tension meter for R-R decks, Fidelipac wow & flutter meter, Heathkit freq counter, Digimac 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 Bdctg, 1019 Cordova St, San Diego CA 92107 619-223-3413

Want to Buy

Small X/Y scope, such as EICO 430, portable or rackmount OK. A Tucker, Foothill Prod, 70 W 83 St, NY NY 10024 212-877-0973

Telemet 4501-A1 TV demodulator chnl 4 + or chnl 6 & any VHF chan J Fuehrer, NTV Network, Box 220, Kearney NE 68848 308-743-2494.

Tek R520A vectorscope, J Fuehrer, NTV Network, Box 220, Kearney NE 68848 308-743-2494.

TRANSMITTERS

Want to Sell

CCA FM-10,000D w/exciter, stereo gen, harmonic filter, tuned to 100.7, in service as standby, \$7500. D Kiker, WCOA, Box 12487, Pensacola FL 32573 904-456-5751

RCA BTA5F at 1310 kHz, mostly complete for parts, cheap. S Johnston, WGH, 281 Independence Ave #1A, Virginia Bch VA 23462 804-497-1310.

RCA BTA1R or 5T 980 kHz crystal, R Dufault, WEBB, 3000 Druid Park Dr, Baltimore, MD 21215, 301-367-9322.

Wilkinson SG1E exciter, E Kazmark, KAZZ, POB 1369, Deer Park VA 99006, 509-276-8816.

RCA BTA-5SS solid state 5 kW AM, some damaged output transistors, BO J Swell, 4025 Lugano, Flagstaff AZ 86001 602-526-1975.

CCA AM1000D 1000/500 W, excel cond, at 1340 kHz \$5000/BO A Soroka, WJRO, POB 159, Glen Burnie MD 21061 301-761-9220

Katel FMX 2100 FM modulator, BO R Sweatte, KZZU, South 5505 Regal St, Spokane WA 99223 509-448-5555

RCA 20 kW, 350' of 3-1/8" transmission line, 10 bay antenna w/radomes, recently taken out of service, sell as package, \$23,000 or separately, M O'Brien, KTGL, 3201 Pioneers Blvd Ste 208, Lincoln NB 68502, 402-483-6814.

Gates FM 1-G w/exciter, used in service, BO J Gerard, WIHS, POB 117, Middletown CT 06457 203-346-3846.



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San Diego, CA 92101
619-239-8462
Telex 229482LIMUR

Versa Count 10 W FM exciter/xmtr w/stereo gen, \$1500. C Haynes, WJMI, POB 31235, Jackson MS 39206, 601-948-1515.

Gates BC500G on 1170 kHz as stand-by, V Baker, Box 889, Blacksburg VA 24060, 703-552-4252.

Want to Buy

FM xmtr, 2.5 to 4.0 kW w/exciter, remote control label, 240 V single phase only, all makes considered, D Carmine, WKKM, Box 549, Harrison MI 48625 517-539-7105

Remote controllable, 2.5-4.0 kW w/exciter, 240 V single phase only, all makes considered, D Carmine, WKKM, Box 549, Harrison MI 48625 517-539-7105.

Harris MW-1A, gd cond, B Spitzer, KKLS, Box 460, Rapid City SD 57709 605-343-6161

Crystal for RCA BTE-10B FM exciter, needed at 91.9 MHz or trade for 92.7 J Lane, WWSA, 1015 Main, Wheeling WV 26003 304-232-1170.

FM xmtr, 1-10 kW for non-comm station, any cond, D Van Zandt, Cornerstone Radio, POB 500, Petersberg IL 62675 217-632-3115.

FM xmtr for class A station, P James, Allstar Bdctg, POB 7007, Defiance OH 43512, 419-782-8591

FM 1 kW, in gd cond, J Caracciolo, WDRE, 1600 Stewart Ave, Westbury NY 11590 516-832-9400

FM xmtr, 10 kW, also 300' 1-5/8" transmission line, air dielectric, D McMurphy, FL Public Radio, POB 6501, Titusville FL 32782 305-268-3000

Low-band chan 4 + VHF xmtr, 10-30 kW w/VSB & 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 Glouster, 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

TUBES

Want to Sell

FM xmtr tube, 4CX10000D, used & rebuilt, \$100. D Woodcock, WNW, 5606 Medical Circle, Madison WI 53719 608-271-1025.

3CX2500A3 \$300; 4CX10,000A3, \$500. J Ortiz, WHOY, POB 1148, Salinas PR 00751, 809-864-0122 eves

Bdct camera pickup tubes, Vidicons 4809, 4811/8134 from RCA TK 27, 28, Vistacons BC 4922B, 4993R, 4994G, from TK455, 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

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

QRK 3-speed, w/Micro-Trak 303 arm, vgc, \$140, W Laughlin, KDCV, 2636 N 56, Lincoln NE 68504 402-466-8670.

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

RCA TT plays up to 14" discs & has two tone arms, one for old transcriptions & one for regular recordings, 45, 78 & 33-1/3 rpm, vgc, \$250. L Bergman, Universal Snds, POB 18716, Spokane WA 99308, 509-328-0766

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

Want to Buy

Technics SL1200MKII, gd cond, under \$400, B Gray, Gray Audio, 223 W Mtn Rd, West Simsbury CT 06092, 203-658-6941

TV FILM EQUIP.

Want to Sell

RCA TK27, w/35mm Simplex projector, TP66 16mm & slide projector, \$4000, T Judge, Tag Comm, 75 Weaver Rd, W Milford NJ 07480 201-697-8545

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.

Want to Buy

Complete RCA film chain, either TK28 or TK29, H Henson, Henson Prod, 3796 Bethunia St Rd, Winston-Salem NC 27106, 919-924-8717

VIDEO PROD. EQUIP.

Want to Sell

Trans-USA Max-9 75-300 ohm VHF/UHF/FM splitters (500), \$220/all P Remaker, WQHS, 3905 Spruce St, Phila PA 19104 215-898-9553

Grass Valley 937 RGM chroma keyer, \$500 complete; Central Dynamics VA 2181 video proc amp, \$500; Central Dynamics VK2140 encoded chroma keyer, \$500. H Ruh, WOVR, 540 Oakton, Des Plaines IL 60018 312-803-8443

Grass Valley 900 Series sync gen, tray & power supply & color lock modules (2), \$250 ea & \$100 for extra tray & power supply, H Ruh, WOVR, 540 Oakton, Des Plaines IL 60018 312-803-8443.

Sony V02850A U-matic 3/4" VCR, fair cond, w/Sony RM400 editor, \$275, K Peckham, WMTV, 615 Forward Dr, Madison WI 53711 608-274-1515

JVC RM70U remote control for 3/4" VCR w/cable, BO, P Cibley, Cibley Music, 138 E 38th, NY NY 10016, 212-986-2219.

Microtime 2020 TBC (2) w/Image X options, books, will include 1 Image plus box & 20 spare boards if buyer takes both units, \$2500 ea or \$5000/all or BO, H Ruh, WOVR, 540 Oakton, Des Plaines IL 60018, 312-803-8443.

Conrac RHA 19, 19" video monitor (10), \$500 ea, as is; Ampex AVR2 (3), \$1500, as is, T Judge, Tag Comm, 75 Weaver Rd, W Milford NJ 07480 201-697-8454.

Knox K50 character gen, R Tanner, Van Wert Cable, POB 126, Van Wert OH 45891, 419-238-4793.

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 Sids, 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 + (6) 910 pulse DA's, \$250 + shpg; Sony DA-101 pulse DA, \$50 + shpg; Sony PSA-101 subcarrier phase shifter, \$50 + shpg; Lenco PFM-300 mtd 300 frame & pwr supply, Lenco PGS-315 sync gen substitute; Lenco PVD-354 variable delay video amp, \$250 + shpg; Ampex/JVC VPR-4400 3/4" field recorder, needs audio stack, full doc, \$200 + 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 bdct multiplexer for film chain, \$275; B&H 2580 16mm snd movie projector, excel, \$275, G Ormrod, GFO Prod, 432 East X St, Tumwater WA 98501 206-352-8028

Want to Buy

JVC TM-R9U 9" color monitor, Belar TVM-1 TV aural mod mon, ch 4 + or any VHF chnl, J Fuehrer, NTV Network, Box 220, Kearney NE 68848, 308-743-2494

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Sony VP2000 3/4" player, needs minor repairs, \$140 frt inc, L Graziplene, Greyland R&D, 3532 N Main St, N Java NY 14113 716-535-7251.

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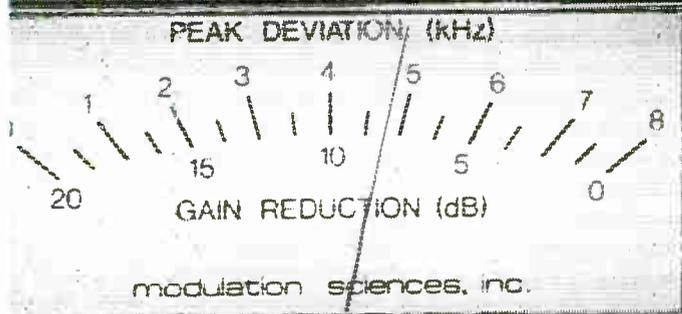
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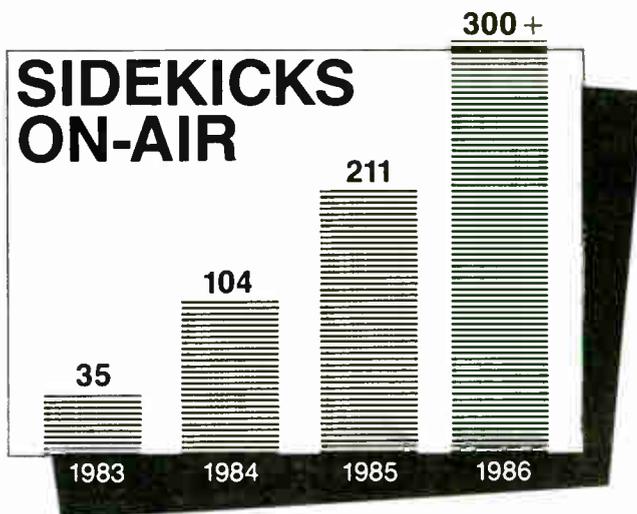
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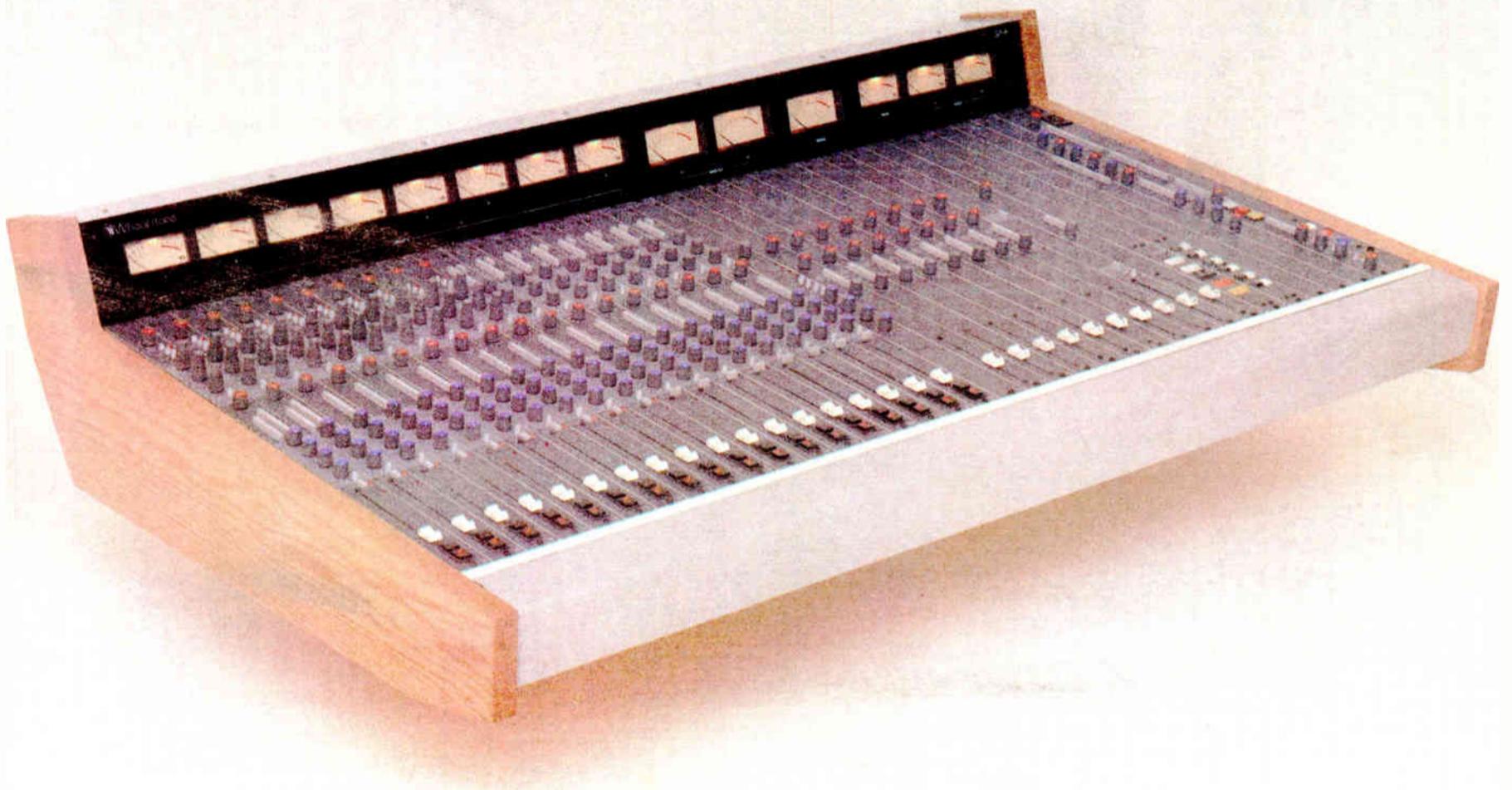
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