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Radio World

Broadcast Equipment Exchange
See pages 25-30

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RFR Suit Filed Against KGA

by Alex Zavistovich

Spokane WA . . . KGA-AM, Spokane, and its owner, Price Broadcasting, Salt Lake City, have been named defendants in a suit filed by the husband of a woman who died of a cancer similar to leukemia.

The complaint, filed 30 July in Spokane County Superior Court on behalf of Thomas DiLuzio, maintained that DiLuzio's wife, Janice, developed cancer as a result of being exposed to the station's 50 kW signal, which broadcasts on 1510 kHz.

DiLuzio's attorney, John Glassman, said Janice DiLuzio was diagnosed in 1982 as having multiple myeloma, a cancer of the blood plasma cells.

At the time, Glassman said, a medical specialist asked Mrs. DiLuzio whether she may have been exposed to radio station transmissions. Glassman declined to name the specialist, but cited him as "one of the foremost authorities on multiple myeloma in the world."

In the 1970s, the DiLuzios moved to a house approximately 500' from KGA's transmitter, Glassman noted. Their children, ages 12 and 15, attended Mullan Road Elementary School, which Glassman said is approximately 200' from the KGA antenna.

The school district has also been named in the suit, which charges that school and county officials placed the school where they should have known a hazard existed, Glassman said.

He added that the complaint further accuses KGA of maintaining a nuisance, and alleges that the station did not warn nearby residents of possibly harmful effects of exposure to radiofrequency (RF) radiation.

KGA, Price Broadcasting, and Spokane County school district officials declined to comment on the case.

Disagreement about cause

Dr. Kristian Storm, a surgical oncologist at the UCLA School of Medicine, disagreed with the contention that exposure to RF radiation can cause cancer.

"No known human cancer has been known to occur from nonionizing radiation at the low end of the spectrum," said Storm, who is also chairman of Committee C95.1 of the American National Standards Institute (ANSI), the group charged with development of RF exposure standards.

(continued on page 8)

Daytimer Remedy Near

by David Hughes

Washington DC . . . The NAB Daytimers Committee has reported progress in solving several problems affecting AM daytimers, including a possible settlement in the dispute surrounding the extension of Daylight Savings Time (DST).

Committee Chairman David Palmer, of WATH, Athens, Ohio, told RW that the FCC may be "inclined to grant relief" in the near future to daytimers who will lose a key hour of full power during AM drive time each day for three weeks next April, when a three-week extension of DST will take place.

Last summer, Congress approved a plan to start DST three weeks earlier in the spring. Instead of moving clocks an hour ahead on the last weekend in April, the change will take place on the first weekend in April 1987.

Because sunrise will occur an hour later than normal during those three weeks, daytimers say they will not be able to operate at full power during an hour of AM drive time. Instead, daytimers will be limited to their much lower presunrise power levels.

Although Palmer was reluctant to give details about the talks his committee had with the FCC, he said he was confident the Commission would permit daytimers to use higher power levels during the three-week period. Palmer expects an announcement from the FCC by early 1987.

"We are still uncertain about the FCC's plan, but we are fairly confident that it will involve a power increase during that one hour," Palmer said.

Daytimers have advocated establishing a minimum presunrise power level. They also support a plan to allow the increase to full power to be made at a specific time, such as 6 AM, rather than at local sunrise.

Ratings trouble

Another problem facing daytimers is the potential for lower overall ratings because stations are now utilizing their postsunset power levels for longer periods, Palmer pointed out.

When the broadcasting agreement between the US and Mexico was signed in August, daytimers on Mexican clear

(continued on page 4)

FCC Fees Schedule On Target

Washington DC . . . The FCC has set 2 April 1987 as the "statutory limit" to begin collection of fees for public hearings, construction permits, facility modifications and other licensing matters.

Brent Weingardt, an attorney in the FCC's Office of the Managing Director, said collection of the fees, which were approved last April, "are going to start on time."

Weingardt commented that the Commission is having a problem reconciling fee collection with the role of frequency coordinators in private radio.

All land-mobile applications have been mandated to go through the frequency coordinators prior to submission to the FCC, Weingardt said. If a fee is attached to the coordinators' applications, he pointed out, it is considered government money and must be submitted within three days.

The Commission is concerned about the problem because the majority of applications received at the FCC come from land mobile groups, Weingardt maintained.

"(Land mobile) is a big money area," he said.

Land mobile concerns

Comments recently filed with the FCC by land mobile interest groups expressed concern about the effect fee collection would have on applications.

The Special Industrial Radio Service Asssociation (SIRSA), a land mobile group, stated that the FCC "should not undermine its efforts to expeditiously

(continued on page 10)

Circle Reader Service 50 on Page 22

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Regulatory News

FCC Files

To file a petition or comments with the FCC, send an original and five copies of your filing to the Office of the Secretary, Federal Communications Commission, Washington DC 20554. When filing comments in support of another party's petition or comments, send a copy of your filing to the original petitioner and provide the Commission with a signed statement verifying that this has been done. For more information about a particular proceeding, call the contact person listed.

FCC User Fees

The FCC said it will begin collecting licensing and application fees by April 1987, a year after it approved the plan.

In August, the Commission requested comments on 11 proposed procedural changes and additions to a schedule of those charges, which include $2,000 for a major CP by AM stations, $1,800 for a major CP by FM stations, $6,000 for all FCC hearings, $500 for minor CPs and $325 for AM licenses.

Brent Weingardt, of the FCC management planning office, said he anticipates a report detailing the comments to be available by the end of 1986.

For more information, see the related article in this issue of RW, or contact Brent Weingardt at 202-632-3906.

AM Stereo

The FCC has not yet responded to a request filed in September by Texar Inc. asking it to choose an AM stereo standard. The petition does not say which system—the Kahn-Hazeltine ISB system (with about 80 stations) or Motorola's C-QUAM system (with about 300 stations)—the FCC should select.

In the petition, Texar maintained that receiver manufacturers are experiencing slow sales due to consumer confusion about the two systems. Most receiver manufacturers make C-QUAM-only radios.

However, FCC Mass Media Bureau Chief James McKinney said he doubts the Commission will abandon its "marketplace" approach on the AM stereo issue. He said broadcasters must decide which standard will survive, noting that only about 10% of all US AM stations have gone stereo.

William Hassinger, McKinney's engineering assistant, said the FCC will respond to the Texar petition in the near future. But he doubted that the Commission will reopen the AM stereo docket, which he and McKinney maintain could be a time-consuming process that might actually delay AM stereo further.

Contact William Hassinger at 202-632-6460.

Arizona Waivers

The FCC, on 16 October, proposed modifying or eliminating its main studio and studio origination rules in response to a June petition from an ad hoc group of 14 radio licensees calling itself the Arizona Justice Committee (AJC).

The rules, now in question, were intended to ensure that a local community had access to a station's main studio. Stations can obtain an "Arizona waiver" to build studios outside their city of license if they provide at least 51% of their public affairs programming from within the city of license. Prerecorded music programming is exempt.

The AJC has complained that the rules are outdated. It said technological advances, such as remote facilities and satellite links, have made the term "main studio" useless and vague. Broadcasters, the AJC added, do not need a "government mandate" to locate their studio where they can best serve their community.

The rule changes involve sections 73.1125 annd 73.1130. FCC docket number is MM 86-406. Comments are due 22 December; replies 6 January. Contact Terry Haines at the FCC: 202-632-7792.

Broadcast Auxiliary

In a Notice of Inquiry (NOI) issued 16 October, the FCC has proposed relaxing some operational and licensing requirements for a variety of broadcast auxiliary services, including RPUs.

The FCC said it is considering blanket frequency authorizations for mobile or portable operation on any frequency in bands these particular services are already permitted to use. The Commission currently licenses such stations to operate on specific frequencies.

The FCC docket is MM 86-405. Comments are due 4 December; replies 19 December. Contact Hank VanDeursen at 202-632-9660.

AM Improvement

The FCC Commissioners will soon receive a summary of comments filed by broadcasters regarding the FCC's AM improvement report, which was released in April.

Wilson LaFollette, assistant chief of the FCC's Policy and Rules Branch, said his division is putting together a report highlighting the most pressing issues addressed in the comments. The report, due by the end of 1986, will be presented to the Commissioners, who will consider specific rule-making proposals to be issued next year.

Synchronous transmitter use is expected to be included in the report to the Commissioners, LaFollette said. A number of stations have been granted special temporary authority to operate the equipment, which would extend station coverage by using additional transmitters on the same frequency.

In other news, the National Radio Systems Committee (NRSC) agreed in September to adopt a draft voluntary interim standard of a 75 μsec AM broadcast transmission preemphasis and a complementary 75 μsec AM receiver deemphasis. Comment on the preemphasis proposal will be accepted by the NRSC until 15 December 1986.

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

Spectrum Auctioning

The auctioning of common carrier and private radio licenses as a means of generating revenue for the US Treasury was endorsed by FCC Chairman Mark Fowler in a 1 October speech.

Only vacant channels would be eligible for auction assignment, Fowler said, adding that auction authority would not be used in the mass media, amateur or public safety services.

Fowler presented auctioning as an alternative to other suggested methods of granting licenses, such as lotteries or hearings. He maintained that auction authority would not change the Commission's responsibility to allocate spectrum under the public interest standard.

The auction proposal, which Fowler contended would expedite and simplify the licensing process, has generated mixed comments from the broadcasting community. A number of engineers expressed concern that frequencies will go to the highest bidder, rather than to the most suitable company.

For more information, contact the FCC's Office of Public Affairs: 202-632-5050.

Daylight Savings Time

The NAB Daytimers Committee met during the summer with FCC Mass Media Bureau Chief James McKinney to dis-

(continued on page 7)

Featured this issue

Transition to Management
by Tim McCartney 12
Autumn Odds 'n Ends
by Mark Durenberger .. 14
More Ammo for Intermittents
by John Shepler 15
Popular Processing Techniques
by Steve Keating 17
Broadcast Computing 18
Synchronous Transmission
by Robert Weirather ... 20

Regulatory News

FCC Rejects DA Proof Requests

by David Hughes

Washington DC . . . The FCC has turned down two requests to make changes in its 1985 order that modified its AM directional antenna proofs requirements.

In a 6 October order, the Commission said it had rejected the two requests—one from the Association of Federal Communications Consulting Engineeers (AFCCE), the other from the Washington, DC consulting firm of duTreil Rackley—to revise some aspects of its deregulation of skeleton proofs and partial proof-of-performance measurement requirements for AM directional antenna systems.

The new rules, which took effect 1 January 1986, eliminated the requirement for skeleton proofs and modified the requirements for the periodic partial proof to allow stations to use "the most appropriate schedule based on need sufficient to ensure compliance with the station authorization."

At the time, the FCC also approved a plan involving modification of its monitoring point measuring schedule for stations without approved sampling systems.

The change allows stations to perform measurements on a quarterly—as opposed to a weekly—schedule.

AFCCE requests

In its latest order, the Commission rejected two AFCCE suggestions: the first requesting that the Commission sanction the use of nondirectional antenna measurement data in partial proofs, and the second that a specific method of antenna proof analysis using nondirectional measurements be included in the rules.

In its deregulation effort last year, the FCC had removed certain "how to" rules for antenna monitor sampling systems that it said were overly restrictive and unnecessary for the prevention of interference.

> *The change allows stations to perform measurements on a quarterly—as opposed to a weekly—schedule.*

However, the Commission said that the guidelines for obtaining sampling system approval would be published in a future notice, which was released 9 December 1985.

Responding to the AFCCE request, the FCC said it has a "longstanding policy of recognizing the use of nondirectional measurements in partial proofs in order to establish proper pattern adjustment." The Commission thus maintained that it would be unnecessary to adopt language sanctioning the use of nondirectional measurements.

"Although the Commission does not require nondirectional measurements, licensees are free to submit whatever auxiliary data that best supports their positions," the FCC said.

Since it declined to "explicitly acknowledge nondirectional measurements," the FCC said it would also decline to adopt "a specific method of directional antenna data analysis with reference to new nondirectional measurements."

duTriel-Rackley request

In the other petition, duTreil-Rackley had objected to the FCC's removal from the rules of design and construction guidelines for the approval of antenna monitor sampling systems. While the criteria were contained in the public notice, the firm said the guidelines would be more accessible to licensees if they were contained in the rules.

However, the Commission maintained that public notices are more—or at least *as*—accessible to licensees as are actual copies of the rules.

"While the rules are available from the Government Printing Office (GPO) or from commercial publishers, public notices can be obtained from the Commission or its copy contractor and are often published in broadcast trade and reference documents," the FCC said.

"Also, unlike the rules, public notices can be easily updated to match the growth of new technology," the Commission added.

The FCC did agree to add a "note" in the rules explaining how the public notice can be obtained.

FCC docket number is MM 85-90. For more information, contact John Wong at 202-632-9660.

Groups Fight WLNE-TV Change

by Alex Zavistovich

New Bedford MA ... Public broadcasting organizations have opposed a request by WLNE-TV (Channel 6), New Bedford, MA, to expand its community of license to include Providence, RI, despite the station's contention that the expansion would have no impact on FM radio service in that area.

In comments filed 3 October with the FCC, the Corporation for Public Broadcasting (CPB) and the National Federation of Community Broadcasters (NFCB) maintained the request could eventually permit the WLNE transmitter to be moved to Providence from its current location in Piverton, RI.

CPB and NFCB claimed that such a move would be to the detriment of public radio in Massachusetts, Connecticut, New Hampshire and New York. Many public radio stations operate in the low end of the FM band (between 88 MHz and 92 MHz), adjacent to the Channel 6 frequency.

The potential relocation of the transmitter would be the same as setting up a new Channel 6, the groups said. The service of current and future public radio stations would be limited to protect the new Channel 6 signal, they added.

No relocation planned

Robert Marmet, partner in the law firm of Marmet and McCombs, which represents WLNE, said the station was "simply trying to build greater awareness in the allocation tables of WLNE's service area."

WLNE's request "does not involve changing its transmitter site," Marmet said. The station "has not filed and does not intend to file" such a request, he added.

However, CPB's objections do not involve what *will* happen, but only what *may* happen if WLNE is permitted to "hyphenate" its market to include Providence, said Sue Dillon, CPB's associate general counsel.

In a hyphenated market, the transmitter could be located anywhere in the station's service area, Dillon said.

Impact on radio

If WLNE were to move its transmitter to Providence, a CPB spokesperson said, 16 public radio stations either funded by CPB or members of NFCB could have their services "curtailed" by Channel 6 interference rules.

Those stations include WGBH in Boston, WHUS in Connecticut, and WAMC in New York, the spokesperson said.

However, two of these public broadcasters contacted by RW were unconcerned about speculations regarding WLNE's transmitter relocation.

Relocation effects

WAMC, Albany, a 10 kW station broadcasting on 90.3 MHz, transmits from Mt. Graylock in North Adams, MA, according to Jay Nussbaum, the radio station's CE. WAMC's operations would not be affected by a Channel 6 in Providence, Nussbaum stated.

WGBH, Boston CE, David St. Onge, said it was hard to determine without formal study whether his station would have to reduce its service if WLNE relocated. The 100 kW station's frequency is 89.7 MHz.

St. Onge questioned the likelihood of a relocation, saying that the station might run into some short-spacing problems between itself and WRGB-TV,a Channel 6 facility in Schenectady, NY.

The issue is "all speculative," Dillon acknowledged, but the opposing comments were prepared because the FCC denied a joint proposal by CPB, NFCB and National Public Radio for a "nationwide presumption against assigning new Channel 6 frequencies."

According to Dillon, the FCC said that if there was a problem with expanded Channel 6 service, the correct course of action was "not a national approach," but a case-by-case treatment.

Therefore, Dillon said, regardless of the speculative nature of the issue, CPB and NFCB urged the FCC to deny WLNE's request to include Providence in its community of license.

Alternately, the organizations suggested that WLNE be required to waive any right to protection other than that offered to a Channel 6 station licensed to only New Bedford.

"CPB and NFCB do not dispute WLNE's right to move its transmitter to another site within the New Bedford market, even if public radio stations would be adversely affected under the Channel 6 rules," a CPB spokesperson said.

However, the spokesperson continued, "they do object to the creation of new Channel 6 markets at the expense of public radio service."

For additional information, contact Sue Dillon at CPB: 202-293-6160. Contact Robert Marmet at Marmet and McCombs: 202-331-7300.

DST Remedy Expected

(continued from page 1)

channels were authorized to broadcast all night, usually with very low power levels. In addition, other daytimers were permitted to extend their postsunset levels up to two hours after local sunset, using a series of gradually reduced powers.

Palmer said many daytimers are upset because some of the ratings services are taking the obviously lower audience figures obtained during the added hours of low power and averaging them with the larger audience ratings during a station's full power operation. This, he says, results in an overall lower rating (cume) than if the station did not use its postsunset (or night) authorization at all.

"Some of the ratings services assume that if a station is on until 8 PM, it operates the whole time at full power. By utilizing their postsunset power and staying on later, a station could be lowering its ratings figures," Palmer said. "Some stations, particularly those in larger markets, may not use their postsunset levels because it could hurt their ratings."

He said some members of the daytimers committee are working with the Committee on Local Radio Audience Measurements, a group composed of broadcasting and ratings service representatives, to create a ratings "weighting formula" for the lower power levels.

Class III update

In another matter for daytimers' relief, Palmer said the daytimers' committee has asked the FCC to issue a rule making proposal on a plan filed by the NAB and the Association for Broadcast Engineering Standards (ABES) last March to eliminate the maximum power restrictions on Class III stations.

The NAB/ABES petition asked the FCC to raise the maximum power limit for Class IIIs from 5 kW to 50 kW, in addition to allowing Class III daytimers to operate at night at powers equal to their "second hour after sunset" postsunset authorizations.

Because of interference from foreign broadcasters, the Commission has already instituted a 50 kW power limit for Class IIIs in Puerto Rico, the Virgin Islands, Alaska and Hawaii.

According to the proposal, though Class IIIs in the 48 continental states would be able to increase their powers, the NAB and ABES stressed that stations would still be required to comply with current interference protection standards.

The next full meeting of the daytimers' committee is scheduled for March or April of 1987. For more information, contact David Palmer at WATH, 614-593-6651, or the NAB public affairs office at 202-429-5480.

Opinion

Readers' Forum

Got something to say about *Radio World*? Any comments on articles? Call us at 800-336-3045 or send a letter to Readers' Forum (*Radio World*, Box 1214, Falls Church VA 22041 or MCI Mailbox #302-7776).

RCA Parts

Dear RW:

I noted with interest the article "RCA Parts Question Addressed" in the 15 August issue of RW.

During their last few years in the radio broadcast equipment manufacturing and sales area, RCA sold a BC300 Series broadcast audio console. This BC300 series, which consisted of 6-, 8-, and 10-channel stereo models, was designed and manufactured for RCA by LPB, Inc.

Several cases have also come to our attention where it did not appear that RCA was able and/or willing to provide service to their old customers for these consoles.

Perhaps you would be so kind as to advise your readership that LPB is fully prepared to service the RCA BC300 Series Audio Consoles.

Richard H. Crompton, Pres.
LPB Inc.
Frazer, PA

Safe and legal?

Dear RW:

It has gotten to the point where I have to say something to the owners/general managers of rural radio stations.

What is wrong with you?

I had extensive experience as a contract engineer in major- and medium-market stations when I decided to move to northern Michigan (due to the influx of grey hair). What I found was astounding.

Who deregulated Good Engineering Practice? I mean high power transmitters with no side covers, their interlocks permanently bypassed; remote controls that haven't worked since Edison died; STLs, TRLs and RPUs operating without license (or application, for that matter); no frequency checks; an EBS system that was haphazard at best. The list goes on.

You are so worried about the bottom line that you show a total indifference to a safe, legal operation.

Now I realize that it is difficult to get a qualified engineer, because (Heaven forbid) we need to make a living, too; but the bottom line on this is that you get what you pay for. The kids you hire right out of school who gerry-rig a dozen things without an overseer, then leave in six months, are not solving your problems; they are learning at your expense.

Have you ever thought of hiring someone long-term?

I just think you should step back and look over your operation. I cannot believe that consistent cutbacks in engineering will solve anything. If the FCC or OSHA ever walk into your plant, we could halve the national debt.

Eric Stone
Broadcast Services
Alanson, MI

Radio World

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AM Power Increase May Hurt

The NAB Daytimers Committee has reported progress in negotiations with the FCC in finding a solution to lessen the detrimental effect of the recent extension in Daylight Savings Time (DST).

To help offset the loss in income stations may feel in their AM drivetime revenue due to the extension of DST by three weeks into early April, the FCC is considering, according to the committee, a blanket power increase in the morning during the new three-week extension. Thus, daytimers could power up at 6 AM instead of at local sunrise and get the benefit of reaching their morning drivetime audience.

While the FCC's apparent willingness to allow higher or full power earlier seems both reasonable and responsive, there is a danger of listener tuneout due to increased interference on the AM band.

The AM band, especially in metropolitan areas, is already a jumble of signals before, during and after sunrise. Local station signals that come in clearly during the day are forced to compete with those coming from hundreds of miles away. A power increase could worsen the problem and turn off those AM-band, AM-drivetime listeners who have a choice between AM and FM (which is most of the country).

Though a power increase seems at first glance like a rational solution to a time change which creates *the effect* of a loss in power, an increase to counteract this loss could backfire.

There are few places in the country today that do not have FM service, or that have a minimum of stations—AM or FM—to choose from. An overall power increase could not only worsen competition between the AM and FM band, but could have the effect of increasing competition between AMs . . . not due to programming, but because one station's signal is physically able to transmit with fewer disruptions from the ionosphere.

If the FCC chooses a power increase as a solution, it should beware of a countereffect that may hamper its own efforts toward an improved and competitive AM band.

—RW

Freedom of choice

Dear RW:

In the case of AM stereo, many proposals have been made for achieving an end to the conflict between competing systems. Other proposals have been made to solve the perceived lack of parity of AM in competing with FM. Some of these seem rather easy to implement and appear to conform to the common sense of the situation. However, they can be be quite complex when the technology is reviewed in detail.

Bruce Elving's suggestion (RW, 1 July) that AM signals be moved to FM subcarriers appears easy. However, as some respondents have pointed out, there are serious technical problems.

Using the entire subcarrier spectrum and perhaps a compander and refined receiver design, it would be possible to produce a working system. But coverage would not be equivalent to that of the old AMs because of differing station location, power and propagation characteristics. And what would we do with the current and proliferating subcarrier program and data services?

However, an older idea of Mr. Elving's, one proposed when FM which was the disadvantaged medium, may be the solution to the AM stereo problem. That is the idea of an "all-channel radio." The thought at that time was that people didn't listen to FM because most radios being sold were AM only. The rationale was that, if only one could get FM radios into the hands of the public, they would use them. But because AM-FM combination radios cost more and people didn't know much about them, they wouldn't buy them.

The FCC, which had embraced the all-channel concept in the case of television, where UHF was the neglected medium, disdained the idea for radio. However, with advances of technology, urged on by a small group of hi-fi enthusiasts and by the manufacturers' desire to "upgrade" (provide incentives for new purchases), the difference in receiver cost became less significant. FM became not only acceptable, but preferable. This change would have been merely accelerated by FCC "all-channel radio" requirements.

For AM stereo, many industry complaints seem to center around the public's lack of interest, as was the case in FM and UHF. The difference here is that AM is not a new technology, where the lack of acceptance is based on unfamiliarity. Rather, the public's reluctance is based on an *outmoded* familiarity—AM was inferior.

But now AM has changed and will continue to improve because of substantial industry efforts. The public doesn't know this because they have not been exposed to stereo AM and better-quality receivers.

Therefore, it appears especially appropriate for the FCC to require that any radio capable of receiving AM stereo be able to decode *all* AM stereo systems now in the marketplace. And perhaps that requirement could be extended to the inclusion of stereo in all AM receivers which sell above a certain price level.

Although this would seem to add expense and complexity to receiver design, the technology already exists and mass production will make it less expensive.

This solution would allow stations to invest in *any* AM stereo system without fear that, later on, the marketplace would force them to replace it. It would put AM stereo in the hands of the public where they would have the opportunity to use and appreciate it.

It is true that this would be another regulation in a time of deregulation. And a single system would be technically simpler. But it would be an easier decision for the Commission than to force an AM stereo standard. That was tried before and we heard the outcry.

Finally, opening up AM stereo, thus giving more freedom of choice to the listeners, would certainly serve the public interest.

Jeffrey Baker, Dir of Eng-Radio
LIN Broadcasting Corp
Rochester, NY

Stereo receiver mandate

Dear RW:

Commendations to Bob Brooks of KJR and others who put faith in the future of AM radio. In major markets where some of the best talent is still on AM, it's common to see the best ratings going to one

(continued on page 6)

More Readers' Forum

(continued from page 5)

or two established AM stations. Whether those stations are stereo doesn't seem to play any role in their market share.

While I regard AM stereo as a necessary "matter of course," AM stereo alone will not improve the ratings of those stations broadcasting the same ol' same ol' they've been inundating us with for years. Some stations I can receive at my home, such as WLW, WHAS, WLS and KMOX, fare well in their hometown ratings and have programming typified by top-notch personalities and programs.

AM listenership suffers most in medium and small markets, where AM stations either try to compete with FM by playing "your favorite music" or offer the same banal music and chatter they have for years. It's easy for an engineer to sit back and place the responsibility for ratings on programmers—but that's exactly where it is. Programmers must graduate from "stirring mud pies" to "baking layer cakes"; AM stereo is neither the flour nor the sugar; it's more of a leavening agent.

Now here's an interesting thought: one of my AM stereo station managers suggested a mandate that all receivers built with FM stereo must also have AM stereo capability. Radios with FM only or AM only would not be subject to this requirement.

If this sounds like it would never fly, consider all the TVs ever built with a UHF tuner, even when there was just a handful of UHF stations. These UHF tuners were not built into TVs as a favor to a few UHF TV stations, but because it was required by law. Designing AM stereo into a radio already containing FM stereo and AM would neither be difficult nor expensive.

Perhaps this idea has already been "run up the flagpole," but if not, I'd like to hear comments from others.

Kirk Harnack
Contract Engineer
Richmond, KY

And now for this word . . .

Dear RW:

I found the article by Bill Weaver in the 15 September issue regarding "price itemizing" in radio ads interesting. I agree that radio should not sell by pursuing a negative campaign against print. I, however, disagree with his suggestion that the radio advertiser "saturate the airwaves with one spot an hour, 24 hours a day."

Part of the audience research conducted by or for a station should include information on the average amount of time the listener spends with the station.

I listen to the radio at work all day, every day. I am quite tired of hearing car ads (there's one running right now!). Each of the local car dealers has taken Mr. Weaver's advice and is running an ad once an hour. The poor listener has to put up with a half dozen car ads (which seem to lack creativity) each hour.

The advertising, as much as other aspects of the programming (music selection, personalities, news, features) determines whether a listener can stand your station, much less *like* it.

Back in the good ol' Top 40 days, the short playlist was justified with the theory that "the average listener hops into his car, drives for 15 minutes and gets out. He wants to hear the number one song during that drive." We used to play the number one song several times an hour, but I think many stations are now aiming for the long-term listener. They'll drive him away if the same song or ad is played too often.

While writing the above paragraph, I heard another car ad. Wonderful!

I've read that ad agencies often push frequency while discounting the effectiveness of "entertaining" ads. While not sure of the effectiveness, I do enjoy hearing the entertaining ads, such as Molson Golden ("No thanks, I'll just suck my tie."), Round Table Pizza (the Federal Cheese Depository needs to get rid of some of the cheese it's been storing by steam injecting it into old oil wells because it's turning the ground water into hot fondue), Kaypro Computer (the $875 computer is $4,392 by the time you add disk drives, monitor, operating system, etc.), and just about all the ads from the Radio Advertising Bureau ("I've never seen a bed with such acceleration.").

There are even good TV ads, such as the Bartles & James wine coolers series ("donuts and fish"), the one describing how chicken nuggets are made ("What parts?"), the ad humorously attacking the McDLT ("No assembly required"), and the McDonalds' ad with the cute woman opening her McFortune cookie.

And, of course, print has some good ads, such as Apple Computer informing us that the Federal Trade Commission requires them to advise us that the price shown is the manufacturer's suggested retail price (you can pay more if you want).

Advertising can be a lot of fun. I hope the fun ads help sell product, but at least if they don't, they don't drive people away from *your* product. I look forward to hearing the Cleo Award results each year to see if my favorites have won.

Finally, an idea for the Radio Advertising Bureau (in a radio engineering newspaper?) might be to show another advantage of radio over TV; people don't leave the room when your ad comes on.

Thanks for sending your excellent publication. Next time I'll write something on engineering (or you could see my letter in *Electronic Engineering Times* regarding international economics).

(Just finished running the spelling checker on this letter . . . .There's another car ad on the radio.)

Harold Hallikainen
Hallikainen & Friends
San Luis Obispo, CA

FCC Files

(continued from page 2)

cuss the loss of an hour of AM drive time next spring because of an extension of daylight savings time (DST). Earlier this summer, the federal government approved a plan to start DST on the first weekend in April instead of the last weekend in the month.

A solution may be in the works, according to David Palmer, chairman of the committee. He said the FCC may propose presunrise authority power hikes for the affected stations. (See the related story in this edition of RW.)

For more information, contact the NAB Daytimers Committee at 202-429-5480, or Jonathan David at the FCC, 202-632-6955.

Synchronous Transmitters

The FCC has issued several construction permits allowing AM stations to begin experimental synchronous transmitter operations. Approximately a dozen stations have applied for permission to operate synchronous transmitters.

The first station to receive permission was KROL, Laughlin, NV. In late summer, KROL began operating a carefully synchronized slave transmitter on its original frequency in order to extend its coverage.

The FCC said it may address the overall synchronous transmitter issue with a rule-making proposal connected with its AM improvement report, which was released in April. No date has been set as to when that proposal would be released; the Commission is still studying data furnished by the synchronous experiments.

For more information, contact Gary Thayer at the FCC: 202-632-7010.

RF Radiation

"The categorical exclusion of certain transmitters to environmental evaluation of RF radiation" will be an item on the agenda for the Commission in December or January, according to Robert Cleveland, physical scientist with the FCC's Office of Engineering and Technology.

The topic of exclusion was first presented in a FCC notice of proposed rule making issued in March 1985, Cleveland said.

No further action has been taken on a related issue, in which the NAB petitioned the FCC to establish a preemptive policy statement regarding state and local RF radiation standards, Cleveland said.

Public notice was issued by the FCC in May requesting that broadcasters submit comments on their experiences in complying with nonfederal RF radiation standards.

In other news, results of a joint FCC-EPA survey of RF radiation levels in Denver are scheduled to be available within the next several months.

The radiation survey, conducted in September, involved measurements of RF levels emanating from broadcast towers on Lookout Mountain, an antenna farm 10-15 miles west of Denver, Cleveland said. The community of Gennessee, approximately 5 miles from Lookout Mountain, was also surveyed.

FCC docket number is GEN 79-144. Contact Robert Cleveland at 202-632-7040.

Frequency Coordination

In October, the FCC rejected an SBE request submitted in September 1985 that the Commission adopt broadcast auxiliary frequency coordination procedures. The SBE asked the Commission to require auxiliary band users to certify coordination of frequencies with local users or frequency coordination committees.

However, the FCC, which has said it does not want to get involved in broadcast auxiliary frequency coordination, called the SBE proposal "unnecessarily burdensome to licensees." The Commission added that existing voluntary frequency coordination efforts have been successful.

In other news, the NAB, which has also criticized the SBE plan, has been working to set up a national frequency coordination committee. No date has been announced when the work on that body will be complete.

Contact Hank VanDeursen at the FCC: 202-632-9660, or Richard Rudman at the SBE: 213-462-5392.

Technical Deregulation

The FCC has proposed deregulating the rules that apply to modifications made to transmitters. According to the plan, announced in June, broadcasters could make some minor electrical or mechanical modifications to transmitters without filing an application for a construction permit.

Modifications would be permitted for AM mono and all FM transmission equipment provided the changes do not create harmful interference. The plan does not cover changes made to AM stereo generators.

The FCC is expected to rule on the matter by the end of 1986. Docket number is MM 86-264. Contact Michael Lewis at the FCC: 202-632-9660.

FM Translators

Action is still pending in an inquiry on whether noncommercial FM translators should be allowed to be program fed by satellite or land-based microwave. The FCC had released a proposed rule change to that effect in April, in response to a

(continued on page 11)

AFTRA Ratification 'Pro Forma'

by Alex Zavistovich

New York NY ... At press time, the American Federation of Television and Radio Artists (AFTRA) had yet to ratify an agreement finalized 10 October with NBC, ABC and CBS, providing the union's news employee membership with a 3% increase in the minimum wage scale.

The three-year contract extends retroactively to 15 November 1985, the date on which the previous network contract expired, to 15 November 1988, according to Don Gaynor, executive secretary of AFTRA Local 210, Bethesda, MD. Gaynor considered ratification of the agreement, although still pending, to be *pro forma*.

The networks reportedly avoided a strike by backing off on a stipulation in the contract which would have forced news personnel to assume traditionally technical jobs, such as operating satellite equipment and performing editing functions.

The proposal was uniformly objected to by AFTRA members, who issued a statement in late August signed by 55 news personalities from all three networks.

AFTRA was supported in its objections by the National Association of Broadcast Employees and Technicians (NABET), which filed in a separate action unfair labor practice charges with the National Labor Relations Board (NLRB) against NBC. The charges claimed the network's contract language would infringe on the jurisdictional responsibilities of NABET's members.

At the time, NABET Network Coordinator Tom Kennedy maintained that a number of NABET positions would be affected by the proposal which, if it were approved, might require AFTRA members to do their own technical work.

The charges were dismissed 19 September by NLRB regional director Daniel Silverman. Silverman, in a letter to NABET President Arthur Kent, said "it does not appear that further proceedings on the charge are warranted."

The proposal, Silverman continued, "does not mandate any work reassignment," and added that "nothing in the proposal constitutes unlawful assistance" to AFTRA at the expense of NABET.

On 1 October, NABET General Counsel Roger Madon filed a request for review of the complaint with the NLRB Office of Appeals. The review was denied 16 October.

AFTRA agreed to reopen discussion on news personalities assuming certain technical duties if the networks first persuade NABET and IBEW to relinquish their exclusive control of those duties. Neither NABET nor IBEW could be reached for further comment.

For additional information, contact Don Gaynor of AFTRA at 301-657-2560; Tom Kennedy at NABET's Burbank local: 818-846-0490, or Roger Madon at the law firm of Sturm and Perl: 212-685-8487.

KGA Cited in RFR Suit

(continued from page 1)

"One in four Americans, or 34 million people of our generation, will get cancer, and liquid cancers are common," Storm said of the suit's contention that multiple myeloma usually strikes people much older than Janice DiLuzio, who died in 1982 at age 39.

"To my knowledge, RF radiation is not a carcinogen in man, and data in animals are very shaky," Storm concluded.

At press time, Glassman maintained there had been no formal response from the defendants.

Another RFR suit

The DiLuzio case is the second reported suit this year charging that exposure to radio station-based RF radiation caused cancer. On 1 May, Continental Electronics and Collins Radio were named defendants in a suit filed by a Kentucky woman whose husband, a radio techician, died of leukemia.

In a suit filed 1 May in Kentucky's Floyd Circuit Court, William Lafferty, a radio engineer for WDOC-FM, Prestonsburg, KY, was alleged to have developed acute myelomonocytic leukemia from prolonged exposure to RF radiation.

The station's antenna and transmitter, manufactured by Collins Radio, were said to have "a latent defect" and reportedly lacked safeguards against exposure to high RF levels.

The Lafferty suit called for at least $10,000 for punitive damages, mental suffering and other injuries. At last reporting, the case had been removed to the US District Court for the eastern district of Kentucky.

At the time, Continental and Collins refused to discuss the case.

For additional information on the DiLuzio complaint, contact John Glassman at the law offices of Feltman, Gebhardt, Eyman, and Jones: 509-838-6800. Contact Price Broadcasting at 801-486-3911.

CBS Denies AM Stereo Plans

by David Hughes

New York NY ... Though CBS-owned KNX in Los Angeles has been converted to AM stereo using the C-QUAM system, CBS denied industry rumors that it would be converting its other AM stations to stereo in the near future.

"We like AM stereo, but we haven't made any decisions on it," said Helene Blieberg, director of media relations for the CBS Radio Division. Other CBS Radio officials could not be reached for comment.

Industry rumors held that the network was planning to convert its seven AM stations—including 50 kW operations in New York, Philadelphia and St. Louis, to Motorola's C-QUAM AM stereo system.

KNX makes switch

A Motorola spokesman confirmed that the network has converted its 50 kW Los Angeles all-news station, KNX, to the C-QUAM system. The station is among the 300-plus stations featured in Motorola's official list of C-QUAM operations, he said.

A CBS official said that KNX began broadcasting with C-QUAM stereo 1½ years ago but it has not been announced or promoted. The source added that he knew of no plans to convert CBS's other stations to stereo.

A decision by CBS to convert its chain of stations to AM stereo would follow the recent decision by Group W/Westinghouse to do so. Group W plans to have its seven AM stations, including 50 kW operations in New York, Philadelphia, Boston and Pittsburgh, converted to the C-QUAM system by the end of 1986.

The Motorola spokesman added that two other New York City stations, besides Group W's WINS, will be converting to C-QUAM in November or December. He would not say if CBS-owned WCBS would be one of them.

Battle continues

Meanwhile the battle between the C-QUAM system and the Kahn/Hazeltine ISB system continues.

In a letter to his supporters dated 16 October, Kahn Communications President Leonard Kahn indicated that his AM stereo system has a good chance of being selected by Japan as its national standard.

So far, Australia and Brazil have selected the C-QUAM system as their national standard. In October, the Canadian Association of Broadcasters (CAB) recommended that its government select C-QUAM.

Kahn maintained in the document that the CAB is promoting a "denial of freedom of choice for broadcasters." He has repeatedly refused to comment to RW on the situation.

Kahn wrote that if Japan picks the Kahn standard then US stations will be "insured of a very large flow of good quality radios" that will be compatible with the Kahn system.

The Kahn memo also indicated that KQIN, a 50 kW Seattle station, plans to be utilizing the Kahn AM stereo system by the end of 1986.

For more information see the 15 November issue of RW. Contact Motorola at 312-576-5304, or Kahn at 516-222-2221. CBS's contact is Helene Blieberg: 212-975-3771.

FCC's Fee Schedule on Target

(continued from page 1)
process applications of private land mobile services."

SIRSA recommended that the fees first be submitted to a coordinating committee, "the final party to review applications prior to their submission." The committee would then present the fees to the FCC on the applicant's behalf.

SIRSA suggested that separate fees could be provided by the applicant to the Commission and the coordinators.

Motorola, a land mobile equipment manufacturer, asserted its desire to have its customers "obtain prompt action on their applications and to be assigned the best available channel at a cost that does not inhibit the use of private land mobile radio."

The company expressed concern over the vagueness of fee collection regulations and the responsibilities of frequency advisory committees which receive applications containing FCC licensing fees. These uncertainties, Motorola held, would raise the costs for applicants, and would, in addition, slow the application process.

The National Telephone Cooperative Association, a common carrier and cellular communications interest group, supported the FCC proposal to have one check cover the cost of multiple applications submitted together. The option was seen by the association as a way to ease the administrative burden on both the Commission and the applicant.

Procedural questions

In other comments, broadcasters and equipment manufacturers questioned the process by which the Commission will collect licensing fees.

The NAB urged the FCC to "adopt rules to minimize paperwork and financial burdens on broadcasters and provide equity and flexibility" to the reestablished fee collections.

The association commented that "the public would best be served if no new fee collection form were created," and said it expected that "licensees and applicants will be given adequate information on the agency's new fee requirements."

To minimize filing errors, the NAB suggested that the FCC include fee schedule bulletins with application forms to give applicants "clear instruction" on the amount of fees.

The association also proposed a "60-day grace period" for improperly filed applications, during which a late payment could be assessed but applications would not be returned unprocessed.

The NAB speculated that the return of applications "will cause extremely valuable opportunities to be lost altogether."

Multiple applications

Included in the FCC's proposal for fee collection was a provision that a single payment could be submitted for multiple applications presented together on the behalf of a single group.

Although the NAB agreed in principle to the single-draft-per-package proposal, it disagreed with the FCC's proposal to return the entire package in the event of inadequate fee payment.

The association suggested that such a policy might deter applicants from taking advantage of the option.

GTE, whose enterprises include telephone and satellite operating companies, concurred with NAB's position. In some cases, GTE maintained, a return of the application would amount to penalizing the applicant for something which may have been beyond its control, such as bank error, Commission staff error or misinterpretation of the appropriate fee.

GTE suggested that refunds or credits are appropriate in some cases in which applications are returned or denied.

The NAB commented that, rather than returning the entire package, random processing of applications could be undertaken until the fee payment was exhausted.

As an alternative, the NAB suggested, the applicants themselves might choose the filings to be rejected, and penalties could be assessed to cover the extra costs.

Weingardt said a report and order on the docket could be expected by the end of the calendar year.

FCC Docket number is GEN 86-285. For more information, contact Brent Weingardt at the FCC: 202-632-3906.

FCC Files

(continued from page 7)

1985 request from Chicago's Moody Bible Institute (MBI).

In comments filed with the FCC, the NAB and National Public Radio (NPR) opposed the program feed. The NAB suggested the proposed modifications were contrary to FCC radio allocations policy and the public interest.

Such modifications to FM translator rules could result in "objectionable" FM interference to TV Channel 6, the NAB contended.

NPR added that translators located great distances from their parent station could produce a "de facto network" which would operate outside the more stringent FCC guidelines for full-service FM stations.

Docket number is MM 86-112. Contact Marcia Glauberman at 202-632-6302.

FM Allocations

Comments filed with the FCC by the NAB endorsed the use of an index method to determine the class of an FM station, although the association opposed intermediate frequency interference separation standard revisions.

The comments were in response to a plan revealed by the FCC in April to replace the current method of defining FM commercial station classes with a system based on the "maximum permitted distance to the expected service contour of each class." Classes are currently determined by minimum and maximum power levels and antenna height.

In the same docket, the FCC proposed allowing any class of FM station to locate on any FM commercial channel, and added that FM station class should be determined by its city of license rather than its transmitter location.

In other comments, National Public Radio (NPR) suggested that the absence of a table of allotments for public stations are an obstacle to public radio operations.

Public stations are required to protect vacant allotted commercial stations as though the stations are operating at full power, NPR said. The group contends public stations are not receiving the same consideration.

FCC docket number is MM 86-144. Contact Michael Lewis at the FCC: 202-632-9660.

Cuban Interference

No progress has been reported with Cuba regarding talks on AM band interference.

Any hope of future talks bogged down when the Cuban government recently said it wanted a clear channel in order to broadcast English-language programming to the US in response to the Voice of America's Spanish-language "Radio Marti" service beamed to Cuba on the AM band.

Responding to the Cuban interference problem, the FCC in September recommended granting its seventh monetary award since 1985 in a program to compensate AM stations for transmission system improvements made to battle Cuban interference.

The requests total $1.2 million. However, Congress has recommended appropriation of only $500,000 to the US Information Agency, which distributes the funds. Most stations report that they have yet to see any of the compensation funds.

The Cuban interference contact is Louis Stephens: 202-632-7792. The compensation program contact is Leonore Cunningham: 202-632-6485.

RF Lighting

The FCC is reviewing comments filed in response to a proposal addressing a longstanding complaint from the NAB that RF lighting devices interfere with AM radio reception. A report and order on the issue is expected by March 1987, according to Liliane Volcy, an engineer with the FCC's Office of Engineering and Technology.

Comments were filed with the FCC responding to the Commission's proposed radiation limits on RF lighting devices at frequencies below 30 MHz. Respondents included the NAB, which supported interim use of a 4.5/f(MHz) μV/m limit in the frequency band 0.45 MHz to 1.705 MHz, measured at a distance of 30 m.

"No one is disputing the need for a limit" on radiation from the devices, Volcy said. At issue, she added, is whether the limit should be set on field strength, or whether conduction limits are sufficient.

At frequencies below 30 MHz, conduction level problems are more prevalent than problems of field strength, Volcy commented.

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

FM-TV 6 Interference

A petition filed by public broadcast interest groups urging the adoption of a policy statement restricting future TV-6 channel assignments was denied by the FCC in May.

According to Michael Lewis, staff engineer for the FCC Engineering Policy Branch, the petition raised no issues which were not already addressed in the Commission's memorandum opinion and order of July 1985.

Public broadcasters maintained that an increase in Channel 6 assignments would interfere with noncommercial radio stations located between 88 and 92 MHz.

Contact Michael Lewis at 202-632-9660.

Metric Curves

The FCC has set 1 January 1987 as the effective date for the use of new AM metric curves. While applications filed on or after the deadline must contain the new curves, the Commission said it will continue to process applications with the older English unit curves if they are filed before the deadline.

The rule specifying use of the metric curves was approved in May 1985, but the Commission delayed the effective date to allow for easier conversion to and wider availability of the new curves.

The metric curve rules are contained in docket MM 84-752. For more information, contact Jonathan David at 202-632-6955.

VOA Modernization Continues

by David Hughes

Washington DC ... The US Information Agency (USIA) has awarded a $5 million contract to Harris Corp. for the construction of six Voice of America (VOA) medium wave transmitters to be installed around the Caribbean and in Central America.

The 16 October annoucement is the latest development in a $1.3 billion, decade-long upgrade program to replace aging transmitters at the US government's international broadcasting service facilities.

The "modernization plan," according to Pat Seaman of the VOA's public affairs office, began in 1982 and will extend well into the 1990s.

Despite the VOA's traditional reliance on shortwave (the part of the spectrum between 3 and 30 MHz), she said the organization is exploring the possibility of having more broadcasts on the standard broadcast bands around the world, including medium wave (the standard AM broadcast band), and even on FM and cable.

One such experiment was VOA Europe, a 24-hour per day English-language service aimed at Western Europe. The service was carried by a variety of private FM stations and cable systems. However, the USIA, which maintains and programs the VOA, pulled the plug earlier this year because of budget problems.

If it were expanded to feature programs in four languages, as had been originally planned, VOA Europe would have cost $16 million per year, Seaman said.

The termination of VOA Europe, she added, would have no effect on the other

(continued on page 14)

Make Most of Your Promotion

by Tim McCartney

Boise ID . . . Engineers promoted into management positions frequently fail to make some of the important transitions. This article explores some reasons why, from the point of view of a CE who spent many earlier years as a GM.

The topic, now being discussed with exponential frequency at conferences and in print, emphasizes the "how to" skills needed by managers. *Not* being discussed is the question of whether engineers really *want* such Draconian changes in their professional lives.

Can't say "No"

Our culture makes it nearly impossible not to accept promotions into management. The benefits, on the first 100 or so glances, seem intoxicating: accomplishment, advancement, status, salary, control, etc.

So, when successful engineers are offered all of this in one package, a "greater calling" draws them in. The engineers, as competent professionals, are confident of their abilities to adapt and succeed.

The new CEs then start to attend the *management* meetings at the engineering seminars, read up on basic management principles and may even get involved in management skills workshops. This series of efforts soon demonstrates that management is the total antithesis of engineering. Management is 100% unscientific.

> *This series of efforts soon demonstrates that management is the total antithesis of engineering.*

So, at the first chance possible, the new CEs leave the station to troubleshoot a minor technical problem located far away. They don't need to make the trip, they just want to.

Meanwhile, the engineering departments are without needed strong management and begin spinning their wheels. This abandonment of management responsibilities indicates a high level of discomfort with the new position.

Are the new CEs at fault? Not completely, since they have not been adequately trained in the intricacies of management. They have moved into a new profession loaded with pitfalls for even the far more experienced managers. So, odds are generally stacked against them.

Major career change

The root of the problem is engineers' drastic underestimation of the major career changes involved. This points to an incomplete understanding of all that is involved in competent management performance.

Technical fine tuning will give way to staff supervision and motivation, budgets, long-range planning, training and human resources development, and complicated relationships with station managers and other departments. Perhaps the worst of all are the sleepless nights following unpleasant personnel flareups.

Experienced managers have worked hard for years, using their best judgment in a constantly changing field of complex, real-life situations. They have learned the hard way from trial and error.

Managers who are able to effectively govern both the business concerns and the human elements of their stations are never given enough credit. All employees, including engineers, have much to learn from these managers. All of us in radio need to study their techniques and even congratulate them for overcoming the nearly impossible!

So, with this rutted-road of a scenario in mind, is it worth it?

Yes, a move to management is worthwhile for the *right* engineers. Once this is established, the new CEs as *managers* must be prepared to let go and allow their engineers to perform more and more of the technical tasks. The new CE-managers then need to focus on *management* concerns—i.e., no more trips just to get out of the office.

To review, a new CE-manager must:

- Understand and appreciate what is involved in management.
- Don't accept a promotion into management because society demands it.
- If the job is right for you, and you're sure, accept it.
- Be a manager first and an engineer second.
- Let go, as hard as it will be.

While risks in management are very high, so are its satisfactions. Engineers who can perform at the management level have much to contribute to our industry.

Tim McCartney is CE at KBSU, Boise State University, Boise, ID. He can be reached at 208-385-3663.

Sound Genesis Files Chapter 7

by Alex Zavistovich

San Francisco CA ... Sound Genesis, a well-known audio dealer, recently filed for bankruptcy after selling its stock and liquidating its inventory.

The company, one of the largest general-purpose pro-audio shops in Northern California, filed for Chapter 7 on 17 October, according to a source associated with one of the creditors.

The company reportedly had debts of $541,377 against assets of $382,939.

The source said bankruptcy was "forced" by a group of Sound Genesis creditors, including Orban Associates, Otari, Shure Brothers and Auditronics. None of the creditors would comment on the proceedings.

The source said Sound Genesis had wanted to close, intending to liquidate its assets and distribute the funds to its creditors.

The creditors, however, felt that the company was engaged in "legal maneuverings that should be examined in a bankruptcy hearing," the source said. The creditors felt enough cash was available that, if the company were challenged, nearly 100% of creditors' funds could be returned, rather than the 30% they had reportedly been promised, the source said.

At last reporting, Dave Angress, sales manager for Sound Genesis, had denied industry rumors of the company's bankruptcy. The shop had been working to ensure that its customers would be "disadvantaged as little as possible" by the closing, Angress had said.

Michael St. James, attorney for Sound Genesis, said the company's business and customer base had "fundamentally changed," prompting the owners' decision to shut down. The company planned to liquidate its assets to give creditors maximum return, he said.

On 15 August, Sound Genesis shut down ordinary operations and provided creditors with an initial letter of notification to that effect, St. James said. The company opened its doors for the final time on 2 September for a liquidation sale which, St. James maintained, was overseen by a committee of creditors.

St. James said he recommended filing for bankruptcy after distribution of the liquidation funds because it was discovered that two employee/shareholders owed money to the corporation.

On 17 October, when Sound Genesis was placed in involuntary bankruptcy by the creditors, the company froze all its bank accounts and filed a voluntary bankruptcy schedule, St. James said.

Lease of the company premises and inventory of indeterminate value remaining from the liquidation was left in the hands of John England, who was appointed trustee of the case, St. James said. England could not be reached for comment.

For additional information, contact Michael St. James at the law offices of Dinkelspiel and Dinkelspiel: 415-777-4700.

Annual Post-October Miscellany

by Mark Durenberger

Minneapolis MN ... Every year at this time, as we face another long winter here in Minnesota, we perform certain chores, such as getting the firewood split and stacked, fixing the snowfence, shoring up the outhouse (in preparation for Halloween) and getting our affairs in order as though we weren't sure we'd make it through to spring.

Regular readers know it's time for the annual fall column of "odds and ends," as I pull out a couple of the year's miscellaneous file notes.

If you've encountered more C-Band satellite downlink interference lately, it may be because AT&T is increasing channel loading and moving into digital or other wide-band transmissions in some of the same spectrum you use to look at your radio satellites.

Engineering Views

There's a short "white paper" on this subject by Spectrum Planning of Dallas (214-680-1000).

You may have to start looking at terrain shielding to "protect" your dish. Watch for the entrepreneurs to start moving regular broadcast audio services to Ku-band.

Is FMX a bust?

Does FMX need further development? The idea is a good one, yet RW reports some stations have discontinued its use.

Have you tried FMX at your FM station? We'd like to hear about your experiences.

I have a problem with the marketing of FMX, composite clipping, new methods of modulation measurement, et al, if they're marketed "to allow the broadcaster to ease up on his processing," because that's not going to happen.

> *Watch for the entrepreneurs to start moving regular broadcast audio services to Ku-band.*

I'm not sure why the competitor to whom the cumes are everything would back off his processing just because the big bucks he just paid for the newest technology will allow him to do so.

We had really "open" audio when we were trying to develop the FM market back in the late '50s, and we had the luxury of running almost "barefoot" with the only processing being for overmodulation protection. Major Armstrong was still at peace in his resting place.

FM wasn't loud but it sounded great. Then along came high-frequency limiters, and FM *still* wasn't loud ... but it no longer sounded great, either.

After the "gated AGC/complementary limiter" came the integrated processor, which recognized the maladies of the audio transmission path, such as the ringing in the passive pre-emphasis circuit and the need for better high-frequency control.

That made a substantial improvement, and FM sounded reasonable ... until the first guy in your market cranked his 8000 to "limit only" or added a black box in front of it, and suddenly, just like AM, we were playing pushbutton warfare on the FM band.

Processor manufacturers have struggled over the years to tame the monster they created. Several very good-sounding systems (really system combinations) can be assembled with today's processors.

The reason they sell is that they can make the audio even "louder" while minimizing the side effects.

But nearly all can be abused ... and if a PD wants it *still* louder and can figure out how to turn the pots to get there, he's not likely to be the guy who endorses the "less-is-more" approach of Good Engineering Practice.

But I haven't given up, and neither should you ... because pretty soon something *good* is going to happen to broadcast audio in spite of itself. Alternative consumer audio sources are going to reshape broadcast audio until it is forced by the marketplace to deliver the very best performance of which it's capable.

Much of the equipment is in place. It remains for some broadcasters to start listening to their engineers. It may not happen overnight, but it's inevitable!

Usually all it takes is for the market leader to be a *true* leader in backing off the processing.

(It's amazing that no matter how good or bad that station sounds, its competitors think the number one station's audio must be "right," and they often play "follow the leader.")

A footnote

I've been meaning to say this ... *Hooray for Texar!* Their open letter for AM stereo is getting attention in non-engineering decision-making areas of the trade, and may be an example of just what we're talking about ... other folks listening to the engineers.

Hang in there, Texar, and accept the fact that some folks will be shooting at you.

You'll know you're making progress when RW stops aiding and abetting the AM stereo furor in the "Reader's Forum!"

Mark Durenberger is a senior RW *columnist and an independent consulting engineer. He can be reached at 612-822-0041.*

Massive Modernization Plans at VOA Continue

(continued from page 11)

VOA expansion plans which "have support from the President and bipartisan support from Congress. We did have to restructure our budget a bit, though."

The Harris contract calls for the construction of six 100 kW medium-wave transmitters throughout the Caribbean region, including Belize and Costa Rica.

According to Harris, the contract also includes ancillary operating equipment, along with installation of the Harris Sentinel control and operating systems, which will allow the new transmitter sites to be operated locally or via VOA's Washington, DC headquarters.

The system will also monitor operational conditions at each site and relay information to VOA headquarters, the firm added.

The VOA already relies on medium wave to cover the Caribbean. Since 1985, it has operated medium wave-based "Radio Marti," a Spanish-language service aimed at Cuba on 1180 kHz from Marathon, FL. The service is also relayed on shortwave.

The VOA is also relayed to the Caribbean via a 50 kW facility on 1580 kHz from Antigua, in addition to being carried on a number of non-VOA-owned stations in the region.

"We are pleased to be a participant in this important international communications program," said Harris Broadcast VP/GM James Koehn.

The VOA utilizes four transmitter sites in the US, in addition to approximately 15 international sites, to beam its programming in more than 40 languages to an estimated audience of about 120 million people.

For more information, contact Pat Seaman at the VOA, 202-485-6231, or James Koehn at Harris, 217-222-8200.

More Tactics on Intermittents

by John "Q" Shepler

Rockford IL . . . Stephanie has just finished her 6 o'clock newscast. You both jump into your jackets and run for the front door with just enough time to make the start of the first show at the drive-in. As your hand reaches the doorknob, the hall lights flicker. The air monitor goes dead. Oh, no.

The power company just dropped the line for 100 ms. You're left with 27 digital clocks, none of which say the correct time, and an automation system whose brain just went to la la land. So much for date night.

I hate glitches. The rotten little monsters always know when to make your life the most miserable. I look at intermittent problems as insects around the house. You can't be sure they're all gone, but you can sure knock 'em down to a tolerable level. Maybe that's where the name "bug" came from.

Q-Tips

This column is really a follow up to the previous one on ways to deal with intermittents. Here is some more ammo for the war on those gremlins.

Psychotic digital circuits

Digital and microprocessor circuits perform perfectly once you get the bugs out of them. Until that point, it's anybody's guess what will happen when your back is turned. You normally think of digital circuitry as solid logic: OFF or ON. However, there are a number of causes for logical circuits behaving illogically.

First, is the logic family the right choice for the application? TTL and LSTTL chips are cheap and fast. However, there isn't much voltage difference between a logical low of 0.8 V and a logical high of 2.4 V.

CMOS logic will run at 10 or 12 V, with a logical low of 2 V and a high of 8 V. The lower speed of CMOS makes the gates less susceptible to really short spikes.

Why use 35 MHz logic in an application where relay switching times are adequate? OK, so the equipment manufacturer made the choice for you. At least give this some consideration in your own designs.

Low-logic noise margins can show up in other ways. For instance, a 5 kW array can easily generate a few volts of RF in your wiring runs. A fast logic circuit doesn't know the difference between Heavy Metal modulation and clock oscillators. Filter the inputs and outputs to digital circuits, if you can. If you need to conduct fast waveforms, use coax and put the circuits in a metal box.

Also, keep the AC power leads away from low level logic or audio circuits. You may be able to hear the problem on the audio circuits, but digital will just glitch when the crosstalk signal peaks above the logic threshold.

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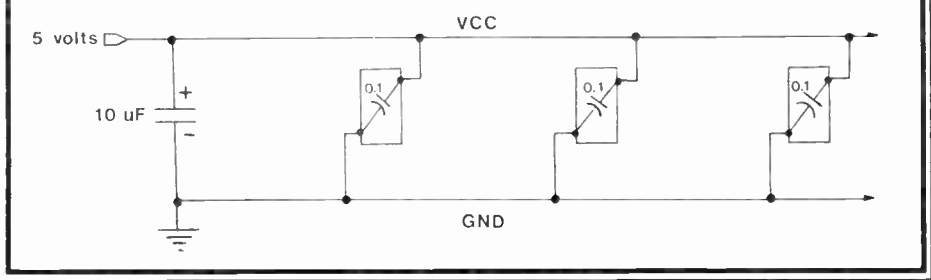
Figure 1. De-glitching Digital Logic



A bigger noise problem with digital circuits originates in the power supplies. Switching power supplies generate a lot of hash. Linear power supplies are cleaner, but when the filter caps start to dry out, the ripple goes up and the logic can start to act funny.

Be generous with bypass caps on logic boards. You need a big cap, like a 1 to 10 mF tantalum, to de-couple the low frequencies, and lots of 0.1 mF ceramics to bypass the glitches at the chips. It's not extravagant to use a bypass cap for every TTL chip. Wire them directly across VCC and GND at the chip. Use the shortest leads possible.

A fluke of TTL logic is that both the switching transistors on the output are on at the same time for a few nanoseconds. This is actually a momentary short in the power supply. The de-spiking capacitors across the chip provide a current supply for these transients and keep the problem from affecting the next chip on the board.

I'm not down on TTL logic. Any technology including CMOS, NMOS, or just diodes and resistors will misbehave under certain conditions. The fast speeds and low voltages involved in TTL or LS chips make them easy targets for glitch problems that are hard to locate. The same comments apply to the newer HCT chips, which are CMOS in TTL clothing.

Stress problems

How hard you drive your components in terms of voltage, current and temperature is called the stress level of the parts.

Some people like to flirt with disaster by running one amp through one amp diodes or 35 V on a 35 V electrolytic. They count on the manufacturer's ratings being conservative and pat themselves on the back for not paying a penny more than needed for parts. Personally, I like a little more insurance.

The problem with riding the line on specifications is that there are other factors that push circuits beyond their design limits. For instance, a lightning strike or switching transient on a power line will zip right into your power supplies. Are the diodes and regulators able to take the extra surge?

Varistors or back-to-back zener diodes on the lines will take the jolt and protect all of your other semiconductors.

Another problem is heat. Cart machines are built with nicely ventilated cases, but to no avail. Everybody stacks them two and three deep. The top machine gets all the heat from below and there is probably a weather forecast or cup of coffee blocking the top vent holes. Parts that work at the ambient temperatures in the factory and design lab get cooked in the studio. The result is reduced life and unexpected circuit failures.

You can extend the life of any equipment that runs hot by adding a quiet "muffin" fan to blow room air across the PC cards. The fans are advertised as unused surplus from obsolete computer equipment, and can be had for less than $10. Try ALL Electronics Corp in Los Angeles or other sources that advertise in hobby electronics magazines. The nice thing about this type of fan is that it runs very quietly and can be used in a studio.

Another way to cool toasty components is with heatsinks. The equipment already has them on some parts because the design equations said so. You can add clip-on heatsinks easily to T05 transistors and plastic power transistors. The heatsinks are just bent pieces of black aluminum that clip onto the parts.

Heatsinks work by increasing the amount of surface area exposed to air. It is assumed that the air is cooler than the parts. The more surface area, the more heat is removed by conduction, convection and radiation. Any big chunk of metal will help conduct heat away from hot modules or transformers.

If capacitors and diodes are failing too often, try replacing them with similar parts that have higher voltage or current ratings. In your own designs, at least use twice the rating you think you need. It's cheap insurance. For instance, a 50 V 1N4001 diode may cost $0.07 when you buy 100.

The 1N4007 diode, which is identical except for a 1,000 V rating, is $0.12. For a few pennies, it pays to use the 1N4007

(continued on page 16)

Intermittent Tactics

(continued from page 15)
for everything and keep only one part number in stock. The higher voltage is just handy reserve in low voltage circuits.

One note of caution: when high power parts fail in transmitters, there is usually a reason that demands investigation. The problem may be lightning strikes, dirty air filters, improper cleaning or transformers that are not set to the correct line voltages.

Be wary of using higher-rated parts in transmitter circuits until you know what the problem really is. Your transmitter should be very reliable under normal conditions.

I recall a problem with time delay relays in one transmitter. Every few weeks the relays would fizzle and you couldn't get the plate voltage to come on.

To avoid getting up at 5 AM every day, I made up a dummy relay with the contacts shorted, and then instructed the morning man to turn on the filaments as soon as he got to the station. "Don't turn on the plates until just before sign-on," I said. That provided the time delay.

Well, that solved the immediate crisis, but the problem still nagged at me. After considerable poking around, the problem turned out to be too high of a voltage at the relay coil. Why?

The line voltage out in the boonies was much higher than the transmitter was set up for. Nobody bothered to change the tap on the control voltage transformer when they set up the plate voltage transformer. Moving the wires a couple of screws solved the problem.

Remember those 27 clocks that all disagree? There are a couple of ways to solve that problem.

I like the battery powered quartz mechanisms for clocks with hands. They are cheap, you don't have to have a receptacle nearby, and they don't care what is happening on the power line.

Batteries need to be changed every year or so. This is less of a chore if you put in new batteries when you reset from daylight to standard time.

Some digital clocks allow for a battery backup. The frequency standard is usually the power line but will switch to an internal oscillator when power fails. The battery won't drive the display but will keep the counters active.

Note that some of the standby oscillators are simple RC or LC circuits that are only roughly 60 Hz. They are OK if the outage is really a glitch and not a major power failure.

An elegant solution is to install a WWV receiver and run a serial link to each clock. This guarantees that the clocks will stay precisely synchronized and avoids the power line reference.

Circuit bugs are annoying, but with persistence you can become quite the exterminator. If you are constantly pestered with intermittent problems, try keeping a log.

What piece of equipment is involved? How did the equipment behave? Exactly what time did the glitch occur?

The value of a log is that you can scan the entries for patterns. You can also manage your time better by attacking the most persistent problems first.

AGC Amps and Peak Controllers Universal

by Steve Keating

Part 5

Los Angeles CA ... In Part 4 I described the function and basic circuit elements typically composing a single-channel AGC amplifier.

Since the dawn of technology permitting the transformation of sound energy into electrical energy, its subsequent transmission over radio waves and transfer to some type of storage media for later and/or repeated use, the practice of compressing audio signals to increase efficiency and high-quality reproduction has been a longstanding procedure in both the broadcast and sound recording fields.

The most common and fundamental audio processing system used by the majority of AM and FM stations to "enhance" program content for maximum "presence" and "apparent loudness" consists of two significant elements: first, either a single-channel (mono) or dual-channel (stereo) AGC amplifier, which is used to smooth out variations between the softest and loudest program volume levels, which is then followed by a fast-acting "peak controller."

Similar to the function of the AGC unit relative to acting automatically to raise or lower program volume level as needed, the peak controller is an important link in the audio chain, as its principle task is to diminish any undesirable "transient" audio energy, which is largely inaudible due to its extremely brief duration. However, if left uncontrolled, this transient signal energy will occupy bandwidth proportioned by the radio carrier that is more efficiently utilized to transmit dynamic, more sustained midspectrum audio signals.

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Generic control settings

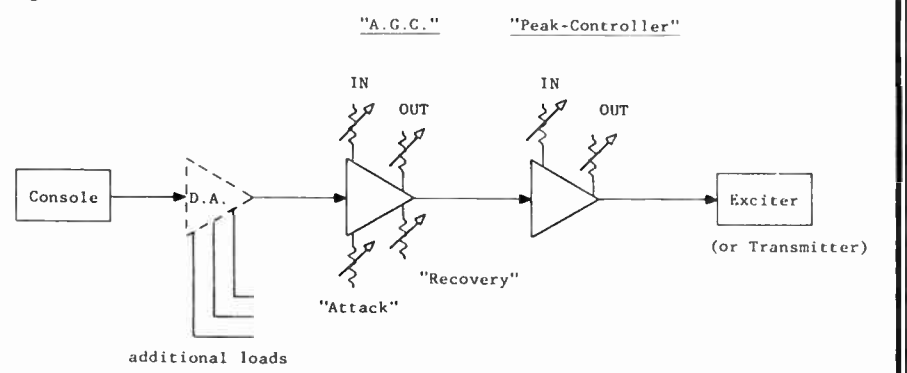
At this juncture, I'll begin describing "generic" control settings applicable to a variety of modern compressor/limiter units and peak-controlling devices.

Assuming a somewhat standard stereo audio chain, as illustrated in Figure 1, we find the left and right discrete program channels coming from a console, routing switcher, or automation system, initially feeding an optional audio distribution amplifier and one pair of outputs, then connecting to the first element in the processing group—the AGC unit.

The remaining outputs from the "DA" may be used to feed nonprocessed program to a number of recorders, loggers, "music-on-hold" phone interfaces, etc. Use of a high-quality audio distribution amplifier ensures the main program line(s) won't be overloaded by paralleling several loads directly across them, thus reducing the efficiency of the program amplifier(s) and potentially resulting in poor fidelity, noise or crosstalk.

Although a sinewave tone is useful for aligning the individual left and right stereo channels and for determining a "course" level setting throughout the system, my experience has always been to use the normal program material appropriate to the station's format to fine tune the final "shape and texture" of the signal while listening to the off-air demodulated output of a properly functioning broadcast-type modulation monitor connected to a professional audio amplifier and pair of full-range speakers.

Figure 1.



Throughout the adjustment process, your reference source must furnish the most accurate and uncolored reproduction possible of the audio information being transmitted.

Before proceeding, it is critically important to keep in mind that the entire audio system—from microphone to transmitter—should be as technically clean as possible. The amplification or enhancement of any noise, hum, distortion or fidelity-limiting element induced into the system could easily be magnified quite significantly by the normal action of the processing scheme.

Following the system block diagram, at the output point of the console, DA, automation system, etc., bridging a high-impedance AC voltmeter across either stereo line with normal program on it will reveal a varying average amplitude range of approximately −10 to +4 dBm—or higher!

Modern AGC functions

Modern AGC leveling amplifiers designed and manufactured during the last six years operate around the principle of 'reading' the average input signal level(s) and acting only to raise any dynamic passages which fall below an adjustable threshold after a given period of time. Many also include a useful feature often referred to as 'gating,' which fixes the limit at which the unit will cease increasing the volume of low level signals.

The 'nominal' program level is used in establishing the desired amount of compression, or gain reduction. Increased compression levels produce greater "density" of the program material while decreasing the original program's dynamic

(continued on page 23)

Broadcast Computing

FCC Fudged 80-90 Formulas

by Dane Ericksen

Alameda CA . . . The article "Computer Help With New Regs" (RW, 1 September) has some errors which could get parties using the program into trouble with the FCC.

The article correctly points out that in Docket 80-90, the FCC substituted formulas for tables for determining the length of a degree in latitude and longitude. However, the trigonometric series in the program are *not* those adopted in Docket 80-90.

In Docket 80-90, the FCC truncated the trigonometric series for the Clarke Spheroid of 1866 to only the first two terms, and "fudged" the coefficients by the factor 1.609/1.609347219, to compensate for the Docket 80-90 decision to round the miles-to-kilometer conversion factor to 1.609 instead of 1.609347219 (approximately: the exact figure is (5280 ft/mi)(1200/3937 meters/ft)(1/1000 km/meter)).

Mr. Balonis' program uses 1.609344 for the miles-to-kilometer factor, which is incorrect for applications related to USGS topographic maps; see ANSI/IEEE standard 262-1982, "Metric Practice," note 14, at page 31.

In most cases the difference between the full-precision trigonometric series, as given in the 1966 edition of the American Practical Navigator, and the truncated and fudged Docket 80-90 trigonometric series, is inconsequential.

However, if use of other than the "exact FCC" method results in a different rounding to the nearest kilometer, as specified in Section 73.208(c)(7) of the FCC rules, a short-spaced situation could exist using the FCC method, when no short spacing would appear to exist using the full trigonometric series given in the American Practical Navigator (which Mr. Balonis' program uses).

For example, for the test case given in Mr. Balonis' article, the distance by the exact FCC method is 279.274 kM; the distance using the full-precision nontruncated trigonometric series is 279.333 kM; and the true distance, using Andoyer-Lambert formulas, which include second-order terms for flattening, is 279.313 kM.

To illustrate my point of rounding-to-the-nearest-kilometer trap, assume the required spacing is 105 kM. Also assume that the pertinent stations have the following geographical coordinates:

Station A: North Lat 41°14'55", West Long 75°52'55'

Station B: North Lat 40°34'59", West Long 75°00'17".

Using the full-precision, nontruncated trigonometric series and the correct 1.609347219 mile-to-kilometer factor, the

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```
LAT1=41.1455
LNG1=75.5255
LAT2=40.2216
LNG2=78.5904

EXACT FCC
TRUNCATED
SERIES
FLAT EARTH
MI↑KM=1.609

D=279.2739938 KM
D=173.5699154 MI

AZ=249.5829746 DEG
RCP=69.58297460 DEG


FLAT EARTH
FULL PRECISION
CLARKE
SPHEROID 1866
MI↑KM=1.609347

D=279.3330973 KM
D=173.5691925 MI

AZ=249.5830826 DEG
RCP=69.58308260 DEG


FLAT EARTH
FULL PRECISION
WGS 1972
MI↑KM=1.609347

D=279.3265383 KM
D=173.5651170 MI

AZ=249.5825111 DEG
RCP=69.58251110 DEG


SPHERICAL EARTH
CLARKE
SPHEROID 1866
111.3207021
KM/DEGREE
AT EQUATOR
MI↑KM=1.609347

D=279.0412243 KM
D=173.3878314 MI

AZ=250.5287552 DEG
RCP=68.50077018 DEG
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SPHERICAL EARTH
111.1200000
KM/DEGREE
AT EQUATOR
MI↑KM=1.609347

D=278.5381359 KM
D=173.0752274 MI

AZ=250.5287552 DEG
RCP=68.50077018 DEG


TRUE ELLIPSOID
CLARKE 1866
a=6,378.2064 KM
1/F=294.979
MI↑KM=1.609347

D=279.3125052 KM
D=173.5563972 MI

AZ=250.6017148 DEG
RCP=68.57372857 DEG


EXACT FCC
FLAT EARTH
-0.014%

CLARKE 1866
FLAT EARTH
0.007%

WGS 1972
FLAT EARTH
0.005%

SPHERICAL EARTH
111.3207021 KM/DEG
-0.097%

SPHERICAL EARTH
111.1200000 KM/DEG
-0.277%

PERCENTAGES
REFERENCED TO
TRUE ELLIPSOID
```

```
LAT1=41.1455
LNG1=75.5255
LAT2=40.3459
LNG2=75.0017

EXACT FCC
TRUNCATED
SERIES
FLAT EARTH
MI↑KM=1.609

D=104.4965127 KM
D=64.94500479 MI

AZ=135.0037458 DEG
RCP=315.0037458 DEG


FLAT EARTH
FULL PRECISION
CLARKE
SPHEROID 1866
MI↑KM=1.609347

D=104.5183969 KM
D=64.94459099 MI

AZ=135.0035807 DEG
RCP=315.0035807 DEG


FLAT EARTH
FULL PRECISION
WGS 1972
MI↑KM=1.609347

D=104.5171341 KM
D=64.94380632 MI

AZ=135.0044504 DEG
RCP=315.0044504 DEG


SPHERICAL EARTH
CLARKE
SPHEROID 1866
111.3207021
KM/DEGREE
AT EQUATOR
MI↑KM=1.609347

D=104.5686724 KM
D=64.97583068 MI

AZ=134.8268506 DEG
RCP=315.4014032 DEG
```

```
SPHERICAL EARTH
111.1200000
KM/DEGREE
AT EQUATOR
MI↑KM=1.609347

D=104.3801437 KM
D=64.85868461 MI

AZ=134.8268506 DEG
RCP=315.4014032 DEG


TRUE ELLIPSOID
CLARKE 1866
a=6,378.2064 KM
1/F=294.979
MI↑KM=1.609347

D=104.5172138 KM
D=64.94385585 MI

AZ=134.7159201 DEG
RCP=315.2904727 DEG


EXACT FCC
FLAT EARTH
-0.020%

CLARKE 1866
FLAT EARTH
0.001%

WGS 1972
FLAT EARTH
-7.626E-5%

SPHERICAL EARTH
111.3207021 KM/DEG
0.049%

SPHERICAL EARTH
111.1200000 KM/DEG
-0.131%

PERCENTAGES
REFERENCED TO
TRUE ELLIPSOID
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Broadcast Computing

80-90 FCC Formulas Truncated

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calculated distance is 104.518 kM, which rounds to an acceptable 105 kM, whereas the exact FCC method gives 104.497 kM, which rounds to a short-spaced 104 kM. Guess which method the FCC will use to evaluate your application?

Finally, Mr. Balonis' program determines azimuth using the arctangent of the triangle defined in the FCC flat earth method.

This is a poor choice. Azimuth should always be determined by the spherical earth method, even when using the FCC flat-earth method to determine distance. The flat earth method will be in error by over half a degree at distances approaching 350 kM, whereas the spherical-earth azimuth will be correct within about 0.1° at this distance.

For Mr. Balonis' example, the exact-FCC flat earth azimuth and the full-precision, nontruncated trigonometric series flat earth azimuth are both N249.58°E, versus a spherical earth azimuth of N250.53°E. The true ellipsoid azimuth is N250.60°E. Thus, it can be seen that the spherical earth azimuth is in error by only 0.07°, whereas the flat earth azimuth is in error by 1.02°.

I have filed comments and recommendations on these and other accuracy problems with the FCC, in Docket 86-144. I hope the FCC will adopt the suggestions and eliminate the current dilemma of using two sets of trigonometric series: a "fudged," truncated series for FCC purposes and a full-precision series for applications which must accurately match actual topographic maps (for example, automated plotting and retrieving of geographical coordinates).

Points on Dilemma Helpful

by Ron Balonis

Wilkes-Barre PA . . . Dane E. Ericksen makes valid points about the difficulties of and problems with calculating Distance and Bearing: the formulas and the constants do make differences. His letter is an excellent tutorial on the calculatory dilemma.

The trigonometric formula I used is from *the proposed* Rule Making MM Docket No. 86-144; 86-169 (51 FR 15927, April 29, 1986). That is the one he refers to in his last paragraph; I hope the FCC avails itself of his expertise and provides a solution to the calculation dilemma.

Since everything to do with fields and antennas will be metric soon, I thank him for the "official" approximate and the exact value of the miles-to-kilometer conversion constant: 1.609347219, and (5280 ft/mi)(1200/3937 meters/ft)(1/100 kM/meter). Hereafter I'll use them.

His point about calculating azimuth is true. I only briefly and vaguely noted it in the text accompanying the program, but I should have said more. His comments illustrate the difficulties one could have by using a "home computer" to compute engineering filings for an FCC application. I know I wouldn't; however, I neglected to specifically qualify the program and its results as such.

Ronald F. Balonis is a RW *columnist and CE of WILK-AM, Wilkes-Barre, PA. He can be reached at 717-824-4666.*

Interest Renewed in Synchronous Xmsn

by Robert R. Weirather

Quincy IL . . . Harris Corporation, Broadcast Division, has been working closely with two AM radio stations that have received experimental authorization from the FCC for synchronous operation. Through synchronous operation, and with special equipment developed by Harris, the two stations will fill in voids in their signal coverage by operating second transmitters at carefully chosen sites on the same frequencies as their primary transmitters.

The two stations to receive experimental authorization are KROL of Laughlin, NV, and KOB, Albuquerque, NM.

KROL site

Signing on the air in late August 1986, KROL is the first new synchronous station in the United States. The Laughlin Roughrider station has its primary transmitter in Laughlin, NV, operating on 870 kHz with a 10 kW directional days, 1 kW directional night permit.

The synchronous site at East Las Vegas, 60 miles from Laughlin, operates on the same frequency with 300 W nondirectional days, 500 W directional night. A power increase is planned for the East Las Vegas site. The station applied for synchronous authorization in order to adequately cover the Las Vegas area, which has a population of 500,000.

According to Joe Reynolds, KROL general manager, the station signed on in mono but planned to switch in the near future to stereo operation. KROL will be sharing its results with the FCC.

"We're excited about pioneering synchronous operation," Reynolds says, "and we'll be providing periodic reports to the FCC."

KOB's story

KOB, Albuquerque, NM, also is beginning synchronous operation, hoping to resume nighttime service to Santa Fe—the state capital and an important city of 75,000 people located to the Northeast.

Gary Diamond, KOB CE, reports that Santa Fe currently has no AM coverage from Albuquerque at night, but it wasn't always this way.

KOB's story is interesting: Diamond says that in 1943, the station was assigned to the 770 kHz frequency, but when it went to 50,000 W in the 1950s, nighttime interference with WABC New York, also on 770 kHz, occurred. A lawsuit ensued, and went all the way to—but was not heard by—the US Supreme Court.

KOB went to 50,000 W nondirectional day and 50,000 W directional night, preventing the station from covering Santa Fe at night.

To fill this null, KOB will operate a synchronous transmitter at 230 W in Santa Fe at night only, diplexing the antenna on Santa Fe's KVSF tower.

Through experimental authorization, the FCC will receive data "concerning the potential benefits and practicality" of allowing synchronous AM transmitters. Synchronous transmission may offer AM stations one way in which to improve their technical quality in the future.

A look at AM synchronous xmsn

The use of nearby AM transmitters with the same frequency and programming to supplement coverage area has been widely practiced throughout the world. Most installations, however, are for equal power transmitters operating in mono. Problems of a high power transmitter with a low power transmitter for fill-in—both with stereo modulation—have been neither widely analyzed nor reported.

Synchronous mono interference problems have been described by CCIR and in older literature in the US, yet how AM stereo will perform remains largely unknown. To shed some light on this question, a study was initiated and the results compiled.

To begin, it is important to note that synchronized AM transmission in the United States has been permitted *only* under experimental conditions. However, it is receiving considerable attention, and actions by the FCC indicate that if all goes well in field trials, this variation may be allowed. What AM stations may be able to do by filling "holes" in their coverage areas is exciting to think about!

Why use synchronous transmission?

There are many reasons why an additional site or sites may be advantageous for an AM station. Problems that may be addressed by synchronous fill-in site(s) are:

- Natural obstructions such as mountains blocking the signal path;
- Man-made obstructions such as buildings blocking the signal path;
- Depressions such as valleys in the terrain;
- Poor or variable conductivity terrain, and/or antenna pattern variations.

If an AM station has an area that it should be covering but is not, a synchronous site may be the answer.

To fully discover what is possible, a station needs to review its coverage with a knowledgeable consultant. To get a feel for what is possible, a station might think in terms of 1%-10% power at the secondary site, with a separation distance of 5 to 100 miles. For many AM stations, this opportunity may allow coverage of substantial "pockets" of population not currently being well served.

The European connection

Synchronous broadcasting has been used in many parts of the world—especially Europe. In most operations, however, transmitters are at nearly equal power level. At the midpoint between sites, a zone of interference is created, where signals from each transmitter are received at equal strength. Reception of two signals from the respective transmitters *without* problems over the entire coverage area is the goal.

The contemplated FCC version of synchronous AM is different. In the United States, the primary signal completely overlaps the signal from the second transmitter, and the potential for an interference zone is much higher.

Since most people don't understand

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Robert Weirather is director, Advanced Development Harris Corporation, Broadcast Division. He can be reached at 217-222-8200.

Figure 1. Typical Block Diagram for Synchronous Operation.

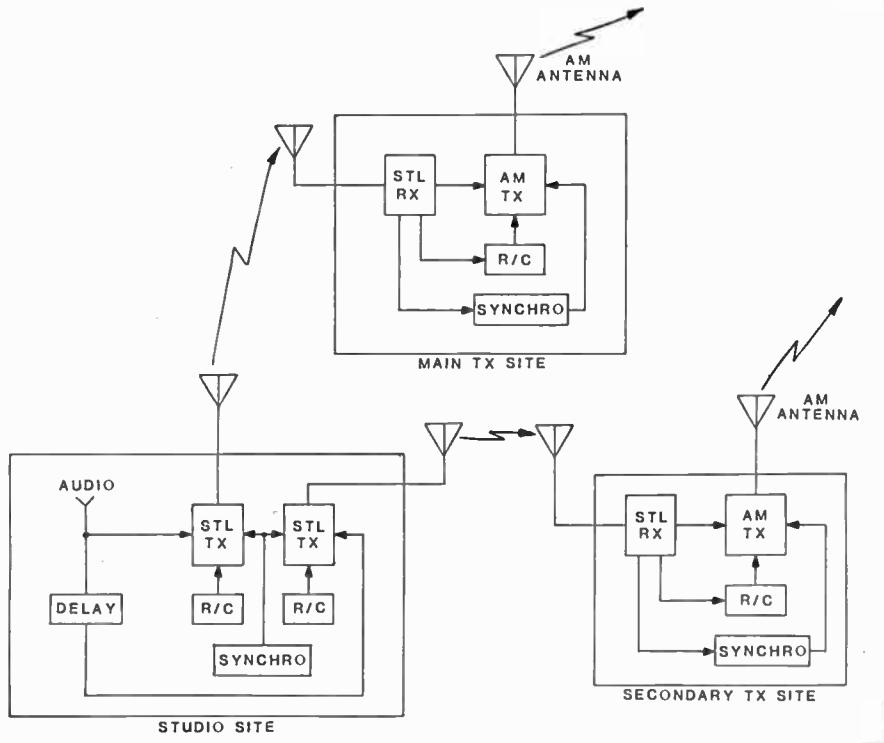


Figure 2.

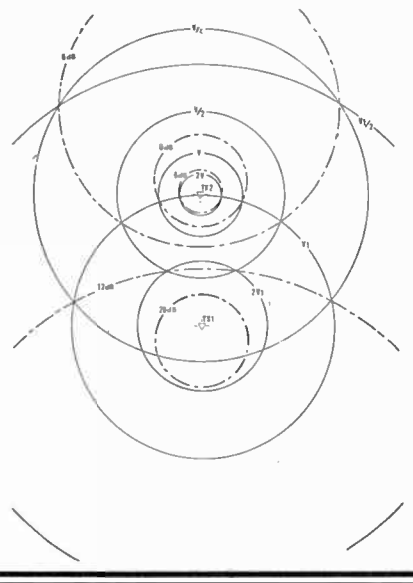
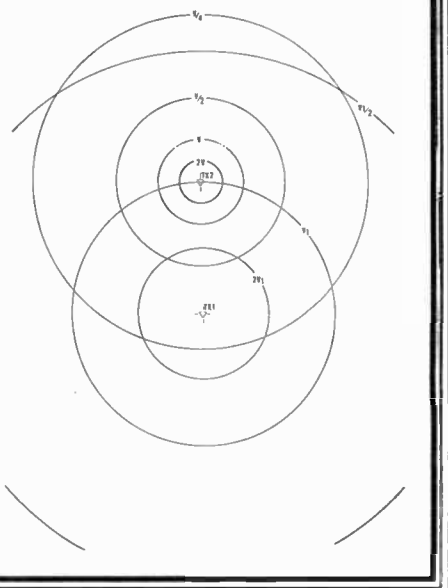


Figure 3.



Synchronous Xmsn Examined

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the zone of interference, it is worthwhile to discuss problems of a low power transmitter surrounded by a much higher powered transmitter. How one implements a system for maximum benefit is not completely known yet. However, many known principles can be applied and field test results analyzed. To get a grasp of this potential, let's look at a system.

To assess the impact that another or multiple sites may have, it is worthwhile to consider the equipment involved. While the primary site may be basically changed by additions, the remote site needs to include site real estate; antenna and networks; transmitter; STL and control equipment and audio equipment (see Figure 1).

Special gear also will be required. First, the two RF signals are required by the FCC to be maintained within 0.1 Hz. Second, the time delay between the audio paths needs to be equalized. The choice and operation of this equipment will make a difference to listeners in both regions.

By using this equipment, we can get a synchronous site running. But what can be expected in the field?

Fielding the signals

To simplify the prediction, let's assume the world is flat; the conductivity is perfect, and the antenna pattern is omnidirectional. What we know is that signals from a transmitter create concentric circles of equal strength around their transmitting antenna.

This can be likened to dropping a large pebble into a quiet pool of water, and then dropping in a smaller pebble some distance away. As expected, the waves caused by either pebble near their entry points are unaffected by the other's waves. Additionally, the waves around the bigger pebble are largely unaffected by the waves from the smaller pebble. However, a short distance from the smaller pebble's entry point, an interference zone is created.

> *"The most important part of the zone of interference is where two RF signals are of equal strength."*

This analogy is identical to the electrical case we'll examine.

The secondary site is within the coverage of the primary site (see Figure 2). Reception on a receiver is like that of "co-channel interference," but the program audio material is identical. What will the reception be like? Harris thinks reception can be made very good and potential problems minimized.

If the primary signal is a hundredfold more powerful (20 dB) than the secondary signal, virtually no problems are expected. Similarly, if the secondary signal overwhelms the primary signal, few problems exist. It is in the zone where the two RF signals are nearly equal that problems can be expected. This zone of interference needs to be understood and calculated so that the benefits of synchronous AM are not overstated.

The most important part of the zone of interference is where two RF signals are of equal strength. Experiments and calculations indicate that the following ratios are important (see Table 1).

Since these RF ratios are important, it is useful to be able to predict their location (see Appendix).

Synchronous transmitters can be expected to create many of the effects commonly associated with skywave/groundwave interference and selective fading. Path length and attenuation differenced under skywave conditions create disturbances of carrier phase and comb filtering of the sidebands. Quadrature distortion on envelope detectors results, as well as periodic dips in frequency response.

Encircled

Without developing the complete mathematics (see Appendix), the 1:1 (0 dB) signal contour is a circle. For example, two separated transmitters in a 10:1 power ratio have a family of field strength curves, as shown in Figure 1. What the mathematics and these figures show in the Appendix is that the region of 1:1 (0 dB) to 4:1 (4 dB) ratio of signals can be large.

The contour 100:1 (20 dB) to 4:1 (6 dB) is quite large, but it is anticipated that only a few problems will exist. On the equal signal contour, the field distribution is like that on a transmission line with a high VSWR. If the RF signals are synchronous, the signal will add or cancel, depending on location.

Expected artifacts

A wavelength at 1,000 kHz is 985', and 55 mph is 81' per second. A car driving toward one synchronous station and away from another at 55 mph (worst case at 55 mph) will go through 360° of phase rotation about every 6.1 seconds. Dips in signal level may be severe, but

(continued on page 22)

Table 1

Signal Power Ratio	Importance
1:1 (0 dB)	Contour of maximum interference
1:1 to 4:1 (0 dB to 6 dB)	Zone of some interference
4:1 to 100:1 (6 dB to 100 dB)	Zone of little interference
100:1 and greater (20 dB)	Zone of virtually no interference

Synchronous Xmsn Under Test

(continued from page 21)
may be compensated for by the receiver AGC. Thus, auto reception may be affected in the near equal signal region.

Fixed reception from receivers would be largely unaffected if the radio frequencies were identical. If the radio frequencies were 0.1 Hz different, the signals would peak and then null every 10 seconds at fixed reception points. This could be quite annoying for quality reception for fixed and mobile radio.

Stereo transmission adds another dimension to the analysis of synchronous operation. Whereas in mono, all the information is carried in the amplitude of the RF signal (or envelope), stereo transmission uses the amplitude and phase of the RF signal. Further, a pilot tone is involved and must be recognized by the receiver to switch to stereo. Harris' studies show that synchronous operation can best be optimized by phase locking the RF carriers at all sites.

Locked up

Various techniques can accomplish the minimum 0.1 Hz frequency difference for secondary sites. Harris believes that the benefits are maximum when the secondary site(s) are locked in frequency and phase to the primary site. Harris has developed a technique and hardware which is adaptable to both mono and stereo transmission to phase lock the RF carriers and the stereo pilot tones of all sites.

To achieve quality reception. it is necessary to modulate the transmitters as identically as possible. The audio needs to be delayed such that receivers in the interference zone have synchronous modulation. The delay must be fine trimmed or undesirable audible artifacts will be heard. Further, the delay must be uniform across the audio band. To achieve this, a digital time delay circuit with fine resolution is highly recommended.

Communications links

Remote synchronous sites can be treated much like the primary site. The major difference is that STLs will likely be used. To operate a remote synchronous site, the following needs to be provided: audio feed (two if stereo), control and synchronizing information.

STLs with stereo and subcarrier features provide the right selection of capabilities for synchronous sites.

By now, AM broadcasters may be asking, "Where do we go?" While the FCC hasn't acted on the rule to permit synchronous operation, several stations have applied for experimental operation. Synchronous sites have the potential to help many AM stations recapture markets and establish improved coverage.

Predicting the contours of signal ratio is necessary to evaluate the impact of a synchronous site. Beginning with these assumptions: omnidirectional, flat terrain and ideal conductor, we know that the field strength (volts per meter) from an antenna will vary inversely with the distance from the antenna.

This field strength pattern is shown in Figure 2 for two transmitter sites. In Figure 2, the transmitters are 10:1 different in power.

Examining Figure 2, we can note the following:

- The signal from the high power transmitter is nearly constant over the region around the low powered transmitter.
- The signal strength from the low powered transmitter drops very quickly from the antenna, thus minimizing excessive coverage.
- The signal strength from the high powered transmitter diminishes slowly and dominates the coverage area.
- As one travels along a path from the primary site (TX1) to the secondary site (TX2), the signal from TX1 diminishes and at some point becomes equal in strength to the TX2 signal.

Ratios

Calculations will show that the contours of constant signal ratio (signal strength from TX1 compared to the signal strength from TX2) are circles. This is shown is Figure 3.

If you would like to calculate what may be applicable for your situation, you may start by using some simple approximations. First, we'll assume flat terrain, omni and perfect conductivity. Then we define:

- P1 = Power of Transmitter #1 (watts)
- V1 = Signal Strength of Transmitter #1 (V/m)
- P2 = Power of Transmitter #2 (watts)
- V2 = Signal Strength of Transmitter #2 (V/m)
- D = Distance Separated (miles)

Then you can calculate the circles of equal strength by using Equation 1:

$$R = D\sqrt{\frac{k}{1-k} + \left(\frac{k}{1-k}\right)^2} \quad \text{(miles)}$$

$$Y = \frac{-(kD)}{1-k} \quad \text{(miles)}$$

$$k = \left(\frac{V2}{V1}\right)^2 \frac{(P1)}{P2}$$

Where:

R = Radius of circle with center at point Y
Y = Distance from Site #1 on line drawn through Site #1 and Site #2
k = Ratios of Interest
D = Distance between sites

Example

If we examine a 5 kW station with a 500 W secondary located 25 miles away, to find the equal signal contour, we:

let $V2/V1 = 1$

and

$$\frac{P1}{P2} = \frac{5000}{500} = 10$$

thus, $k = 10$

Calculating:

R = 8.784 miles and Y = 27.778 miles.

We can draw this circle on a piece of scaled paper. The center of the circle is 27.778 miles from transmitter 1 along a straight line between the two sites. In fact, this center point is 2.778 miles on the other side of transmitter 2. The circle radius is 8.784 miles. At 18.99 miles from Site #1, the signals are equal. Similarly, we could calculate 2:1 (6 dB), 10:1 (20 dB), etc.

At a certain signal ratio, the center of the circle (Y) is negative. This means that the circle center is on the opposite side of Site #1.

Circle Reader Service 8 on Page 22

Two Techniques Now Universal

(continued from page 17)
range. On some units the input gain or gain reduction controls serve this purpose.

Most signal processing equipment manufacturers suggest control setting parameters for optimizing the performance of their units for use with specific formats. Due to the largely subjective nature of audio processing artifacts, combined with the diversity of obtainable results, those written suggestions should serve only as a guide for "getting you in the ballpark."

Only after many hours of listening to the broadcast signal on a wide variety of different types of receivers can you effectively evaluate the overall performance of an audio processing scheme.

The peak controller

Assuming that the broad level range fed into the AGC unit comes out noticeably more "dense" and smooth compared to the original, unprocessed signal, we then couple it to the input of the peak-controller.

In many modern analog equipment designs, audio transformers are offered only as options for coupling the device's internal circuitry with incoming and outgoing signals.

Vastly more popular at present is the use of balanced-differential integrated-circuit opamps which economically emulate some of the desirable characteristics exhibited by a high-grade audio transformer, but without many of the performance limitations transformers impose.

Generic system results

For the purpose of detailing our relatively simple "generic" system depicted in the block diagram, I'll define the nature of the results expected from the system as a unit, the nature of the activity desired of each element, and a general rule-of-thumb formula for setting up a basic configuration.

The designations given various adjustable controls found on modern processing devices are frequently terms invented by the designer to fit specialized, unconventional effects available beyond the basic operation(s) required from the unit. A thorough review of the instruction manual supplied with the equipment is recommended prior to its installation and use.

The Input Level and Output Level control(s) are usually clearly marked on both the AGC unit and the peak-controller unit. They may be positioned on the device's front panel or located on the rear chassis section.

Setting the input and output levels on both devices is the first step. It is essential to avoid overloading either the unit's input circuitry and to provide sufficient level for proper operation. Elaborate experimentation at this stage is necessary, assisted by the advice available from the initial installation and/or basic adjustment section of the equipment manufacturer's instruction manual.

> *"Remember that you are setting the controls on separate pieces of equipment which comprise a complete system."*

Remember that you are setting the controls on separate pieces of equipment which comprise a complete system. Your goal should be to produce the highest quality, most "dial-present" product from the your resources.

After the input level(s) have been set on the AGC amplifier, you can begin adjusting all variable controls the manufacturer suggests be repositioned by the end-user for tailoring the activity of the unit to the individual station's program format and desired sound.

Prevalent on many AGC units is some form of variable control(s), the setting of which varies the time (in seconds or fractions thereof) the active circuitry will take to restore a prior volume range existing at the unit's output after a burst of substantially higher incoming signal level—whether brief or sustained—is presented to the input. Generally speaking, a longer recovery time produces less "apparent loudness" since the extended period taken to match a previous level is perceived as a "valley" or lower audible volume level.

Concurrently on many devices is a control frequently marked 'Attack,' which sets the length of time the unit will take to reduce the amplitude of a signal significantly higher in level than "normal." For most applications, we want this time period to be a short as possible.

Adjusting the Recovery (sometimes known as Release) time controls for as rapid action as possible is usually desirable among formats requiring maximum density, such as Top-40, Country & Western, Urban Contemporary, etc. Formats ranging from the Easy Listening type to Classical suggest slower settings for more gradual action.

In Part 6 we'll examine additional processing controls and consider more complex adjustment schemes.

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AMPLIFIERS

Want to Sell

Schafer stereo PB preamp, goes w/Ampex C440. $75. C Cornett, Cornett Tech Srvs, 3127 Bailey, Lincoln MI 48146. 313-928-6238.

McIntosh, all types; Marantz tube; Conrad-Johnson & other precision audio equipment bought-sold-traded. Free catalogue. 8AM-5PM Mon.-Fri. Audio Classics, POB 176RW, Walton NY 13856. 607-865-7200.

Crown DC-300A, gd cond, $475; BGW 250, older style, gd cond, $350. CK Bucy, Cisco Snd, Box 16583, Lubbock TX 79490. 806-763-3537.

Belar RFA-1 AM RF amp, solid state, $175. D Doelitzsch, WDDD, 1 Bdct Ctr, Marion IL 62959. 618-997-8123.

Crown D150A 150 W power amp, $290. B DeFelice, DeFelice Consulting, 621 Bishop, Bridgeport CT 06610. 203-336-5606.

Harman-Kardon Citation 12 (2), rack mountable power amps, gd cond, BO. J Von Vleck, Aras Consultants, 2321 N Utah, Arlington VA 22207. 703-524-5067.

Dynaco Mark III, 60 W tube pwr amp, $50. E Helvey, Successtrax, POB 1357, Winchester VA 22601. 703-877-1191.

Biamp TC60 power amp, $295. D Kocher, 1901 Hanover Ave, Allentown PA 18103. 215-776-1455.

Ampex monitor amp & speaker, $100. B Hunter, KIXE, Box 9, Redding CA 96099. 916-221-5800.

Scott tube-type Stereomaster 299-D preamp & amp, $20; matching Scott Stereomaster 333-B, AM/FM tuner, $15; Scott tube-type stereo lab amp, from a kit, $20. C Brennan, 661 Horseshoe Curve, Pike Road AL 36064. 205-277-0139.

Langevin tube & solid state & preamps, large quantities, BO. R Van Dyke, Squires Ave, E Quogue NY 11942. 516-728-1327.

Sansui CA-F1 straight-line preamp, black, rack mt, like new, $200. W Laughlin, KDCV, 2636 N 56, Lincoln NE 68504. 402-466-8670.

Want to Buy

Dynaco ST35 & MK III, M Disch, HumanKind Software, 427 W Capital Dr, Hartland WI 53029. 414-367-5719.

McIntosh, Marantz, Dynaco Quad, Audio Research, etc, amps; WE, Tannoy, Altec, EV, JBL, Hartsfield, Olympus, Harness, Laguna speakers; Thorens, Fairchild turntables; WE tubes & microphones. Lapine, 3920 August Dr, Lake Worth FL 33461. 305-588-8195.

Marantz, McIntosh, WE & related elect. C Dripps, Kurlaff Enter, 4331 Maxson Rd, El Monte CA 91732. 818-444-7079.

Marantz/McIntosh MC2300 MC2500, C29 tube & solid state equip. C Dripps, Kurloff Ent, 4331 Maxson Rd, El Monte CA 91732. 818-444-7079.

ANTENNAS & TOWERS

Want to Sell

Crouse-Hinds FCB-12 tower beacons for 2-620 W lamps (w/o red filters; Harris ERI FMS-5, 5-bay CP FM antenna at 106.5 MHz. P Wells, KLZZ, 8665 Gibbs Ste 201, San Diego CA 92123. 619-565-6006.

PiRod Mdl 60 1100' tower complete w/EGG strobe system, like new cond, 4 yrs old, zone A tower can be mod for TV pylon, still standing near Corinth GA, $160,000. X Zapis, Transworld Bdct Corp, 1729 Superior Ste 401, Cleveland OH 44114. 216-621-9300.

ERI FMC-7B 7 bay FM antenna, Harris dual Cycloid II, circ polarized, center fed, can be 6 bay, $4000 FOB Blythe CA. J Mayson, KIMB, 2222 Kansas Ave Ste L, Riverside CA 92507. 714-682-2222.

RCA 7 bay circular antenna, 98.1 MHz, $3000/BO. K Harnack, WKQQ, POB 100, Lexington KY 40590. 606-252-6694.

Rohn RG55 AM or FM tower, 290' FT, 3 star MTS w/guys & turnbuckles, painted, $5000/BO. G Hinkle, KKFM, 303-596-5536.

ERI G5CPS 5 bay FM antenna for 94.7 MHz, $4000. M Raby, WFBQ, 6161 Fall Creek Rd, Indianapolis IN 46220. 317-257-7565.

AM tower, 150' self supporting w/four legs, approx 7' sq base w/insulators, tower is tapered, right angled steel, obstruction lights, currently on ground, avail immed, BO. C Thornton, WAGE, 711 Wage Dr, Leesburg VA 22075. 703-777-1200.

Phelps-Dodge, six sections, 3-1/8 rigid line, 50 ohms, flanged both ends, $250 ea; (4) 3-1/8" elbows, $125 ea. J Seaman, WFLY, POB 12279, Albany NY 12212. 518-456-1144.

Kintronics FMC 7.5 isocoupler tuned to 92.7, like new, $750. E Fears, KHBN, POB 31235, Jackson MS 39206. 601-981-4245.

Harris FMH-11AC FM antenna, 11 bay, 4 yrs old, w/top shorting stud, in storage, tuned 107.7 MHz. R Roiseland, KMAJ, Box 4407, Topeka KS 66604. 913-272-2122.

Truscon tower, 4 leg, angle steel, heavy galvan, self-supporter, 183', excel cond w/4 base insulators, $16,000. R Brosig, WTAN, St. Petersburg FL. 813-461-1341.

Heavy duty type, self standing tower, 40', in (5) 8' sections, $330. S Lawson, KAK FM, 928 Hyland, Santa Rosa CA 95404. 707-528-4055.

AM tower, 150' self-supporting w/four legs, approx 7' sq base w/insulators, tapered, constructed of right angled steel, obstruction lights, currently on ground, avail for immed delivery, BO. C Thornton, WAGE, Box 1290, Leesburg VA 22075. 703-777-1200.

Windcharger, 400', 18" face, on ground ready for pickup, $4000/BO. JP Robillard, KLUV, 1803 N 1st East St, Haynesville LA 71038. 318-624-0105.

Utility tower, 130', 16" face, on ground ready for pick-up, $1000/BO. JP Robillard, KLUV, 1803 N 1st East St, Haynesville LA 71038. 318-624-0105.

Cetec JSLP2R 2 bay w/radomes, 96.7 MHz, 5 mos old, $2500. D Dobrowolski, WSEY, 6313 Odana, Madison WI 53719. 608-274-1441.

Trucson 4 leg self-support angle steel, 183', excel cond, w/base insulators, $16000. R Brosig, WTAN, 200 Pierce, Clearwater FL 33516. 813-461-1341.

Scala FMVH 4 bay, vert, antenna & divider network, 500 W max, $1000. S Lawson, KAK FM, 928 Hyland, Santa Rosa CA 95404. 707-528-4055.

Phelps Dodge-Celwave CFMHP-10 10 bay CP FM w/deicers, 103.3 MHz, 385', 3-1/8" line, heliax w/connectors, $7500/BO. D Overbye, Overbye Assoc, 229 E Johnson, River Falls WI 54022. 715-425-5421.

Dual directional coupler, 1030-1090 MHz, 7/8" EIA flange reduces to N-jack, new, $35; 50 ohm 1-5/8" EIA 90 degree miter elbow w/bullet & insulator, new, equal to Andrew type 1061 (5), $30. J Cunningham, YSDA, Rt 2 Box 113B, Stonewall OK 74871. 405-265-4496.

Phelps Dodge Isocoupler, 25 kW, FM 98.7, AM 1260, retunable, $100; RCA BFH-8 horizontal antenna w/tuning section & mounting hardware. A Branch, Allen Audio, PO Box 1979, Decatur GA 30031. 404-325-7847.

Cetec JSLP-2R 2 bay antenna at 96.7 w/radomes, less than 6 mos old, $3000. D George, WSEY FM, 6313 Odana Rd, Madison WI 53719. 608-274-1441.

AM tower, self-supporting, 150', w/4 legs approx 10' sq base w/insulators, tapered w/obstruction lights, avail immed, BO. C Thornton, WAGE, Box 1290, Leesburg VA 22075. 703-777-1200.

Flanged EIA 90° elbows (3), new, 3-1/8", $200 ea PPD; flanged EIA reducer, new 3-1/8" to 1-5/8", will fit either sex, $125 PPD. D Gilliam, KJZZ, 1435 S Dobson, Mesa AZ 85202. 602-969-9099.

Micro Comm diplexer, avail soon, will retune, will handle 2 class C stations. J Sands, KMZQ, 1555 E Flamingo Rd, Ste 335, Las Vegas NV 89119. 702-731-5100.

Andrew 87-Z splice kit for 1-5/8" heliax, $100 PPD. D Gilliam, KJZZ, 1435 S Dobson, Mesa AZ 85202. 602-969-9099.

RF xmission line hardware for rigid line & heliax, 7/8 to 6-1/8", 500', new HJ5-50 7/8" heliax w/75AR connectors attached. H Husbands, 6626 Talmadge Ln, Dallas TX 75230. 214-233-6351.

Gates FMCP 124A 8 bay class A FM antenna, tuned to 105.1 MHz. J Walters, KKJO, POB 166, St Joseph MO 64502. 816-279-6346.

Want to Buy

FM 4/5 bay circular polarized antenna. J Bruce, Thoen Comm, 407 N Swenson, Stamford TX 79553. 714-761-4377.

FM antenna, low power, horizontal tuned to 102.3. M Brasher, 216 Zenalona, Albuquerque NM 87106. 505-242-7163.

FM antenna, 1 to 2 bay, 98.3 MHz. A Bowab, WDLT, 2402 Wolfridge, Mobile AL 36618. 205-344-3698.

AUDIO PRODUCTION (OTHER)

Want to Sell

Shure M610 feedback controller w/rack-mount, gd cond, $95. CK Bucy, Cisco Snd, Box 16583, Lubbock TX 79490. 806-763-3537.

UREI Vidigraf 1970 bargraph display gen, $300/BO. A Tucker, Foothill Prod, 70 W 83rd, NY NY 10024. 212-879-0973.

Orban 8100A/ST studio chassis for 8100A, $600. B Anderson, WRCN, 72 W Main, Riverhead NY 11901. 516-727-1570.

Comex ABC Network command decoder for talk radio. B Korngald, Box 2621, Savana GA 31402. 912-355-9926.

Eventide BD955 digital delay, 7.5 kHz, 6.4 sec, 2 yrs old, only used 1 yr, $2000/BO. D Sharp, WKAI, 119 W Carroll, Macomb IL 61455. 309-833-5561.

Sony R-R, (3) portable, solid state elecs, $35. J Lipski, KIQO, POB 1456, Lompoc CA 93436. 805-865-6536.

Eventide 932 3.2 sec digital delay stereo, $1500; Aphex type II aural exciter, $1500. A Bater, WPIX, 220 E 42nd, NY NY 10017. 212-210-2773.

Comex digital delay 7 sec, simple to work, 1 yr old, $1000; ABC Network cue command decoder, brand new, $1150. B Korngold, Ben Bdctg, POB 2621, Savannah GA 31402. 912-355-9926.

Shure 610 feedback controller, $90; Realistic stereo mixer, compressor, $100; 10 band EQ, $90; dbx 155 4 chan, $325; Shure gated, all excel. D Kocher, 1901 Hanover, Allentown PA 18103. 215-776-1455.

Telex CS61 sport headsets, 3 pair, $50/pr. C Springer, KLMR, POB 890, Lamar CO 81052. 303-336-2206.

Comp 8 th studio w/Tascam 80-8 w/dbx, 15 ch mixer, mic, much equip & tape, call for separate pricing & details, $5000. B Johnson, Rejoice Recording, POB 45, Rainier OR 97048. 503-556-4052.

Ampex mixer, 6 inputs, stereo, $200; (2) bulk tape erasers, $50 ea; (3) Magnefax tape duplicators, BO. B Hunter, KIXE, Box 9, Redding CA 96099. 916-221-5800.

Yamaha R1000, reverb, new cond, $750. T Stoller, 2320 Eade Ave, Ft Wayne IN 46805. 219-484-7390.

Shure Audio Masters EQ, $100 ea; Shure feedback controller, $100; dbx 155 4-chan, $325; Linn drum, $1400, all mint cond. D Kocher, 1901 Hanover Ave, Allentown PA 18103. 215-776-1455.

Altec 9062A 7 band passive EQ's, one pair w/doc, $40. B Skye, Skyelabs Inc, 58 W Tidbury Dr, Dover DE 19901. 302-697-6226.

Lexicon M97 Super Prime Time digital delay, excel cond, $1200; UREI 546 2 chan parametric EQ, gd cond, $250. T Stein, New River Studios, 408 S Andrews, Ft Lauderdale FL 33301. 305-524-4000.

dbx 162 perfect working order, $350. B Hawkins, WENS, 1099 N Meridian, Indianapolis IN 46204. 317-266-9700.

Eventide BD955 digital delay, mono, 7-1/2 kHz, 7 sec, $1400. A Soroka, WJRO, POB 159, Glen Burnie MD 21061. 301-761-1590.

Teac 15 w/floor stand, 24 chan cap board w/8 out, excel cond, $3500. H Saunders, Music Shop Recdg, 1114 Riveria Dr, Greensboro NC 27406. 919-273-9892.

Technics SH-9010 EQ, 5 band stereo, BO. J Sulik, WGBA, 1145 Pine St, Green Bay WI 54305. 414-437-2624.

Burwen TNE-7000 phono NR, black, rack mt, mint cond, $300. W Laughlin, KDCV, 2636 N 56, Lincoln NE 68504. 402-466-8670.

Want to Buy

Pultec, Lang, or API EQ. D Kocher, 1901 Hanover, Allentown PA 18103. 215-776-1455.

Misc elect: Westrex 10A, RA1979, Fairchild 627, Davin 910-911, Davin 833A, Davin 811A, Gray 208, Altec 759, many early mono-stereo cartridges. C Dripps, Kurlaff Enter, 4331 Maxson Rd, El Monte CA 91732. 818-444-7079.

R-R, 6-8 chan console, 2 R/P cart machines all in stereo. E Lewis, Sound Audio, POB 1161, Globe AZ 85502. 602-425-3930.

Reverb units, $1-200. P Douglas, KKAY, Box 759, Plaquemine LA 70765. 504-473-3806.

AUTOMATION EQUIP.

Want to Sell

IGM 48 tray Instacart, mono, needs work, BO. B Brown, WPRS, Box 367, Parris IL 61944. 217-465-6336.

Schafer 903 automation systems, remanufactured, warranty, installation, & training. Broadcast Automation, 4125 Keller Springs No. 122, Dallas TX 75244. 214-380-6800.

Autogram 581A, Autogram brain, (6) SMC Carousels, (2) time announcers, BO. C Veers, WBHT, Box 198, Brownsville TN 38012. 901-772-3700.

IGM R-R & Carousel, clock & net switcher w/rack & misc equip, $3500. K O'Malley, WLRW, POB 3369, Champagne IL 68121. 217-352-4141.

Harris R-R source interface cards for System 90 or 9000 (2), #995-7867-001, $150 ea. C Bryson, Comserve, 93 Robinhood Dr, Zeliemople PA 16063. 412-776-5204.

IGM System 700 w/digital PDP8/M computer & remote entry console, call for details, $13,000 takes all. J Whitmer, WNBS, POB 1340, Murray KY 42071. 502-759-1300.

Microprobe 100 automation programmer w/manual & cables, looks nice, $950/BO. J Whitmer, WNBS, POB 1340, Murray KY 42071. 502-759-1300.

Control Design CD-28 automation system, (4) Scully LJ-10, (4) Carousels; Extel; CRT, more, mostly junk, gd for parts only. J Seaman, WFLY, POB 12279, Albany NY 12212. 518-456-1144.

Harris System 90, comp w/3 racks, programmer, remote console, (4) ITC 750 reels, (3) stereo SMC Carousels, 2 Harris single play cart decks, Extel printer, 1024 event memory & lots more, $10,000/BO. K Harnack, WPAD, POB 450, Paducah KY 42001. 502-442-8231.

IGM 48 tray mono Instacart, includes IGM Mk I remote controller, $6000/BO. P Finken, KHHT, Box 1686, Minot ND 58701. 701-852-0361.

Schafer GLS7000 stereo, interface w/music networks, 2 Audiofiles, $23,000. E Reynolds, WTJZ, 553 Michigan Dr, Hampton VA 23669. 804-723-3391.

Cetec Series 7000 automation, complete w/4 ITC 770 R-R's, (2) Audiofile cart machines, CRT terminal & software, in 4 racks, 5 yrs old. A Bishop, WZSH, POB 111, E Rochester NY 14445. 716-586-2263.

RCA DAP-5000 automation system control w/Instacart interface, clock & audio switching panel, $1800. D Doelitzsch, WDDD, 1 Bdct Ctr, Marion IL 62959. 618-997-8123.

Circle Reader Service 16 on Page 22

RW Broadcast Equipment Exchange

AUTO EQUIP . . . WTS

IGM 78 tray Go-Cart, excel cond, stereo. $2900/BO. D Workman, KPPL, RR 1 Box 203, Stockton IA 52769. 319-785-6069.

AR-2000 automation controller plus lots of spare parts, boards, & source cards, BO. D Doelitzsch, WDDD, 1 Bdct Ctr, Marion IL 62959. 618-997-8123.

SMC 250RS Carousels (2), Gates version, mono, $500/both. L Snyder, Box 182, Floral Park NY 11001. 718-347-2940.

Harris System 90, 3 racks, 4 ITC reel recorders, 3 stereo SMC Carousels, 10242 events & more. $13000/BO. B Bereman, WPAD, POB 450, Paducah KY 42001. 317-297-1300.

IGM 48-S stereo Insta-Cart, premium cond, $5000. T McGinley, 1st Media Corp, POB 10239, Wash DC 20018. 301-441-3500.

BE Control 16 (4) Revox PR99's; (2) SMC 20-A Carousels; IGM Go-Cart 42, vgc, operational & documented, price neg. D Wilbur, WOBL, Box 277, Oberline OH 44074. 216-774-1570.

SMC time announce unit w/2 carts. J Walters, KKJO, POB 166, St Joseph MO 64502. 816-279-6346.

IGM Instacart, 48 tray mono, 5 yrs old, $3000. J Mason, KJMB, 2222 Kansas Ave Ste L, Riverside CA 92507. 714-682-2222.

IGM Brain, BM format tape sequencer. J Phillips, WDCW, 414 Washington, Defiance OH 43512. 419-782-8591.

Harris 9000-1 inc (5) ARS1000DC, (3) Sonomag Carousels, all w/control, CTR & printer, BO. S McDaniel, WZFX, Ste 700 Wachovia Blvd, Fayetteville NC 28303. 919-486-4991.

Autogram 250 (4) stereo Carousel, excel cond, recently refurb, BO. P Douglas, KKAY, Box 759, Plaquemine LA 70765. 504-473-3806.

Want to Buy

Tone gen, 25 Hz. T Welch, WROD, 991 Daytona Bch FL 32105. 904-253-0000.

CAMERAS (VIDEO)

Want to Sell

Sony DXC-1640 (2) & CMA-6 CCU packages; one excel cond, $800 & one fair cond w/lots of use, $450; 50' 14 to 14 pin cable, $75, will consider donating before 12/31/86. R Weller, RSBS, 6117 Code Ave S, Edina MN 55436. 612-925-2162, aft 6PM.

Ikegami HL-33 camera, 1" plumbs, comp rebuilt, excel cond, many extras, $2500. U George, George Assoc, 175 5th Ave #3206, NY NY 10010. 212-475-3330.

Ikegami HL79A w/Angenieux lens, 9.5-126, w/wide angle adaptor, w/case, batteries, battery charger, AC adaptor, rain cover. T Cereste, Lightscape, 420 W 45th, NY NY 10036. 212-757-0204.

Want to Buy

JVC CCU & cable for use w/JVC KY2000 camera. J Owens, Asbury College, Wilmore KY 40390. 606-858-3511 X757.

Sony DXC 1210 & DXC 1600 Trinicon for Sony DXC 1210 needed, also viewfinder, any cond & DXC 1600 camera head for cabinet parts. C Lund, Cycle Snd & Video, 167 Madison, Waterbury CT 06706. 203-756-7761.

Fujinon zoom & focus controls for 1-1/4" lenses. H Henson, Henson Prod, 4569 Haven Crest Rd, Winston-Salem NC 27106. 919-924-8717.

RCA TK-44's, needed for bdct museum, need not work. H Henson, Henson Prod, 4569 Haven Crest Rd, Winston-Salem NC 27106. 919-924-8717.

CART MACHINES

Want to Sell

Tapecaster 700RP cart machine,, $300. C Hampton, WXBM, 1687 Quintet Rd, Milton FL 32470. 904-994-5357.

ITC Mono RP in vgc. P Wells, KLZZ, 8665 Gibbs Ste 201, San Diego CA 92123. 619-565-6006.

Gates PB only mono cart machines (4), $300. A Loera, Anthony Bdct, 10419 Haddon, Pacoima CA 91331. 818-897-2688.

Tapecaster X700RP (4) mono, currently in use, $700/BO. A Searfoss, WIIN, 2707 Atlantic Ave, Atlantic City NJ 08401. 609-348-4646.

BE5304 triple deck stereo w/all tones & 5310 recorder w/tones, needs several parts, as is $1000. B Hawkins, WENS, 1099 N Meridian, Indianapolis IN 46204. 317-266-9700.

BE FSD-100 splice finder, vgc w/manual, $275. B Hawkins, WENS, 1099 N Meridian, Indianapolis IN 46204. 317-266-9700.

BE 3100P play only, all aux tones, vgc, $700. L Snyder, Box 182, Floral Park NY 11001. 718-347-2940.

BE 5304 triple deck stereo w/all tones & BE 5310 stereo record module w/all tones (3), mint cond, light use, $3000 ea. B Hawkins, WENS, 1099 N Meridian, Indianapolis IN 46204. 317-266-9700.

BE 3200RP w/all aux tones, FF & mic input, vgc, $950. L Snyder, Box 182, Floral Park NY 11001. 718-347-2940.

BE 3300RPS, like new, used 20 hrs, stereo R/P, no aux tone. L Snyder, Box 182, Floral Park NY 11001. 718-347-2940.

CCA-QRK cart play w/aux det, vgc, $150 or BO. W Hoisington, WTCG, 303 S Three-Notch St, Andalusia AL 36420. 205-222-8849.

Record amp for ITC 3-D cart machine, mono 3 tone, $500. D Doelitzsch, WDDD, 1 Bdct Ctr, Marion IL 62959. 618-997-8123.

BE cart winder w/timer, vgc w/manual, $275. B Hawkins, WENS, 1099 N Meridian, Indianapolis IN 46204. 317-266-9700.

UMC 10 mono R/P, very little use, $300 ea or BO; UMC 10 play only, very little use, $250. W Hoisington, WTCG, 303 S Three-Notch St, Andalusia AL 36420. 205-222-8849.

BE Spotmaster stereo, 3200 PS PB only, $1100; 3200 RPS R/P, $1900, both machines low hrs, excel cond, w/tones & auto FF. L Wagner, ARN Prod, POB 1788, Orlando FL 32802. 305-299-1299.

Sparta 4625 stereo R/P type A cart, remote control functions & sec tone, gd cond, new motor & heads, $525/BO. J Kramer, Video Mktg Srvs, Alpha Bldg Rm 523, Easton PA 18042. 215-253-8930.

Collins 642-2 cart player, tube type, w/record amp, gd cond, $60 plus ship. W DeFelice, CKXN, 621 Bishop Ave, Bridgeport CT 06610. 203-336-5606.

Tapecaster 700P mono PB, gd cond. I Baron, WCUA, Box 814 Cardinal Station, Wash DC 20064. 202-635-5106.

ITC 3D stereo 3 tones (4), $2200 ea; ITC RP stereo, 3 tones (2), $1700 ea. J Scherer, KIQI, 2601 Mission, San Fran CA 94110. 415-648-8800.

SMC record cart machine, mono. J Walters, KKJO, POB 166, St Joseph MO 64502. 816-279-6346.

BE 3200RPS (3); BE 3100P (2) play only immaculate. J Rockwell, MGC Corp, 904 Lakeside Dr, Lynchburg VA 24501. 305-744-9751.

ITC 3D mono w/3 tones, works fine, w/manual, $1700/BO. B Hawkins, WENS, 1099 N Meridian, Indianapolis IN 46204. 317-266-9700.

Gates Criterion R/P stereo w/150 Hz aux cue, rack mt, very low hrs, $200; Gates Criterion 80, stereo play, 150 Hz aux cue, cabinet, $250. J Boehm, WFYR, 3000 Olive Rd, Homewood IL 60430. 312-861-8100.

Spotmaster 2000 mono RP, mint cond, BO. J Phillips, WDCW, 414 Washington, Defiance OH 43512. 419-782-8591.

Viking (Telex) 35 cart, $100; 3M Contata 293AG tape player, needs repair, $60. E Davison, Multiplex Music, 135 N Illinois, Springfield IL 62702. 217-787-0800.

Rapid Cue PB mono cart machines (2) w/spare motor, in 19" rack; Spot-o-matic deck w/PB preamp, $75; $250 for both. F McCall, Performance Srvs, 1521 W St Mary's Rd, Tucson AZ 85745. 602-323-0901.

Want to Buy

McCarta MS-502 MK II amplifier module for McCarta cart player MS-502 MK II. C Lund, Cycle Snd & Video, 167 Madison, Waterbury CT 06706. 203-756-7761.

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 RP mono or stereo 3 tone in operating cond. R Roiseland, KMAJ, Box 4407, Topeka KS 66604. 913-272-2122.

Cart machines, stereo & FM audio processing equip. M Brasher, 216 Zenalona, Albuquerque NM 87106. 505-242-7163.

Gates or other brands, multiple-slot cart players, mono, automation connection, sec tone pref, working or in repairable cond, reasonable. W DeFelice, CKXN, 621 Bishop Ave, Bridgeport CT 06610. 203-336-5606.

Triple stack stereo cart machine, prefer w/tones. S Karwan, KCMJ, 490 S Farrell Ste C-202, Palm Springs CA 92262. 619-320-6818.

Gates 150 Hz cue amp & QC-150 for Gates Criterion. P Wayne, 4915 Heatherdowns #6, Toledo OH 43614.

CASSETTE & REEL-TO-REEL RECORDERS

Want to Sell

ITC 750 stereo recorder; Ampex 351 reel deck w/mono heads & Inovonics 375 solid state R/P elec. P Wells, KLZZ, 8665 Gibbs Ste 201, San Diego CA 92123. 619-565-6006.

Ampex 352 PB stereo, Ampex elect, BO. P Finken, KHHT, Box 1686, Minot ND 58701. 701-852-0361.

Ampex 352-2 stereo P/R w/Inovonics 375 elec, BO; Ampex 352 mono P/R, w/Inovonics 375 elect, BO. P Finken, KHHT, Box 1686, Minot ND 58701. 701-852-0361.

Gonnsett G50 swap Nortronics cart alignment tape for R/R align tape 7.5" reel, stereo. R Koch, WQFF, Box 5195, Greensboro NC 27435. 919-273-1385.

Nagra III (2), bought overseas, gd cond, $800 ea or $150/both. Mr. Eng, Aust Bdctg Comm, 1 Rock Plaza, NY NY 10019. 212-755-1177.

Otari ARS1000 (2) mint cond, 6 mos old, must sell, BO. B Williamson, WHVW, 435 Violet Ave, Hyde Park NY 12548. 914-471-9500.

Ampex 440A elec, also Teac 505 tube elect 2T w/1/4T play, 3-3/4 & 7-1/2 ips, needs some work, BO. R Tilkens, Ambient Recdg, 9622 52nd Ave, College Park MD 20740. 301-982-9288.

Ampex 601 in portable case, mono tube-type, BO. D Hastings, WKYB, POB 1000, Hemmingway SC 29554. 803-558-2558.

Otari MX 5050B (4), excel cond, $1100 ea. M Dibennedetto, Colony Comm, 401-277-7845.

Revox A77, $400; Pioneer RT-701, BO. C Hampton, WXBM, 1687 Quintet Rd, Milton FL 32470. 904-994-5357.

Revox PR99 MKII, brand new (3), BO. J Hebner, KVXO, E 2211 W Sprague, Spokane WA 99202. 509-534-1059.

Ampex 350 (4) mono, all in cabinets, in excel cond, BO. N Schnapf, Assoc Recording Studios, 10 Swirl Ln, Levittown NY 11756. 516-796-3698.

Scully 280 R-R 2 trk in Ruslang cabinet, gd cond, $595; Ruslang R-R cabinet, excel cond, $175. B Levine, The Flamingo Network, 411 S Woodward Ste 502, Bham MI 48011. 313-642-7426.

Technics SV-100 digital audio processor for R/PB, $500. B Graifman, 3111 Broadway-4E, NY NY 10027. 212-866-1099.

Revox A-77, 2 tk, w/manual, 3 3/4-7 1/2 ips, gd cond, $550 inc ship or BO w/PU. K Buckley, Group W Cable, 3970 N Milwaukee, Chicago IL 60641. 312-794-2174.

Ampex PR500 1/2", 7 trk data recorder, excel cond, transport speeds 15/16, 1-7/8, 3-3/4, 7-1/2, 15 & 30 ips, $4000/BO. Doug, POB 417, Springfield VA 22150. 703-922-7829.

Ampex 300 FT mono, in roll around cabinet, solid state elect, BO. S Morse, Morse Prod, 19 12th, Carle Place NY 11514. 516-334-5216.

Nagra 4.2 mono w/case & power supply, excel cont, $1800. S Morse, Morse Prod, 19 12th, Carle Place NY 11514. 516-334-5216.

Uher Report 4000S w/case, mic, power supply, etc, vgc, $300. L Waddington, Les Waddington Engr, 16 Garden City Rd, Noroton CT 06820. 203-655-2160.

Ampex AG350 4 trk, 1/2", $1200. D Hill, Dimension Snd, 358 Center, Jamaça Pl MA 02130. 617-522-3100.

Ampex 351-2 recorder, BO & high speed cassette duplicator, stereo, BO. H L Sewell, Oak Ridge Music Recdg Srvs, 2001 Elton Rd, Ft Worth TX 76117. 817-838-8001.

Tascam DX-8 8 chan NR, mint cond, $580. D Kocher, 1901 Hanover, Allentown PA 18103. 215-776-1455.

Revox A-77 R-R 2 trk recorder w/manual, 3-3/4-7-1/2 ips, gd cond, $550 includes shipping/$ negotiable w/pickup.

Revox A77 (2), R/P, gd cond, $400 ea; Sony TC-640 (2), R/P, bad switches, $75 ea; Sony TC-645 R/P, bad switches. R McDaniel, KJRG, 209 Meridian, Newton KS 67114. 316-283-1678.

Otari MX7308, 1" 8 trk very low hrs, excel cond, w/remote control, $5800. L Wagner, ARN Prod, POB 1788, Orlando FL 32802. 305-299-1299.

Ampex 2 trk (2); FT; 3 trk; 4 trk; 8 trk, w/selsync, BO. A Oliver, Lynn Oliver Studios, 304 W 89th, NY NY 10024. 212-874-7660.

Otari ARS1000 1/4", 2 chan 1/2 trk PB only, 7.5-15 ips, in Ruslang cabinet, practically new. J Green, WHPL, Stuart Ave, Garden City NY 11530. 516-222-7438.

Telex Magnacord 10-24, stereo, mint cond, w/portable cases, BO; Crown 800 mono, FT, vgc w/case, matching amp/speaker unit, 4 chan MicMix built in, BO. B Weiss, KLSI, 1722 Main, Kansas City MO 64108. 816-474-6400.

Scully 280 1" 8 trk, 1/2 & 4 trk heads, block inc synchmaster, custom roll around. T Cereste, Lightscape, 420 W 45th, NY NY 10036. 212-757-0204.

Scully 280B 1/2 4 trk, 15-30 ips, varipitch w/console, gd cond, $1500/BO. J Von Vleck, Aras Consulting, 2321 N Utah St, Arlington VA 22207. 703-524-5067.

Ampex ATR800 R-R, rack mount, BO. C McGinty, WMAK, 109 W 5th, London KY 40741. 606-864-7843.

MCI JH110C-8 w/autolocator, 3 transformerless elect, factory cabinet, $8200/BO. D Green, Wayes Snd Recdrs, 1956 N Cahuenga, Hollywood CA 90068. 213-466-6141.

Technics RSM85 cassette deck, under 200 hrs, $350. M Fiedler, Mayoney-Fiedler Prod, 5346 DuPont Ave, S Minneapolis MN 55419. 612-822-0013.

Ampex AG-350, 2 trk stereo, 7.5-3.75 ips, vgc in Ampex console, $750 plus ship; Scully 280, 2 trk stereo, 7.5-15 ips, gd cond, $750, wood console free; Marantz PMD-360 port stereo cass rec, 3 heads, dbl Dolby B, limiter, mic/line in, built-in monitor amps & speaker, AC/DC, like new, $250; Sony TC-142 prof port mono cass rec, 3 heads, mic/line in, AC/DC, gd cond, $125. E Helvey, Successtrax, POB 1357, Winchester VA 22601. 703-877-1191.

Pioneer R-R stereo machines (2), $375. A Loera, Anthony Bdct, 10419 Haddon, Pacoima CA 91331. 818-897-2688.

Nagra 3 studio portable R-R w/sync option, FT mono, $1000. V Ranieri, 354 Bloomfield, Caldwell NJ 07006. 201-226-4356.

Scully 14" PB R-R decks (2), suitable for prod or automation, excel cond, $500/BO. D. Workman, KPPL, RR 1 Box 203, Stockton IA 52769. 319-785-6069.

AKAI GX-600D, takes 10.5 reels, 7.5 & 3.75" speeds, 4 trk stereo, gd cond w/manual, $100 plus ship. M Gollub, WMJS, Box 547, Prince Frederick MD 20678. 301-535-2201.

Ampex AG440B 8 trk, mint cond, comp w/remote, $5500. Elsmere Music, Box 185, Bedford Hills NY 10506. 914-234-9201.

Ruslang RL600 (2) consoles for MX5050BII, $150. A Soroka, WJRO, POB 159, Glen Burnie MD 21061. 301-761-1590.

Technics SV-P100 digital audio cassette rec, BO. J Sulik, WGBA, 1145 Pine St, Green Bay WI 54305. 414-437-2626.

Ampex ATR102 1/2" 2 trk w/pedestal & remote, $4500; MCI JH110A (2) 1/4" 2 trk w/Lang cabinet, $1800 ea. B Nathan, Unique Recg Std, 701 7th, NY NY 10036. 212-921-1711.

Ampex AG440 recorders (2), mono, FT, $1000 ea. B Hunter, KIXE, Box 9, Redding CA 96099. 916-221-5800.

Tascam 32 (6) just removed from service, very clean. J Rockwell, MGC Corp, 904 Lakeside Dr, Lynchburg VA 24501. 305-744-8751.

Concord MK III 7" 1/4 trk, 3 spds, ferrite hds, gd cond, $85; Sony TC-366 7" 1/4 trk, 3 spds, gd cond, $89; Ampex AG-355 serv manual, BO. W Laughlin, KDCV, 2636 N 56, Lincoln NE 68504. 402-466-8670.

Crown SP722 tape deck, play only, w/manuals & some spares, stereo 2 trk, works well, $300. J Boehm, WFYR, 3000 Olive Rd, Homewood IL 60430.

Nagra 4.2L sync recorder w/7" reel cover, $3500; 4S stereo sync w/7" recorder, $3800. S Smith, Chicago Audio, 1005 W Webster, Chicago IL 60614. 312-327-5533.

Dolby 330 2 chan stereo tape dup unit w/B-type (consumer) NR char, excel cond, $950. G Lewis, Lewis Recdg, 216 S Pershing, Arlington VA 22204. 703-521-1871.

Studer A810, (2) 2-2 R-R decks, $5000 ea. M Hieb, KLTQ, 329 E 200 S, Salt Lake City UT 84111. 801-533-9305.

Teac 80-8 w/DX8, patch cords, align tape manual & console, excel cond, $2500. H Saunders, Music Shop Recdg, 1114 Riveria Dr, Greensboro NC 27406. 919-273-9892.

Ampex 351-2 (10), all guar within specs, buyer pick up, 2 trk, $200 & 2 trk play only, $150; Scully 280 (2), 8 trk w/cabinet in gd cond; also 2 trk w/o cabinet in working cond, $1750 for both. I Kaufman, Natl Recrd, 460 W 42nd, NY NY 10036. 212-279-2000.

Scully 284 2TS in console, new heads, $1500; Ampex 351 FT, needs heads, BO; Tascam 48, new, $3000. W Priest, Classic Snd & Recd, 1249 Bayshore Blvd, Dunedin FL. 813-736-4474.

Scully 280-4 in console, align tape, service manual, trade for Nagra stereo, write only. J Neuman, Industrial Announcer, POB 7703, Atlanta GA 30357.

Tascam 80-8 w/dbx & roadcase plus 20 reels 1/2" tape, used, $3000. B Johnson, Rejoice Recording, POB 45, Rainier OR 97048. 503-556-4052.

Ampex PR10 FT, CL-10 deck, spare motor, 2 sets elec, $100. B Dudley, Location Snd, 6919 19th St, Tampa FL 33610. 813-237-6516.

Ampex 350 FT mono w/Inovonics 375 elec, $750; Scully 284-8 1" 8 trk w/remote & rolling cabinet, $2500. A Grunwell, Calf Audio, 157 Gray Rd, Ithica NY 14850. 607-272-8964.

24 trk machine, converts to 16 trks, 15 or 30 ips, $12,500. R Robinson, TNA, 10 George St, Wallingford CT 06492. 203-269-4465.

Ampex 351 reel machine R/P stereo. J Walters, KKJO, POB 166, St Joseph MO 64502. 816-279-6346.

Tape-A-Thon librarian tape player system, (2) 702-10 bi-directional decks, interspercer, pwr amp, in rack cabinet, call for details. D Beatty, Beatty Televisual, 1287 Wabash, Springfield IL 62704. 217-787-4855.

Ampex 601 w/port case, working gd, heads fair, $250; Tape-A-Thon 702-10 R-R, works gd, $200; other Tape-A-Thon parts & chassis avail. E Davison, Multiplex Music, 125 N Illinois, Springfield IL 62702. 217-787-0800.

Ampex AG-440, 4 trk in Ampex roll-around console w/comp extra AG-440 transport w/two 2 trk head stacks, all heads in vgc, EQ card components matched, w/orig manuals & some spares, $2200; Ampex 351/440 2 trk, Accurate Sound 351 upgraded transport w/AG-440 electr, matched EQ components, no case, heads in vgc, $800. B Skye, Skyelabs Inc, 58 W Tidbury Dr, Dover DE 19901. 302-697-6226.

Revox A700 remote cont w/LEDS, $100; A700 parts/serv man, $10; A700 dust cover, $10; hubs & various parts & PR99 serv man, $10; B710 cass deck full doc remote cont & carton; Studer A810 w/wood panels & full doc, $4200; Teac 3440 dust cover, $10. R Cannata, Cantrax Recorders, 2119 Fidler Ave, Long Beach CA 90815. 213-498-6492.

Sony 777-4 portable R-R w/remote control, excel cond, $250 plus ship or trade for gd quality 10-1/2" reel, stereo or mono, 7-1/2 & 3-3/4 ips, 1/2 trk portable recorder. S Barkett, WPQR, RD2 Box 91, Hopwood PA 15445. 412-438-2336.

Teac DX-8 8 chan NR, excel cond, $580. D Kocher, 1901 Hanover Ave, Allentown PA 18103. 215-776-1455.

RW Broadcast Equipment Exchange

CASSETTE . . . WTS

Revox A77, 2 trk, 15 ips w/new heads, excel cond, $550/BO. H Landsberg, Henry Eng, 503 Key Vista Dr, Sierra Madre CA 91024. 818-355-3656.

Want to Buy

Tapesonic 70 TRSH stamped metal head cover, 15 ips bushing cast metal lower head cover, original knobs for electr & reel hold-down for 10-1/2 reels. C Lund, Cycle Snd & Video, 167 Madison, Waterbury CT 06706. 203-756-7761.

Otari DP4050-OCK cassette duplicator. C Hertzburg, Kinura Records, Box 660236, Miami Springs FL 33166. 305-887-5329.

Stereo PB decks, 2 trk, automation compatible, rack mount, working or repairable, reasonable. W DeFelice, CKXN, 621 Bishop Ave, Bridgeport CT 06610. 203-336-5606.

CONSOLES

Want to Sell

Shure SE30 mixer, rackmount, gd cond, $300; McMartin LX-40A mixer, works, as is, $50; Biamp 2442, custom roadcase, vgc, $2700 plus ship. CK Bucy, Cisco Snd, Box 16583, Lubbock TX 79490. 806-763-3537.

Autogram, BE, UREI studio consoles, new. Let BAI bid on your needs. Broadcast Automation, 4125 Keller Springs, No. 122, Dallas TX 75244. 214-380-6800.

Altec 600/600 sliding faders, 15 single, 1 double & double rotary, removed from operating console, entire lot for $50. I Kaufman, Natl Recd Stds, 460 W 42nd, NY NY 10036. 212-279-2000.

Ramko DC-8M 8 chan, 18 inputs, completely rebuilt, proof measure provided, $1200. C Bryson, Comserve, 93 Robinhood Dr, Zeliemople PA 16063. 412-776-5204.

Autogram AM8, BO. B Hughes, POB 649, Palestine TX 75801. 214-729-6077.

Langevin AM 16 preamp; AM 17 prog amp; EQ 251-A EQ's; PS 221 power supplies, mounting trays & instruction books, excel cond. B Anderson, Anderson Prod, 11557 Sunshine Terr, Studio City CA 91604. 818-769-6569.

Electrodyne/Cetec SM-9 modules, 9 switches, 8 buses, 1 solo button (20), BO. R Robinson, TNA, 10 George, Wallingford CT 06492. 203-269-4465.

Spotmaster stereo 5 chan w/preamp, schematics & manual, vgc, $900. K Harris, WPWC, POB 189, Dumfries VA 22026. 703-221-1124.

Soundcraft Series II, 16×8×16, $3500. T Bartlett, North Country Snd, 175 Bunker Hill Rd, Auburn NH 03032. 603-483-2662.

McMartin B-801, B-501, B-801 mono 8 ch w/spare parts inc B-501 mono 5 chan. R Gwyn, WLFA, Box 746, Layfayette GA 30728. 404-638-3276.

Melcon 1731 opamps (26) & 8 API 2520, removed from operating console, $100. I Kaufman, Natl Recd Stds, 460 W 42nd, NY NY 10036. 212-279-2000.

McCurdy 7600 19 chan board, mint cond, stereo, $5000. A Loera, Anthony Bdct, 10419 Haddon, Pacoima CA 91331. 818-897-2688.

Interface 200, 8 in 2 out w/EQ, pan & echo send on ea input, 600 out, in rugged alum case, remote or prod console, $600; McMartin Accu-Five, 5 chan, mono console, 19" rack mt, cue buss, moni, cue, & TB amps, 13 input cap, like new, $600, w/UREI LA-5 leveling amp, $850. E Helvey, Successtrax, POB 1357, Winchester VA 22601. 703-877-1191.

Opamp Labs 2008-4E, 20 in 10 out, gd cond, $6500. L Wagner, ARN Prod, POB 1788, Orlando FL 32802. 305-299-1299.

Ampro Micro Touch 5 chan stereo, gd cond, $1500. M Persons, WCMP, RR 2, Pine City MN 55036. 218-829-1326.

Gatesway mixer board w/power supply, 10 ch mono, fair cond. I Baron, WCUA, Box 184 Cardinal Station, Wash DC 20064. 202-635-5106.

BE 8M150, mono 8 chan rotary, gd cond, w/manual, $1500. R Laine, United Cable of CO, 4757 S Salida Ct, Aurora CO 80015. 303-680-1910.

Howe 9000 Series stereo console, 30 input sources, all elect w/slide faders, less than 2 yrs old, gd cond, $7500/BO. A Sutton, WMGA, POB 1380, Moultrie GA 31776. 912-985-1130.

Sound Workshop 1280B, excel cond w/Anvil case, $1350, w/o case, $1000. B Skye, Skyelabs Inc, 58 W Tidbury Dr, Dover DE 19901. 302-697-6226.

Gates Studiocette 80, 4 pot 12 in, not in service, BO. J Phillips, WDCW, 414 Washington, Defiance OH 43512. 419-782-8591.

Howe 9000 Series, 30 input slide pot, gd cond, BO. A Sutton, WMGA, POB 1380, Moultrie GA 31776. 912-985-1130.

Altec 250A tube type console w/table, 9 in 2 out w/cue, gd cond, $750. B Woolf, Fidelity Sound, 3986 Edidin Dr, Jacksonville FL 32211. 904-744-1661.

Cherokee 300 8 pot mono console w/2 spare modules. J Walters, KKJO, POB 166, St Joseph MO 64502. 816-279-6346.

Tascam 5 16 chan stereo, $1200. B Johnson, Rejoice Recording, POB 45, Rainier OR 97408. 503-556-4052.

Gates 10 chan stereo, gd cond, w/spares & manual, $900. G Stevens, KFXY, 409 Duke St, Morgan City LA 70380. 504-384-1430.

Tascam 5 23 input, 8 chan, vgc, no T/B module, $900. J Boehm, WFYR, 3000 Olive Rd, Homewood IL 60430. 312-861-8100.

Tascam 30 4 chan, like new, $1000. T Stoller, 2320 Eade Ave, Ft Wayne IN 46805. 219-484-7390.

Sound Workshop series 30 wired to XLR panel 18×3×2; one wired to panel 20×8×2 w/10 stereo modules, perfect cond; Hill B Series 15×8×2 w/snake to XLR panel, factory mod for bdct. J Rockwell, MGC Corp, 904 Lakeside Dr, Lynchburg VA 24501. 305-744-9751.

Want to Buy

Solid state production console. C McGinty, WMAK, 109 W 5th, London KY 40741. 606-864-7843.

Stereo board, 6-8 chan, solid state pref, working or repairable cond, w/manuals, reasonable. W DeFelice, CKXN, 621 Bishop Ave, Bridgeport CT 06610. 203-336-5606.

Collins 1C-6. R Kramer, KSOR, 1250 Siskiyou Blvd, Ashland OR 97520. 503-482-6301.

Ross SMC803, need service manual only. JW Shepard, 539 Westminister Ln, Salem VA 24153. 703-389-1670.

DISCO & SOUND EQUIP.

Want to Sell

Roseberry freq shifter, ±5 Hz, voice range, $50. R Robinson, TNA, 10 George, Wallingford CT 06492. 203-269-4465.

CL&S Levi bass cabinets, w/extentions, Gauss speakers, (8) $450 ea plus ship; CL&S RH-60 Gauss 4000 (6), $250 ea plus ship; JBL N500 crossover, $250; Altec 811 horn w/806A driver, gd cond, $95. CK Bucy, Cisco Snd, Box 16583, Lubbock TX 79490. 806-763-3537.

Carvin 2029 EQ (2) less than 1 yr old, 1/3 octave EQ's, $250 ea. R Dietterich, WLTJ, 1051 Brinton, Pgh PA 15221. 412-244-7600.

GLi 5990 production controller/mixer, new, factory boxed, shipped prepaid freight upon receipt of first $850 check. F Luppino Jr, Marketing Insights, 1445 Sunset Ridge, Glenview IL 60025. 312-729-2047.

Recording Studio, 8 trk, all pro gear, tape machines almost new, Scully, Neumann, Crown, McIntosh etc, sacrifice price, $7500 for all. WC Burchitt, Bur-K Inc, 842 Bellefonte Princess Rd, Ashland KY 41101. 606-324-8812.

EMT 140 reverb unit in gd working cond w/inst, you pick-up, $850. I Kaufman, Natl Recrd, 460 W 42nd, NY NY 10036. 212-279-2000.

MXR digital delay, $250. D Kocher, 1901 Hanover, Allentown PA 18103. 215-776-1455.

Valley People rack, 3 gain brains, one Maxi Q, excel $1000; Accesit noise gates 3 chan w/PS, $250. D Kocher, 1901 Hanover, Allentown PA 18103. 215-776-1455.

Echoplate 2, BO. H L Sewell, Oak Ridge Music Recdg Srvs, 2001 Elton Rd, Ft Worth TX 76117. 817-838-8001.

Thiel 03A speakers, $700/pr. B Graifman, 3111 Broadway-4E, NY NY 10027. 212-866-1099.

Ursa Major digital reverb, $850; Delta Lab DL-2 accustic computer, $850; Marshall 5002, time modulator, $900, all excel. D Kocher, 1901 Hanover, Allentown PA 18103. 215-776-1455.

Altec 604C Cab (2) speakers, $400. A Oliver, Lynn Oliver Studios, 304 W 89th, NY NY 10024. 212-874-7660.

MXR pitch transposer w/display & foot switch, original boxes, perfect, $600. R Robinson, TNA, 10 George, Wallingford CT 06492. 203-269-4465.

Vanco MM-7, stereo/mono audio prod/disco mixer, 2 mic inputs w/pan, 2 TT inputs, 2 line/tape inputs, cue buss, $125. E Helvey, Successtrax, POB 1357, Winchester VA 22601. 703-877-1191.

Technics SB7000 time aligned speakers, $400/pr. L Synder, Box 182, Floral Park NY 11001. 718-347-2940.

Altec Lansing Voice of Theatre speakers & studio monitors, BO. J Phillips, WDCW, 414 Washington, Defiance OH 43512. 419-782-8591.

Eventide HM-80 Harmonizer, special effects, reverb & pitch change, never used, $500. T Brazil, WRUP, 832 W Washington, Marquette MI 49855. 906-228-6800.

Lexicon Prime Time II dual tape digital delay, mint cond, $800. W Whitney, Sub Sound, 2232 Wengler, Overland MO 63114. 314-429-2858.

Altec W horn cabinets (4), $750 ea. A Grunwell, Calf Audio, 157 Gray Rd, Ithica NY 14850. 607-272-8964.

BTX 4500 (2) synchronizers, excel cond, $1000 or $1750/both. I Kaufman, Natl Recdg, 460 W 42nd, NY NY 10036. 212-279-2000.

MicMix XL-305 room reverb, stereo send & return w/3 bands of EQ, vgc, $350. B Skye, Skyelabs Inc, 58 W Tidbury Dr, Dover DE 19901. 302-697-6226.

JBL 4301, 1 pair, gd cond, $300/pair. H Underwood, Underwood Audio, 34 Aviation Way, Atlanta GA 30341. 404-457-1263.

Delta Lab DI-2 stereo delay, $850; MXR digital delay, $275; Ursa Major digital reverb, $900, all in mint cond. D Kocher, 1901 Hanover Ave, Allentown PA 18103. 215-776-1455.

Comp 8 trk set up, inc Teac 80-8 w/dbx, Tascam 35-2 w/dbx, mdl 10 mixer MicMix reverb, patchbay, etc., will sell separately, $3400. B McPeek, Mirror Image, 619 S Main, Gainesville FL 32601. 904-376-1688.

Want to Buy

SEAS tweeters, to fit Dynaco A-35 speakers, new/used or blown okay; also working or blown A-35 speakers. A Tucker, Foothill Prod, 70 W 83rd, NY NY 10024. 212-879-0973.

API 550, Pultec, Sontec EQ's. D Kocher, 1901 Hanover, Allentown PA 18103. 215-776-1455.

Older speakers by JBL, Altec, Jensen, Tannoy, WE. C Dripps, Kurlaff Enter, 4331 Maxson Rd, El Monte CA 91732. 818-444-7079.

Dolby B encoding system. F Forest, Musical Star Streams, POB 44, Mill Valley CA 94942. 415-383-STAR.

LIMITERS

Want to Sell

Dorrough 310 comp/exp w/AM peak limiter card, tri-band unit, $700. A Caswell, C&G Bdctg, Box 171, Linden MI 48451. 313-735-4545.

CRL audio processing equipment, great prices on the full line. FM4G in stock for immediate delivery. Broadcast Automation, 4125 Keller Springs, No. 122, Dallas TX 75244. 214-380-6800.

Delta AME-1 AM mod controller (2), one complete, one for parts, $300/both. R Dietterich, WLTJ, 1051 Brinton, Pgh PA 15221. 412-244-7600.

DAP 310 AM Compressor/Limiter, looks gd, snds fine, just removed from service, $500/BO. J Whitmer, WNBS, POB 1340, Murray KY 42071. 502-759-1300.

Gates Sta-Level compressor, needs some work, $50 plus ship. K Harnack, 895 Mt Rushmore, Richmond KY 40475. 606-624-2181.

CBS Volumax 400 excel cond, $95, call after 6PM CDT; CBS FM Volumax Stereo 411, excel cond, call after 6PM CDT, $150. R Moen, Radio Srvs, 402-334-8767.

UREI BL-40 Modulimiter, appears to work fine, specs-out OK, w/manual, $300. K Harnack, WPAD, POB 450, Paducah KY 42001. 502-442-8231.

Orban 8100ST studio chassis for FM, $600; Orban 8100 AXTZ, 6 band processor for FM, $2000. H Ginsberg, WXXX, 150 Kennedy Dr, S Burlington VT 05403. 802-863-4487.

CBS Audimax Stereo, looks like 400 series, cond unknown, $200 plus ship. J Whitmer, WNBS, POB 1340, Murray KY 42071. 502-759-1300.

Volumax FM 4110 & Audimax 4450A, BO. C Hampton, WXBM, 1687 Quintet Rd, Milton FL 32470. 904-994-5357.

Harris MSP-90 stereo AGC, $800/BO. R Dietterich, WLTJ, 1051 Brinton, Pgh PA 15221. 412-244-7600.

Harris MSP100 FM audio processor, recent factory updates, excel cond, $1200. J Gerlkey, KRES, 300 W Reed, Moberly MO 65270. 816-263-1600.

Harris MST90 tri-band AGC, limiters & main frame, $1000; Harris AM 80 mod mon w/175% PK indicator, $300. T Hawks, Radio Bdctg Srvs, Box 8316, Amirillo TX 79114. 806-372-4518.

Volumax 400; Volumax 411 stereo for FM; Dorrough DAP-310 FM audio processor, missing Lo EQ card, w/extra FM peak limiter PCB; Inovonics 215 processor w/chassis, pwr supply & basic output card. P Wells, KLZZ, 8665 Gibbs Ste 201, San Diego CA 92123. 619-565-6006.

Aphex Compellor, $900. B Anderson, WRCN, 72 W Main, Riverhead NY 11901. 516-727-1570.

CBS Labs Volumax 4110, gd cond, $100/BO. B Weeks, WBFL, POB 107, Bellows Falls VT 05101. 802-722-4890.

Orban 424A studio Optimod, $750 or trade for Aphex stereo Compellor. B DeFelice, DeFelice Consulting, 621 Bishop, Bridgeport CT 06610. 203-336-5606.

Distributor Directory

The following distributors serving the broadcast industry would be glad to help you with any of your requirements.

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RW Broadcast Equipment Exchange

LIMITERS . . . WTS

CBS Audimax 4450A stereo in mint cond, $600; CBS Volumax 411 stereo in mint cond, $300. J Michaels, WZZK, 530 Beacon Pkwy W, Birmingham AL 35209. 205-942-7800.

CRL AM processing system inc APP-300A, SEP-400A, PMC-300A, $1600; UREI 527-A graphic EQ, $250. M Ripley, KOZE, Box 936, Lewiston ID 83501. 208-743-2502.

dbx 162 compressor limiter, stereo balanced in & out, excel cond, $550. L Wagner, ARN Prod, POB 1788, Orlando FL 32802. 305-299-1299.

UREI LA5, same as LA4, brushed alum panel, w/rack mount, $300. E Helvey, Successtrax, POB 1357, Winchester VA 22601. 703-877-1191.

EMT PDM 156 limiter/compressor, like new cond, $2500. A Zentz, Zentz Recdg, 688 S Santa Fe #205, LA CA 90021. 213-683-1096.

Orban Optimod 8100A, 18 mos old, $3500. K Thomas, Thomas Bdctg, Box 1146, Ardmore OK 73402. 405-226-2524.

CBS 4450A AGC & matching FM limiter, both vgc, $250 ea or BO. W Hoisington, WTCG, 303 S Three-Notch St, Andalusia AL 36420. 205-222-8849.

CBS Labs 411 FM stereo Volumax, upgraded w/low-noise components, recently aligned, excel cond w/comp doc, $185/BO plus ship. W DeFelice, CKXN, 621 Bishop Ave, Bridgeport CT 06610. 203-336-5606.

Universal audio limiter, $200. B Hunter, KIXE, Box 9, Redding CA 96099. 916-221-5800.

CRL AM system SPP800, SEP400A, PMC300A, used 1.5 yrs, $3000. C Prim, KURL, 636 Haugen, Billings MT 59101. 406-245-3121.

Altec A332C limiter amp w/P511 power supply, serial #53, $30. B Skye, Skyelabs Inc, 58 W Tidbury Dr, Dover DE 19901. 302-697-6226.

Aphex Compellor limiter, excel cond, boxed w/manual, $900. J Alan, WMMS, 517 W Giles Rd, Muskegon MI 49445.

Dorrough 610, w/all latest factory mods, $2700. A Soroka, WJRO, POB 159, Glen Burnie MD 21061. 301-761-1590.

CRL AM4 mono, excel cond, factory refurbished, 2 yrs old, BO. J Saunders, WLIM, 45 Pennslyvania Ave, Medford NY 11763. 516-475-1580.

Inovonics 215 audio processors, includes gated AGC, compressor & FM peak controller modules (2), excel cond, $800 ea. T Hemingway, WGAJ, Box 248, Deerfield MA 01342. 413-773-9649.

Gates Solid Statesman FM limiters (2). J Walters, KKJO, POB 166, St Joseph MO 64502. 816-279-6346.

UREI LA4's, stereo blackface w/rackmount & manual, work fine, $550. B Hawkins, WENS, 1099 N Meridian, Indianapolis IN 46204. 317-266-9700.

Orban 422A current mod comp gated lim, BO; UREI BL-40 Mod-u-Limiter, $250/BO. J Phillips, WDCW, 414 Washington, Defiance OH 43512. 419-782-8591.

Inovonics MAPII •No397. 7 yrs old, gd cond w/manual, $600/BO. J Mason, KJMB, 2222 Kansas Ave Ste L, Riverside CA 92507. 714-682-2222.

CBS Audimax III. J Walters, KKJO, POB 166, St Joseph MO 64502. 816-279-6346.

Want to Buy

Pacific Recorders Multimax, AM or FM. D Davis, KMIN, POB 980, Grants NM 87020. 505-287-2989.

Stereo AGC or compressor/limiter for FM processing, working or repairable cond, must have manuals, reasonable. W OeFelice, CKXN, 621 Bishop Ave, Bridgeport CT 06610. 203-336-5606.

MICROPHONES

Want to Sell

Sony ECM56F (2) electret condenser, phantom or battery mic, $200 ea; Sony ECM33F phantom or battery power mic, $100 ea. J McComb, Boogie Bdct, 820 N Lasalle, Chicago IL 60610. 312-328-8494.

AKG 224E excel, $140. D Kocher, 1901 Hanover, Allentown PA 18103. 215-776-1455.

Luxo mic booms (3), $35 ea. H Ginsberg, WXXX, 150 Kennedy Dr, S Burlington VT 05403. 802-863-4487.

Shure, EV, Telex, M67, 635A, CS91A, $400 for all. S Strouf, Sound Inovations, 8705 Albien Ct, Tampa FL 33634. 813-886-3150.

EV RE-20 (2), gd cond, $225 ea; Shure SM-54 (2), gd cond, $125 ea; Shure SM-53, gd cond, $125; EV RE-16 (3) switched flat, fair cond, $95 ea; RCA 77D (2) work, fair-poor cond, $150 for both. CK Bucy, Cisco Snd, Box 16583, Lubbock TX 79490. 806-763-3537.

RCA 44BX, (2), $275 ea; (2) 770DX, $400 ea; 77, $595, all w/stands & booms; Neumann U-47, $1200. A Oliver, Lynn Oliver Stds, 304 W 89th, NY NY 10024. 212-874-7660.

Neumann U47 (3) mics. C Hertzburg, Kinura Records, Box 660236, Miami Springs FL 33166. 305-887-5329.

Sennheiser MKH 405 & 404 mics w/power supplies & cables, both need work, offer or trades. R Robinson, TNA, Box 57, Wallingford CT 06492. 203-269-4465.

AKG 224E, $200 ea; RE20, $225, mint cond. D Kocher, 1901 Hanover Ave, Allentown PA 18103. 215-776-1455.

Shure SM-81 condenser mics (2) plus AC PS to trade for 1 Neumann U-87. Shure's in mint cond. J Newman, Sound Results, POB 7703, Atlanta GA 30357.

WE 633 historic mics from UN, will trade for other old mics, $50; 24A table stand, $50. R Van Dyke, Squires Ave, E Quogue NY 11942. 516-728-1327.

AKG 224E, dynamic mics (3), $285 ea, excel cond. G Lewis, Lewis Recdg, 216 S Pershing, Arlington VA 22204. 703-521-1871.

RCA 77-D, excel; RCA MI 4048-D, gd cond, both $275. D Kocher, 1901 Hanover, Allentown PA 18103. 215-776-1455.

AKG NR-4288 w/CK-9 condenser mic, PS, handle & case; HMR WM-152A wireless mic in Anvil case. S Dodson, Desert West, 1870 W Prince Rd #48, Tucson AZ 85705.

Sennheiser MKH-416 P48 w/Rycote windscreen, $500. S Smith, Chicago Audio, 1005 W Webster, Chicago IL 60614. 312-327-5533.

Sony ECM56FP condenser, like new, $125 ea or $200 for two; Edcor wireless mike system w/EV C090 lavalier mike & xtal controlled rcvr, $250; AKG D110 lavalier mike, $50; Shure Voice Gates (4) on rack panel, $50 ea or all for $125. E Davison, Multiplex Music, 125 N Illinois, Springfield IL 62702. 217-787-0800.

Turner 2302 dynamic new in box $30; Turner 450D paging mic, new $10. W Laughlin, KDCV, 2636 N 56, Lincoln NE 68504. 402-466-8670.

Want to Buy

AKG CK4 capsules; sell Sennheiser MKH416T w/windscreen & T48 converter, $425/BO. R Tilkens, Ambient Recdg, 9622 52nd Ave, College Park MD 20740. 301-982-9288.

Old bdct & rec mics, parts, station name plates, stands. R Van Dyke, Squires Ave, E Quogue NY 11942. 516-728-1327.

Mic w/sound similar to EV RE-20, will pay up to $100. P Wayne, 4915 Heatherdowns #6, Toledo OH 43614.

MISCELLANEOUS

Want to Sell

Mitsubishi P50U printer for video, 3-1/4×4" printers from video inputs w/4 rolls of printer paper, demo use only, $75. B Watrous, Watrous Prod, 745 S Orange Ave, Sarasota FL 33577. 813-366-3316.

Misc gear: including oscillators; limiters; AM xmtr; printers; amps; consoles & much more, call for details. L Lindstrom, WPOK, 315 N Mill, Pontiac IL 61764. 815-844-6101.

Walnut finish racks, (3) wall mount, holds 100 carts, $45 ea. L Snyder, Box 182, Floral Park NY 11001. 718-347-2940.

Stabiline EMS64275YC, never used, $20,000/BO; Aerovent PB12B-3 blower, never used, $300/BO; Electro Impulse 20 kW, never used, $1700/BO. L Maines, Quincy Prod, 707 S 18th, Quincy IL 62301. 217-222-5267.

Alden 9271 D/H/AEC facsimile recorder for NWS map repro by satellite or landline, 4 yrs old, 24 hr clock & stand, 30 rolls of paper & spare blade, BO. C Lewis, KLMS, 1540 S 70th, Lincoln NE 68506. 402-489-6500.

Cabinet, 19"×62"×21" depth inside dim, full rear door, 2/3 front door, cutouts for filters, BO plus frgt. C Zalemski, EDS Comm Service, POB 92, Johnson City NY 13790. 607-798-7111.

Atlas gas detector, works well, $25. J Cunningham, YSDA, Rt 2 Box 113B, Stonewall OK 74871. 405-265-4496.

Symetrix 104 telephone interface system, like new, 3 mos old, $800. B Bereman, WPAD, POB 450, Paducah KY 42001. 317-297-1300.

Symetrix TI-101 telephone interface, never used, great cond, $300. D Walker, KTAM, 1240 Villa Maria Rd, Bryan TX 77805. 409-776-1240.

RCA 19" equip rack. J Walters, KKJO, POB 166, St Joseph MO 64502. 816-279-6346.

AT&T desk phones (3) 5 lines & hold for 1A2 system, $75 ea.; T159 w/printer, dozens of programs, w/carry case & ext printer paper, $85; shipping crate for Harris Executive console, $25. L Snyder, Box 182, Floral Park NY 11001. 718-347-2940.

Wood cart rack, 100 slot, pecan finish, new, $80; 40 slot pecan finish, new, $35. J Boehm, WFYR, 3000 Olive Rd, Homewood IL 60430. 312-861-8100.

Parts, large box inc tubes, IC's, caps, resistors, hardware, multimeter, tools, RF & AF connectors, $25 plus $5 ship. C Daniel, KNCB, Box 1072, Vivian LA 71082. 318-375-3279.

Tellabs 248RF housings (4) w/4008 cards, power supplies & repeat coils, $250/set PPD. D Gilliam, KJZZ, 1435 S Dobson, Mesa AZ 85202. 602-969-9099.

Micro-Trak M72 lazy susan cart rack, $29. A Soroka, WJRO, POB 159, Glen Burnie MD 21061. 301-761-1590.

Okidata U82A printer, like new, dot matrix, $200. J Cunningham, YSDA, Rt 2 Box 113B, Stonewall OK 74871. 405-265-4496.

Electro Sound 1800 cassette loader, 300 DPS, fully automatic, $2500. B Woolf, Fidelity Sound, 3986 Edidin Dr, Jacksonville FL 32211. 904-744-1661.

Adtech Brute III power supply (2), excel, $200 ea; high voltage power supply components, $35; dual voltage, regulated, wired & working, $50/BO on all; Tie Key telephones, new, $50; Econ-Key 300 touch tone, $100. E Davison, Multiplex Music, 135 N Illinois, Springfield IL 62702. 217-787-0800.

Advent 1000 video projector, trade for 35mm projector; Canon 10×1 lens for RCA TK-76 camera. S Dodson, Desert West, 1870 W Prince Rd #48, Tucson AZ 85705.

TTC/Wilkinson SIA-1, brand new surge protector, $500/BO. S Skikker, KDNK, POB 1388, Carbondale CO 81623. 303-963-0139.

Want to Buy

Want to talk to anyone getting audio Hits from SA-9000 system. J Schloss, KICD, 2600 Hiway Blvd, Spencer IA 51301. 712-262-1240.

Fixed mica caps, 002 5 kV, 510 μF (10), 120 μF, 3300 μF all at 2,500 V, .018 600 V, .01 10 kV, 2D21 tubes, $5 ea or you decide. S Weber, KGRV, POB 1598, Winston OR 97496. 503-679-8185.

Deisel electric gen, around 50 kW. A Weiner, Weiner Bdct, 4 Second St, Presque Isle ME 04769. 207-764-8300.

Schematic and/or service manual for Fisher 90T receiver. M Johnson, KCYX, POB 207, McMinnville OR 97128. 503-472-2151.

Fixed mica caps, 0.002 5 kV, 510 mmf (10), 120 mmf, 3300 mmf, all at 2,500 V, 0.018 600 V, 0.01 10 kV, 2D21 tubes, $5 ea/BO. S Weber, KGRV, POB 1598, Winston OR 97496. 503-679-8185.

Service manual for Sony SEG-1 special effects gen. L Auman, Auman Recdg, Rt 1 Box 368, Dover OH 44622. 216-343-2297.

MONITORS

Want to Sell

Belar AMM1, $750. B Jeffreys, WYBR, 2830 Sandy Hollow Rd, Rochford IL 61109. 815-874-7861.

Nems-Clark 112 phase monitor w/remote panel; McMartin TBM-2500 FM RF amp for mod monitor. P Wells, KLZZ, 8665 Gibbs Ste 201, San Diego CA 92123. 619-565-6006.

Belar AMM-3 mod monitor, excel cond when removed, set for 1520. C Jednorski, WTRF, Box 248, Brunswick MD 21716. 301-694-8111.

Rust SFM 19 monitor, BO. C Hampton, WXBM, 1687 Quintet Rd, Milton FL 32470. 904-994-5357.

Harris STS-1 AM stereo monitor, perfect cond, never used, $465. L Maines, Quincy Prod, 707 S 18th, Quincy IL 62301. 217-222-5267.

McMartin TBM 2200A stereo monitor FM; TBM 4000A SCA monitor; TBM 2000A, won't sell separately, $1500 firm. B Coleman Jr, Coleman Bdctg, 114 Circle Dr, Rocky Mtn NC 27804. 919-443-7870, aft 5PM.

Tek RM 529 waveform monitor, gd working cond, $500. V Ranieri, 354 Bloomfield, Caldwell NJ 07006. 201-226-4356.

McMartin TBM-3700 baseband FM main chan mod mon; TBM-2500C FM-RF amp. Goodrich Ent, 11435 Manderson, Omaha NE 68164. 402-493-1886.

Gorman Redlich EBS-2 comp EBS encode-decode w/rack mt tuner. J Phillips, WDCW, 414 Washington, Defiance OH 43512. 419-782-8591.

McMartin TBM 3500 FM mod monitor, $100. H Husbands, 6626 Talmadge Ln, Dallas TX 75230. 214-233-6351.

Want to Buy

FM baseband & composite mod monitors, solid state, working or in repairable cond. W DeFelice, CKXN, 621 Bishop Ave, Bridgeport CT 06610. 203-336-5606.

Employment

To place ads in this section, use the Action-Gram form. To respond to box numbers, write Radio World, Box 1214, Falls Church VA 22041, Attn: __.

POSITIONS WANTED

News pro avail now, looking for small/med ND position. Phil, 216-882-3387.

DJ experienced in top 50 market & in the industry since 1962 seeks large or medium market on-air position, currently OM & CE in small market. Write to: Radio World, POB 1214, Falls Church VA 22014. Attn: Box 10-1.

Tech oriented person seeks bdct engr position. ISCET, CET, genrl, amateur license, HBO MDS exper, NBN CE, exper studio repair & maint. M Rakoff, 114-41 Queens Blvd Ste 148, Forest Hills NY 11375. 718-591-0002.

Video tech desperately seeking a PT/FT position in Colorado, will take anything, salary req 18-20K w/benefits, 9 yrs exper, college grad, military training. S Smith, 9645 W Ohio Dr, Lakewood CO 80226. 303-985-7485.

Seeking group chief position, 19 yrs exper in major market (15 yrs as CE) AM stereo/DA, FM, STL, RPU, satellite, studio/Tx construction. FCC, SBE certified. Also commercial pilot. Write to: RW, POB 1212, Falls Church VA 22041. Attn: Box 12-1.

CE Radio, general, ham, non-drinker, former CE Boston, Houston, Miami, heavy theory, avail immed. M Gottesman, 3377 Solano Ave #312, Napa CA 94558.

CE, AM/FM, all phases including construction & high power & AM directional. Write: RW, POB 1214, Falls Church VA 22041. Attn: Box 11-1.

Corp CE, hard working, self-starter, wanting FT position, 9 yrs hands-on exper in AM/FM would like single or group owned stations, for KS, CO, MO, NE, OK & Chicago IL, avail immed. Larry Timmons, 913-425-6509.

Air position, mature reliable individual w/5 yrs exp at 100 kW FM A/C. S Wiley, 115 Toulouse Dr, Lafayette LA 20506. 318-989-1869.

Technician (Ampex VR-1100/VPR-2B), seeks FT position in CO, write: Mrs. Smith-Fliesher, 1245 Deering Ln, Radcliff KY 40160.

Announcer, 5 yrs exper looking for position in Wisconsin or Illinois. Last at adult station in Milwaukee. Jeff, 414-543-4775.

Morning man, news, prod, copy writing, admin, 18 yrs exp, good voice, married, stable, avail now, prefer warm climates, medium/bigger markets, Larry Kay, 717-653-2500.

Seeking group chief position, 17 yrs exp, medium & major markets, AM directional, FM, satellite, automation & audio. PO Box 3191, Grand Rapids, MI 49501.

Corp CE, hard working, self-starter, looking for FT position w/single or group owned stations, 9 yrs, on-hand exp in AM/FM, for KS, CO, MO, NE, OK, avail immed. Larry Timmons, 913-425-6509.

RF SALES ENGINEER

This will be a rewarding position for an individual with experience in all areas of radio broadcast equipment with emphasis on FM RF Systems. The position involves field travel and is based in the Philadelphia area.

Contact:
Radio Systems
Box 356
Edgemont, PA 19028
(215)-356-4700

HELP WANTED

CE, KBUC AM/FM San Antonio, resume & salary requirements to: Bruce Hirsh, TK Comm, Inc., 3000 SW 50 Ave, Ft Lauderdale FL 33314. EOE.

ENG/Prod engr wanted auto exp., particularly repairing audiofiles, production background also essential, good delivery on news, will keep station on the air & legal, perform air-shift, salary commensorate w/exper, benefits, audio tape & resume. Paul Ware, KUTY, 38201 6th St E, Palmdale CA 93550. 805-947-3107.

Consultants

BROADCAST TECHNIQUES BT
Applications & FIELD ENGINEERING SERVICES
P.O. Box 26899
Phoenix, AZ. 85068
602-242-2211

R.L. HOOVER
Consulting Telecommunications Engineer
11704 Seven Locks Road
Potomac MD 20854
301-983-0054
Member AFCCE

Robert M. Lund
Broadcast Consultants
Auburn, Massachusetts
Applications - Field Engineering
617/832-2611

RMF ASSOCIATES
Field Engineering
Design, Construction, Turn-key
PO Box 641
Cape Girardeau MO 63701
(314) 651-4272

W. LEE SIMMONS & ASSOC., INC.
BROADCAST TELECOMMUNICATIONS CONSULTANTS
14 Archer Road
Hilton Head Is., SC 29928
(803) 785-4445

Moffett, Larson & Johnson, Inc.
Consulting Telecommunications Engineers
1925 North Lynn Street
Arlington, VA 22209
(703) 841-0500
800-523-3117
Member AFCCE

Contact: Radio World Newspaper, PO Box 1214, Falls Church VA 22041 for availabilities. Phone 800-336-3045

Can't Find It? Call 1-800-426-8434 For Immediate Action! Want To Sell It?

Broadcast Equipment Exchange

MONITORS . . . WTB

McMartin TBM-4500A, any cond. Goodrich Ent. 11435 Manderson St. Omaha NE 68164. 402-493-1886.

MOVIE PRODUCTION EQUIP.

Want to Sell

Magna Sync Moviola G962A, solid state studio consolette. 8 mic or line bal inputs, mono & stereo outputs w/echo & headphones, built in osc, EQ's & talkback, comp w/inst & exterior wired patch panel, 20 dB headroom. $500. I Kaufman, Natl Recdg Stds, 460 W 42nd, NY NY 10036. 212-279-2000.

Singer PA200, 35mm proj GPL, sell or trade J Workman, Maritz Comm, 600 W Lafayette, Detroit MI 48226. 313-963-1200.

Bolex M5 camera w/zoom, sync motor for sound recdg & battery pack. BO. H Deans, Deans Prods, 170 Grand St. White Plains NY 10601. 914-949-5920.

Angenieux 14-525mm lens for Fernseh camera, KCP w/road case. $300 or BO. S Judge, Tag Comm, 75 Weaver Rd, W Milford NJ 07480. 201-697-8454.

Arriflex UST581 portable mixing amp for sound on Arriflex cameras. Joe, Mainreel Comm, 67 Green St. Augusta ME 04330. 207-623-1941.

Want to Buy

Photosonics 70mm mdl 10 camera & drive take up motors, will pay full price. H Deans, Deans Prod, 170 Grand, White Plains NY 10601. 914-949-5920.

Flight Research 35mm mdl 207 pulse/sign camera, AKA multi-data, will pay full price. H Deans, Deans Prod, 170 Grand, White Plains NY 10601. 914-949-5920.

Zmar 180mm f1.3 refractor lens, will pay full price. H Deans, Deans Prod, 170 Grand, White Plains NY 10601. 914-949-5920.

RECEIVERS & TRANSCEIVERS

Want to Sell

Motorola UHF ENG system w/6 MX-300-S 5 W HT's, 6 Syntor 100 W mobile units, Spectra-Tac receiver & comparator, antennas, chargers, other access, system mod for wide audio bandwidth, 1 yr old, details avail. P Wells, KLZZ, 8665 Gibbs Ste 201. San Diego CA 92123. 619-565-6006.

Drake TR-4C SSB transceiver, speaker, AD/DC power & EV mic, new cond, $325; Heathkit HW-12 (2) SSB transceivers, 80 meters, lots of power supplies & mics, works great, $125; Heathkit SB-500 (2) meter transverter, converts 10 meters SSB to 2 meters, works great, $100. B Boyer, Boyer Assoc, 3349 N E. 28th Ave, Ocala FL 32670. 904-629-5147 (PM wkends).

Sony ST-J60 FM stereo tuner, quartz tuning, multiple presets, excel cond, $155 plus ship. W DeFelice, CKXN, 621 Bishop Ave, Bridgeport CT 06610. 203-336-5606.

Crown FM2 tuner, excel cond, BO. P McManus, McManus Enter, 4011 Orchard, San Diego CA 92107. 619-223-1730.

REMOTE & MICROWAVE EQUIP.

Want to Sell

Harris 6550 SCPC satellite rcvr, set up for Brownfield, but can be recrystalled, $1800. D Doelitzsch, WDDD, 1 Bdct Ctr, Marion IL 62959. 618-997-8123.

Marti STL 8 (2) w/R-200/950 receivers, SCG8H subgen 39 kHz, (2) 4' grid Scala parabolics, all in gd operating cond, $4000 FOB Blythe CA. J Mayson, KIMB, 2222 Kansas Ave Ste L, Riverside CA 92507. 714-682-2222.

S-A dish/Series 9000 satellite system, receiver/DAT 32 for ABC network complete w/2 dual audio decoder cards & cue decoder, BO. C Hampton, WXBM, 1687 Quintet Rd, Milton FL 32470. 904-994-5357.

QEI 7775-ATS, one unit for telco, one unit for STL, not used since factory check-up, $2500. B Lord, KQBE, POB 1032, Ellensburg WA 98926. 509-962-2823.

S-A digital satellite system w/dish for ABC, Westwood One, etc, you transport, $6000 plus frt. O Dougherty, WNVB, POB 1440, Vineland NJ 08360. 609-825-2600.

Moseley PCL 505C, great working cond, tuned to 94.30 MHz, $5000. E Schecter, KDKB, 1167 W Javelina, Mesa AZ 85202. 602-897-9300.

Want to Buy

Marti RPT 25 Systems remote pickup units, prefer RPT25. T Duffy, KOFE, 1525 Main Ave, St Mary's ID 83861. 208-245-4559.

Advanced Comm 7010, tuneable FM demod for Harris 6550 receiver, thumbwheel or DIP switcher, must be in excel working cond. D Voss, KADR, RR1 Box 86, Elkader IA 52043. 319-245-1400.

RPQ type accepted equip in 450 MHz band. R Morlino, WEQX, Elm St. Manchester VT 05255. 802-362-4800.

Dual audio decoder, 7.5 for Scientific Atlanta 7325 digital processing unit, will trade for 15 card. M Shannon, WAMJ, 1129 N Hickory Rd, Southbend IN 46615. 219-287-8375.

Flexible x-mission line, 1-5/8". A Weiner, Weiner Bdct, 4 Second St. Presque Isle ME 04769. 207-764-8300.

RPU solid state VHF xmtr & rcvr needed. R Johnson, WRKR, 2200 N Greenbay Rd, Racine WI 53405. 414-637-3036.

Digital satellite system for ABC network, from dish to demod. K Thomas, Thomas Bdctg, Box 1146, Ardmore OK 73402. 405-226-2524.

Remote control for 1 kW AM station. C McGinty, WMAK, 109 W 5th, London KY 40741. 606-864-7843.

RPU type accepted equip, 26 MHz, urgently needed, any make & model. E Nichols, KJNP, POB O. North Pole AK 99705. 907-488-2216.

Marti equip & rcvr in 161 MHz band. P Douglas, KKAY, Box 759, Plaquemine LA 70765. 504-473-3806.

STATIONS

Want to Sell

AM station, 1 kW, FT, bldg, land incld, part ownership, 5K min, loc Ark. M Gottesman, 3377 Solano Ste 312, Napa CA 94558. 501-856-2212.

Radio station, AM, 1 kW, only station in county. N Crum, WABV, Box 700. Abbeville SC 29620. 717-334-1833.

Colorado mountain town station, 250 W, AM. G Zellmer, KDMN, Box 639, Buena Vista CO 81211. 303-395-2072.

AM 1 kW daytimer 1580 kHz; FM 3 kW 105.5 MHz, comp automated, equip excel, Sunbelt, ideal for owner/operator, only station in market. $250K, call or write. JP Robillard, 1803 N First East St, Haynesville LA 71038. 318-624-0105.

Sacrifice, smaller AM 1 kW, full-timer in SW Wash coastal area, ideal owner operator, great potential, located on major hwy, apartment, mobile home, studios, land w/tower inc, only AM in market. $200,000. E Kazmark, POB 1369, Dear Park WA 99006. 206-875-5551 or 509-276-8816.

FT AM stereo station in top 100 markets, due to heart attack must sell, favorable terms to qual buyer, positive cash flow, on air 40 yrs, class B FM avail for comboing in 1987. J Rockwell, MGC Corp, 904 Lakeside Dr, Lynchburg VA 24501. 305-744-8751.

Colorado Mtn resort AM/FM radio station, excellent coverage, super buy & terms. J Gayer, 815 Reed, Lakewood CO 80215. 303-233-8433.

Want to Buy

Class A FM radio station or CP, somewhere in Kentucky or surrounding state. J McPherson, McPherson Comm, Rt 1 Box 195, Brodhead, KY 40409. 606-758-8525.

STEREO GENERATORS

Want to Sell

RCA BTX101 SCA gens (2), $200 ea. A Bater, WPIX, 220 E 42nd, NY NY 10017. 212-210-2773.

SWITCHERS (VIDEO)

Want to Sell

GVG 1600-1X switcher w/EMEM chroma key, serial editor interface, excel cond. P Scholes, Ardent Teleprod, 2000 Madison Ave, Memphis TN 38104. 901-725-0855.

Want to Buy

GVG production switcher. H Henson, Henson Prod, 4569 Haven Crest Rd, Winston-Salem NC 27106. 919-924-8717.

TAPES, CARTS REELS

Want to Sell

Fidelipac carts (300), mostly 20 & 40 sec, $100. D Markegard, KTCA, 1640 Como, St Paul MN 55108. 612-646-4611.

Metal reels, 10-1/2", all for 1/4" tape, all NAB hub, large stock, guar in excel cond, 1 to 10, $1.50, 10 to 100, $1.25, 100 plus, $1 ea. COD, shipped UPS, approp charges added to total invoice & KY sales tax added as applicable. G Falk, Falk Recdg, 7914 Fegenbush Ln, Louisville KY 40228. 502-239-1010.

Ampex 671, three groups to choose from: 7"×2400' hand picked bulk taped down ends, 70 per ctn 60¢ ea or $42 per ctn plus UPS; or hand picked taped down ends in printed box, 50 per ctn, 80¢ ea, $40 per ctn plus UPS; or as is bulk, 60 per ctn, 35¢ ea, $21 per ctn plus UPS. Call Burlington Audio Tapes, 106 Mott St, Oceanside, NY 11572. 1-800-331-3191 or in NYS 516-678-4414.

Mastercart II's (100) 70 sec, (70) 40's, $3.75 ea/BO; also several hundred Fidelipac 300's. D McGroom, WNDH, 419-592-8060.

Capital A2's, approx 200 various lengths, $400 takes all. K Hunter, KLKT, 774 Mayes Blvd, Incline Village NV 89450.702-832-1000.

Fidelipac 300's (300), gd cond, in use, mostly 70 & 40 sec, $1 ea. R Molino, WEQX, POB 1027, Manchester VT 05255. 802-362-4800.

Urgent, fire destroyed record/tape collection, no insurance, need immed copies of records/tapes of top 100 or some under each year '53-'85, also copies History of Rock & Roll & other programs etc, leave message. S Stevenson, Stevenson Corp, POB 735, Blaine WA 98230. 604-531-4576.

Metal reels, 14", NAB 1", like new, minimum order 20, $3 ea. D Hill, Dimension Snd, 368 Center, Jamaca Pl MA 02130. 617-522-3100.

Fidelipac carts, approx 2000, gd shape, BO for all or partial. A Zenn, KGV, 2255 Kuhio #1201, Honolulu HI 96815. 808-923-7600.

Audiopak AA3, 1000 carts various lengths, $1 ea. P Christensen, WIVY, 3100 University S, Jacksonville FL 32216. 904-721-9111.

Reels, 5" (1000) w/NAB hub. S Voros, Voros Enter, 1537 S 81st, Milwaukee WI 53214. 414-475-6200.

Circle Reader Service 28 on Page 22

ACTION-GRAM

EQUIPMENT LISTINGS:

Radio World's Broadcast Equipment Exchange provides a FREE listing service for all broadcast and pro-sound end users. Simply call 1-800-426-8434 to place your listings courtesy of Broadcast Supply West.

Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a paid basis. Listings are available on an $18/25 word basis. Call 800-336-3045 for details and complete display rates.

EMPLOYMENT SECTION:

Help Wanted
Any company or station can run "Help Wanted" ads at the flat rate of $18 per listing per month (25 words max). Payment must accompany insert; there will be no invoicing. Blind box numbers will be provided at an extra charge of $2. Responses will be forwarded to listee, unopened, upon receipt. Call 800-336-3045 for display rates.

Positions Wanted
Any individual can run a "Position Wanted" ad, FREE of charge (25 words max), and it will appear in the following 3 issues of Radio World. Contact information will be provided, but if a box number is required, there is a $2 fee which must be paid with the listing (there will be NO invoicing). Responses will be forwarded to the listee, unopened.

Check as appropriate: ☐ Help Wanted ☐ With Box Number ☐ Positions Wanted ☐ Without Box Number

Text (25 words maximum): _____

_____

_____

Name _____ Title _____

Company/Station _____

Address _____

City _____ State _____ Zip _____

Telephone _____

BROADCAST EQUIPMENT EXCHANGE
PO BOX 1214
FALLS CHURCH VA 22041

RW Broadcast Equipment Exchange

TAPES . . . WTB

Want to Buy

Good adult music record collection, light & jazz & jazz vocals pref. must be in gd cond. S Weber, Fred Arthur Prod, 1218 E 18th, Denver CO 80218. 303-832-2664.

Top 40's/oldies music libraries on 2 trk reels, automation compatibility desired. W DeFelice, CKXN, 621 Bishop Ave, Bridgeport CT 06610. 203-336-5606.

TAX DEDUCTION EQUIP.

Non-profit college station needs: stereo or mono cart machines w/manuals. F Thomas, Muskegon Comm College, 221 S Quarterline Rd, Muskegon MI 49442. 616-777-0330.

El Salvador Christian station needs remote RF link, 892R tubes & submergible water pump. J Counter, YSLE, 5484 San Patricio Dr, Santa Barbara CA 93111. 805-967-6410.

FM xmtr, 10 kW, need for public radio in Pittsburgh. P Rosenfeld, WYEP, 580 E End Ave, Pittsburgh PA 15221. 412-765-1170.

TEST EQUIPMENT

Want to Sell

Tek 564 storage scope. $500; Tek 502 scope dualbeam. $100. J Gagliardi, Harvard Univ, 69 Fruit, Norfork MA 02056. 617-732-1752.

Retiring, wish to sell all equip from radio engr practice, bridges, freq synth, H-P computer w/Scott Baxter software, plotter, maps, much more. Write or call for detailed list. Ivan Miles, 872 Beaverbrook Dr NW, Atlanta GA 30318. 404-355-8188.

Tek 491 spectrum analyzer, $4500. J Gagliardi, Harvard Univ, 69 Fruit, Norfork MA 02056. 617-732-1752.

GR 1606A RF impedance bridge, gd working cond, $750; GR 916AL RF impedance bridge, gd working cond. $450. V Ranieri, 354 Bloomfield, Caldwell NJ 07006. 201-226-4356.

HP 400D AC voltmeter. $60. D Hill, Dimension Snd, 368 Center, Jamaca Pl MA 02130. 617-522-3100.

Tek 555 dual beam scope w/extra power supply & manuals, needs cal. $250. J Kipski, KIQO, POB 1456, Lompoc CA 93436. 805-865-6536.

Want to Buy

2-3 tower phase monitor. T McGinley, 1st Media Corp, POB 10239, Wash DC 20018. 301-441-3500.

TRANSMITTERS

Want to Sell

RCA TTU1B TV xmtr, UHF 1 kW, gd cond, spare cavities, diplexer, comp set of tubes. L Nixon, WTKV, 601 N Lee St, Valdosta GA 31601. 912-247-3333.

QEI FM xmtr meter bridge, reads SWR/voltage/current. Vp to 150 W. $250. Stan, KAK-FM91, Box 91, Villa Grande CA 95486. 707-528-4055.

Continential 2 yrs old, 1 kW, mint cond, all current updates. $12000 terms, $10000 cash. D Jack, KNTA, Box 6528, San Jose CA 95150. 503-234-8448.

FM plate for Collins 831D, 200-250 V primary nominal 5160 V sec at 1 A w/taps 3600 & 4400 V. $500. J David, KMPL, POB 907, Sikeston MO 63801. 314-471-1520.

WE D151170 250 W AM, looks very clean, needs only minor work, on-air recently, tuned to 1340 kHz. $800 & ship. J Whitmer, WNBS, POB 1340, Murray KY 42071. 502-759-1300.

Collins 1 kW xmtr, in service, 1978 model, station now 5 kW. V Arnold, WJEM, POB 368, Valdosta GA 31603. 912-242-1565.

RCA BTF-5D 5 kW FM xmtr, 94.7 MHz. $8000. M Raby, WFBQ, 6161 Fall Creek Rd, Indianapolis IN 46220. 317-257-7565.

Gates FM-1 xmtr, $6500. C Hampton, WXBM, 1687 Quintet Rd, Milton FL 32470. 904-994-5357.

AEL 10KB 10 kW xmtr, $5000. E Fears, KHBN, POB 31235, Jackson MS 39206. 601-981-4245.

AM xmtrs crystals, one 1320 kHz & one 1390 kHz, BO. D Workman, KPPL, RR 1 Box 203, Stockton IA 52769. 319-785-6069.

Collins 20V2, 1000/500 W; Collins 550A2, 500/250 W. G Zellmer, KDMN, Box 639, Buena Vista CO 81211. 303-395-2072.

Wilkinson exciter, excel cond, up to 15 W, tuned to your freq, has AFC metering & full sys metering, avail immed. L James, WROC, 975 S Florida Ave, Tarpin Springs FL. 813-937-3429.

RCA BTA50F 50 kW AM xmtr, excel cond, in storage ready for immed pickup, all manuals, electrostatic air filter, solid state rectifiers, proof RF perf avail. $18,000 plus PU & ship. G Heldenselt, Heidenselt Bdctg, 2880 W Lake, Wilson NY 14172. 716-751-6187.

RCA BTA5F 5 kW AM xmtr, excel cond, in storage for immed pickup, $10,000 plus PU & ship. G Heldenselt, Heidenselt Bdctg, 2880 W Lake, Wilson NY 14172. 716-751-6187.

QEI exciter & meter readout bridge, new cond, $2000. S Lawson, KAK FM, 928 Hyland, Santa Rosa CA 95404. 707-528-4055.

McMartin B-910 FM 15 W exciter, factory tuned & tested to your freq, w/ or w/o stereo modules. Goodrich Ent, 11435 Manderson, Omaha NE 68164. 402-493-1886.

Collins FM 5B, 5 kW FM, gd cond, BO. D Workman, KPPL, RR 1 Box 203, Stockton IA 52769. 319-785-6069.

Collins 300J 250/100 W AM xmtr, can be used for PSSA, you pick up. $800. D Doelitzsch, WDDD, 1 Bdct Ctr, Marion IL 62959. 618-997-8123.

Want to Buy

FM xmtr, 1 to 3 kW. J Bruce, Thoen Comm, 407 N Swenson, Stamford TX 79553. 714-761-4377.

Solid state FM exciter in working order. Stan, KAK-FM91, Box 91, Villa Grande CA 95486. 707-528-4055.

Collins 21-E, 5 kW AM; 1-10 kW FM, any age or cond; chan 12 & 16 or low UHF TV xmtr 1-20 kW peak output, any age or cond, needed immed. J Kouch, KJKL, 105 Gemini Pl, Syracuse NY 13209. 315-487-2393.

Xmtr, 500 W or 1 kW tube or solid state. WLMV, Box 187, Vernon Hills IL 60061. 312-680-7557.

FM, 1 kW or 3.5 kW. L Logan, Family Stations, Oakland CA 94621. 415-568-6200.

CCA or CSI 25-27.5 kW FM xmtr, any cond. T McGinley, 1st Media Corp, POB 10239, Wash DC 20018. 301-441-3500.

Harris MW10. D McDonald, Big M Bdct, POB 700, Ennis MT 59729. 406-586-6541.

McMartin BA-2.5K 2.5 kW AM, any cond. Goodrich Ent, 11435 Manderson, Omaha NE 68164. 402-493-1886.

5 or 10 kW in gd cond. G Bicochi, IBS, 1771 N Powerline Rd, Pompano Beach FL 33060. 305-977-9111.

TUBES

Want to Sell

EIMAC 833A modulator final tubes, new, $100 ea. J Bruce, Thoen Comm, 407 N Swenson, Stamford TX 79553. 714-761-4377.

4CX250FG, 23 avail, call for info. $40 ea or less if you buy more or BO. J Schloss, KICD, 2600 Hiway Blvd, Spencer IA 51301. 712-262-1240.

Econco rebuilt 4CX5000A, $650 & 5CX1500A, $450, never used. G Hill, KSHA, 1151 Hilltop, Redding CA 96003. 916-223-5742.

Want to Buy

Vidcon E5080 tube for a Concord TV camera. L Auman, Auman Recdg, Rt 1 Box 368, Dover OH 44622. 216-343-2297.

TURNTABLES

Want to Sell

Technics SL10 MKII TTs (2). $350 ea. C Hampton, WXBM, 1687 Quintet Rd, Milton FL 32470. 904-994-5357.

QRK 12-C excel cond w/tonearms, $95 ea, call after 6PM CDT. R Moen, Radio Srvs, 402-334-8767.

QRK & Maze TT, parts & Micro-Trak 303. I Baron, WCUA, Box 814 Cardinal Station, Wash DC 20064. 202-635-5106.

Rek-O-Kut 12" Rondine deluxe 3 speed TT, w/non-descript viscous dampened tone arm & GE cartridge. $35 plus ship. C Brennan, 661 Horseshoe Curve, Pike Road AL 36064. 205-277-0139.

Presto mono cutting lathe, 3 speed, 1D & 1C heads, 2 doz styli, blanks, gd cond, $350/BO. D Kocher, 1901 Hanover, Allentown PA 18103. 215-776-1455.

Presto 1936, 28" recording lathe w/2 16" cutters. P McManus, McManus Enter, 4011 Orchard, San Diego CA 92107. 619-233-1730.

Russco Studio Pro B, 2 sp, vgc w/Audio Technica tonearm; Gates CB500 transcription TTs w/one Gates base, fair cond. I Baron, WCUA, Box 814 Cardinal Station, Wash DC 20064. 202-635-5106.

BE Spotmaster Studio Pro TT w/Micro-Trak tonearm, low hrs, $200. L Wagner, ARN Prod, POB 1788, Orlando FL 32802. 305-299-1299.

Want to Buy

Transcription TT, 16", motor & arm, cartridge & base for use with 78 rpm/33 rpm records. F Luppino Jr, Marketing Insights, 1445 Sunset Ridge, Glenview IL 60025. 312-729-2047.

EMT 927, 928, 930's. C Dripps, Kurlaff Enter, 4331 Maxson Rd, El Monte CA 91732. 818-444-7079.

TV FILM EQUIP.

Want to Sell

Beaulieu R16 camera w/Ang 12-120 zoom lens, 4-gang, synchronizer, rewinds, sound readers, viewers, B&H 816 hot splicer, B&H 202 optical magprojector, w/sync motor, B&H 385 projector, recording amps, light meter, reels, other misc access & equip, Polecat lighting mounts, BO. B Howard, Academy Film Prod, 3918 W Estes Ave, Lincolnwood IL 60645. 312-674-2122.

RCA TK27, TP66 film chain, 16mm, multiplexer, TP5 fly chain, 8mm Super 8 transfer, comp system plus spares, $10,000/BO. S Weiss, Stevens Quality Video, 28759 Greenfield, Southfield MI 48076. 313-424-8439.

VIDEO PRODUCTION EQUIP.

Want to Sell

Chyron VP1 character gen w/software & gen lock upgrades, $2100. L Froom, SPS Video Prod, 1901 Chapel Hill Rd, Silver Spring MD 20906. 301-598-5392.

NEC DVE controller, $1500. C Malcom, Video Srvs, 1599 Superior #B2, Costa Mesa CA 92627. 714-631-1144.

Mole-Richardson 126B perambulator, BO. M Fiedler, Mayoney-Fiedler Prod, 5346 Du-Pont Ave, S Minneapolis MN 55419. 612-822-0013.

Telestrator 400 video graphics system, $3500; Sony CMA-6 (2) camera adapters, rack mountable, mint cond, BO. J Von Vleck, Aras Consulting, 2321 N Utah St, Arlington VA 22207. 703-524-5067.

CMX I squares, (2) 2860; AVR2; MM1200; (2) GV1600; VR1200, as lot. H Casteel, Technichrome, 1212 S Main, Las Vegas NV 89104. 702-386-2844.

RCA TK760 (2) remote panels & camera cables. S Dodson, Desert West, 1870 W Prince, Tucson AZ 85705. 602-293-1849.

TV Research Intl EA-3/EA-6 VCR edit controller w/manual, $250. F McCall, Performance Srvs, 1521 W St Mary's Rd, Tucson AZ 85745. 602-323-0901.

Video prod equip inc: Microtime T-100 TBC, Leader waveform monitor & vectorscope, Panasonic monitors, JVC ESP-2AT edit system, JVC KM 2000 SEG, Panasonic tripie 5" BW monitors, Panasonic WV 555 studio camera, Panasonic WV 555 ENG camera, RTS BP 300 comm system, Knox Ki28-MOD 8 char gen, Lowel omni light kit, call for details, sold seperately or for $29,000 complete w/custom console. Baker Street Stds, 10 Wheeler Ct, Watertown MA 02172. 617-924-0065.

Want to Buy

Unimedia SMT-12 video monitor schematic. J Balter, Maine Reel Prod, 67 Green St, Augusta ME 04330. 207-623-1941.

JVC TN-3P video monitors. M Adler, Sherwood Comm, 1310 Industrial Hwy, Southampton PA 18966. 215-357-9065.

Convergance 104 or 204 parts. C Malcom, Video Srvs, 1599 Superior #B2, Costa Mesa CA 92627. 714-631-1144.

VIDEO TAPE RECORDERS

Want to Sell

Panasonic NV9400 3/4" portable VCR w/charger & 3 batteries, great shape, $650 plus ship. J Owens, Ashbury College, Wilmore KY 40390. 606-858-3511 x757.

JVC 6060U 3/4" VCR, $800. R Robinson, TNA, 10 George, Wallingford CT 06492. 203-269-4465.

JVC 8500 U-matic editing system, all 3 pieces complete, gd cond, $4000. U George, George Assoc, 175 5th Ave # 3206, NY NY 10010. 212-475-3330.

Sony 2850, Sony 2860, JVC 3/4" U-matic recorders (18), BO. H Casteel, Technichrome, 1212 S Main, Las Vegas NV 89104. 702-386-2844.

Sony RM420 (3) U-matic remote control boxes, BO. B Hawkins, WENS, 1099 N Meridian, Indianapolis IN 46204. 317-266-9700.

VR2000B (3) gd cond, $2500. H Casteel, Technichrome, 1212 S Main, Las Vegas NV 89104. 702-386-2844.

Sony BVH500 1" video w/Anvil case, batteries, charger, AC500 AC adapter, HT 500A chroma stabilizer. T Cereste, Lightscape, 420 W 45th, NY NY 10036. 212-757-0204.

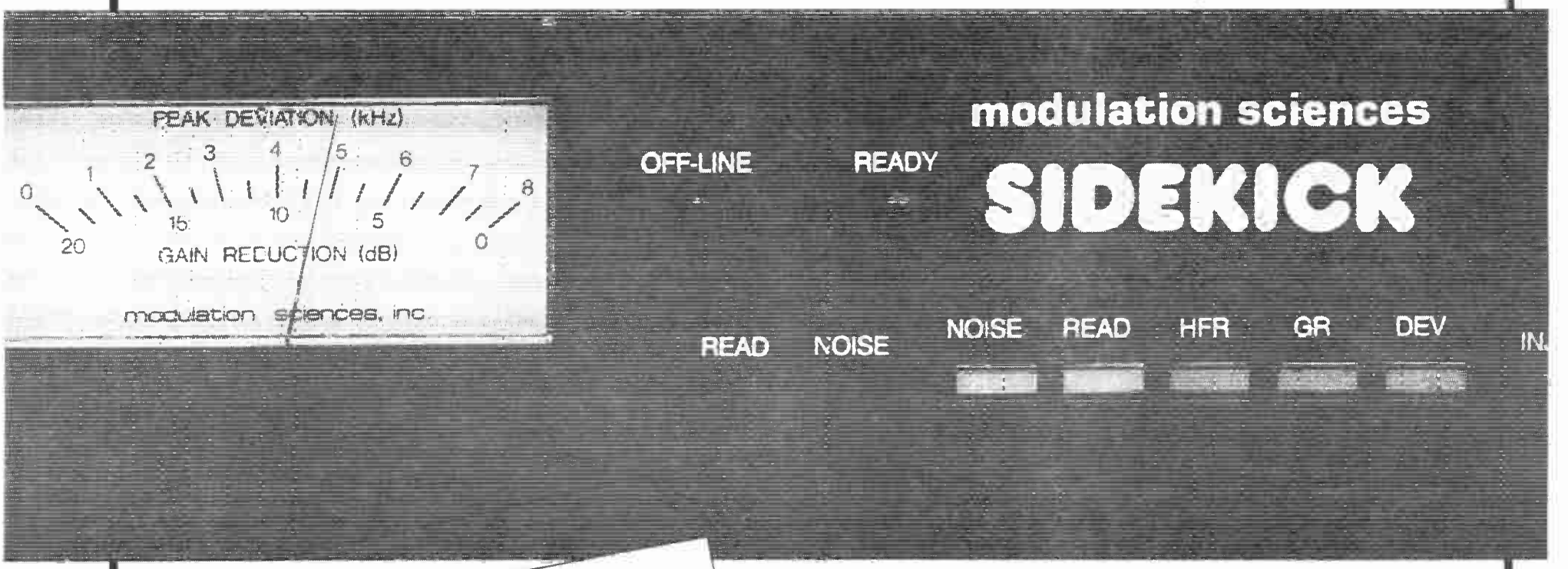
JVC 1" editing system, $5000. C Malcom, Video Srvs, 1599 Superior #B2, Costa Mesa CA 92627. 714-631-1144.

Want to Buy

IVC 700 & 800 color boards (2), (2) guide rollers & (2) ribbed rubber counter drive rollers for 700 models & one color board for 800 model. C Lund, Cycle Snd & Video, 167 Madison, Waterbury CT 06706. 203-756-7761.

Panasonic NV9600/NV9240XD, working 3/4" edit decks & other assoc edit equip, could also use NU8500 VHS decks. B Chapman, Video Effects, POB 6316, Napa CA 94581. 707-257-7669.

THE ONE BOX SOLUTION THAT MADE SCA WORK



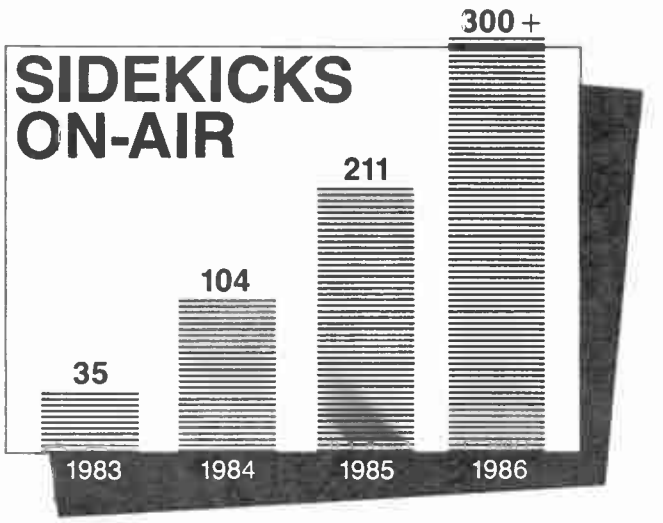
RF IDEAS

Broadcast Technologies, Inc.

E.J. PRYOR, JR.

"I have been operating one SCA on 67khz on my Dallas, TX station for some years. After many years of the normal problems of crosstalk, noise, etc., Modulation Sciences came forward with the 'Sidekick' SCA generator. I have never spoken out for a particular device in this column before, but I found that virtually every problem I had been experiencing, disappeared when I finally got one of these units and installed it at the studio between my stereo generator and composite STL. I found that the crosstalk, main to sub and sub to main, was improved almost 20db and the system noise was markedly improved also. There is no measurable degradation to the stereo performance or loudness whatever. With the new rules allowing stations to increase their total modulation 5% for each 10% of injection, the main channel (mono) level suffers a negligible 0.5db reduction in loudness."

Reprinted by permission from Broadcasters ID. Aug/Sept 1985



Here's how Sidekick makes SCA work:

Sidekick installation is quick, easy, and problem-free:

- Install at studio or transmitter.
- Insert anywhere in chain via Sidekick's loop-through composite input/output (SCA input NOT required).
- Remote control provisions standard.

Sidekick's elegant circuit design takes the hassles out of SCA:

- Sidekick is tweak-free and drift-free.
- Crystal-locked synthesizer is stable over time/temperature.
- Excellent RF and EMI shielding.
- Performance certified by an independent P.E. (to receive a copy, just call).

Sidekick's "One Box Solution" builds in everything you need:

- Integrated audio processor for superb SCA performance.
- Noise generator and synchronous AM meter lets you tune transmitter for minimum crosstalk.
- Super-accurate peak & hold SCA deviation monitor.

30-Market Survey Results:

SIDEKICK IS THE #1 CHOICE OF MUSIC SCA OPERATORS.

From SCA: Radio Subcarrier Report 9/85

Call **Toll-Free (800) 826-2603**
And Get Sidekick Working For You.

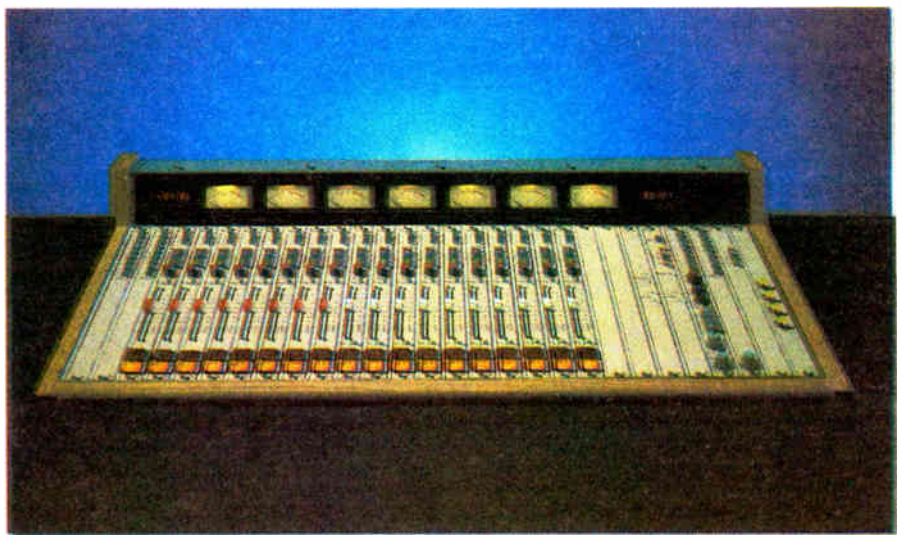
modulation sciences, inc.

115 Myrtle Ave. Brooklyn, NY 11201 In N.Y.S. (718) 625-7333

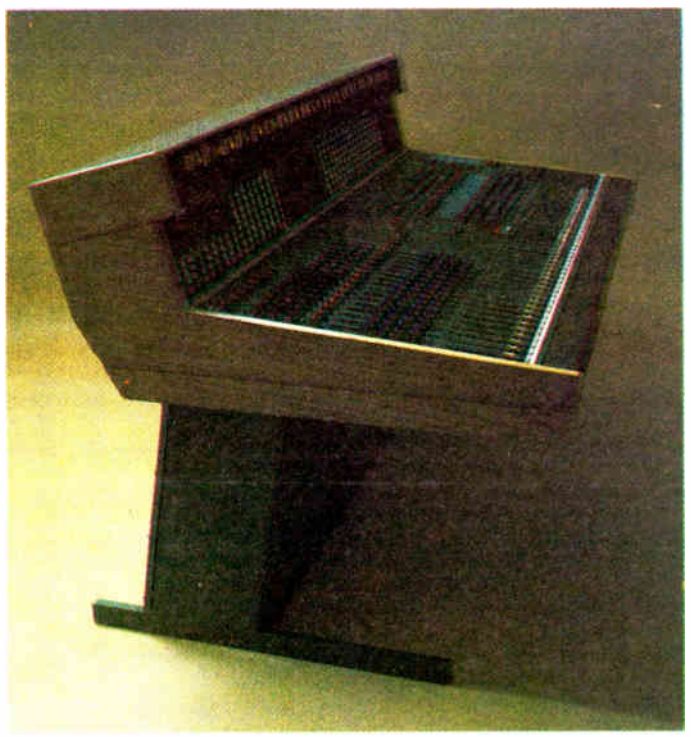
Circle Reader Service 38 on Page 22

Multiple Choice:

What do you need in an audio console?
Every application is different; what are *your* requirements? Should the input section be stereo or mono, mic or line? What kind of outputs and subgrouping do you need? Is a matrix mix important? Do you require mix-minus capabilities? What about metering, timers, tape remotes, mainframes, future expansion?



A-500 Radio On-Air

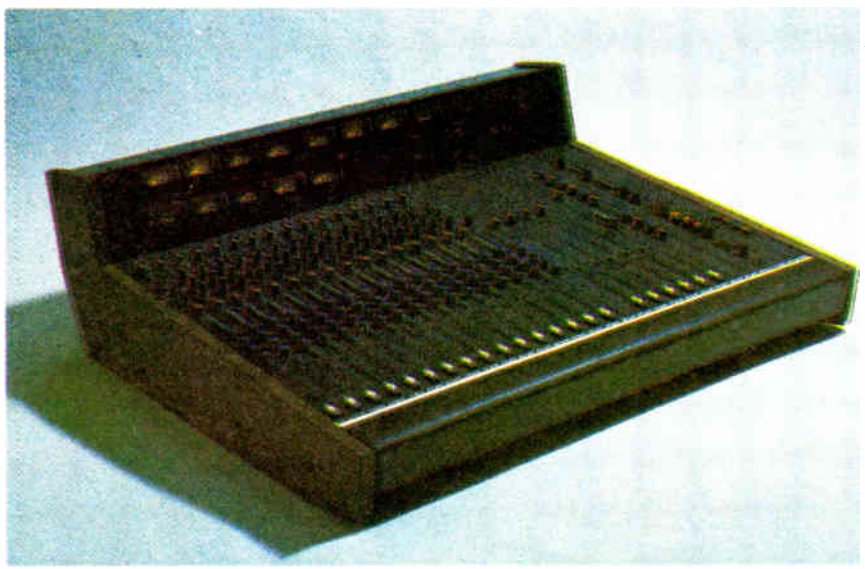


TV-80 Television Master

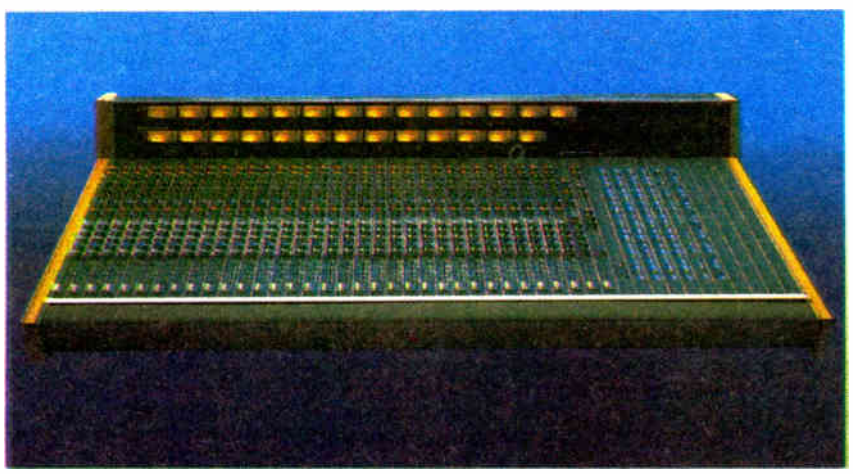
WHEATSTONE consoles give you all the choices. Our sales engineers listen to your requirements, then work with you and plan your console from the first module to the last VU meter. The result is custom-configured equipment built specifically to your needs.

The truth is, there's only one choice when specifying broadcast equipment: QUALITY. There's simply no room in broadcast for cutting corners; when you're on-the-air the phrase "Time is Money" takes on real meaning.

So whatever your application, stereo or multitrack production, television master control, on-air, video edit, or mobile installation, consult WHEATSTONE.



SP-5 Stereo Production



3224 Multi-Track

QUALITY

There's No Better Choice.

Wheatstone Corporation

Circle Reader Service 32 on Page 22