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June 1, 1987

Volume 11, Number 11

Daytimers May Go Fulltime

by David Hughes

Washington DC ... The FCC has proposed allowing all "qualifying" AM daytimers—including those on domestic clear and regional channels—to add nighttime operations.

The power levels would be similar to a plan put into effect last year which allowed daytimers on foreign clears to go fulltime.

In a notice issued 6 May, the Commission unveiled a plan that could allow many daytimers to operate all night with up to a maximum of 500 W, "provided such operation complies with applicable interference protection requirements."

The proposal also would make permanent a ban on applications for new daytimers. In December 1986, the Commission issued a temporary freeze on new daytime stations, and had said it was contemplating a permanent ban.

New night powers

Under the new plan, daytimers—including those on Class I and Class III channels—that add night hours "would not be required to protect each other against interference," the FCC said in its proposal, "nor would they have to meet city-coverage requirements."

The Commission also said that stations which add night operations that do not achieve a field strength of at least 141 mV/m at 1 km from their transmitter "would not receive interference protection from subsequently authorized stations, nor would they need to comply with minimum operating schedule requirements."

One small "wrinkle" in the plan, according to Louis Stephens, of the FCC Mass Media Bureau's International Branch, is that it calls for reducing the current minimum power level for Class III's on regional channels from 500 W to 250 W. It would also reclassify Class IV stations with at least 250 W on regional channels as Class III operations.

"This will permit these stations to obtain nighttime protection from subsequently authorized stations," the Commission said. "Unlike Class III stations, such protection is not afforded to Class IV stations."

The FCC's May notice only mentioned highlights of the plan. At RW's press time in early May, Stephens said the full text—with greater detail of the new plan—was due to be released by early June.

Powers to be computed

NAB Counsel Barry Umansky said that if the daytimer plan is aproved, the FCC would "put its computers to work" to determine night powers for existing daytimers. "Some daytimers may get some significant powers," he predicted.

The FCC said it would issue show cause orders to stations that "are able to benefit" from the new rules. "No applications would be required to obtain this authority."

Daytimer advocates, as might be expected, applauded the plan.

"Essentially, with a few variances, it's just what we asked for," said David Palmer, head of the NAB Daytimers Committee.

His group, only days before, had asked the FCC to issue a rulemaking proposal to give daytimers on Class III channels nighttime authority. "It was right on target," Palmer added.

He said that many of the night powers in the recent FCC proposal would be comparable to a daytimers' current second hour post sunset authority (PSS) power.

Palmer added that the FCC could rule on the plan, which is now out for comment, in two steps—approving the less controversial Class III night operations later this summer and taking more time to study night operations for daytimers on Class I channels, which is certain to be opposed by clear channel advocates.

Jim Wychor, formerly president of the Daytimer Broadcasters Association, which eventually became the NAB Daytimers Committee, said that he hopes the night powers stations receive would be higher than second hour PSS levels.

He said that the FCC's night power calculations in past daytimer cases were "too low. They were based on antiquated interference criteria."

However, there may be some new action on that issue. The NAB's Umansky told RW that this summer the Commission is also planning to release a Notice of Inquiry with a "long fuse" to begin the process of reexamining AM technical standards including interference criteria.

And FCC officials confirmed that "something like that may be in the works."

Daytimers committee

In addition to the request from the NAB Daytimers Committee to give Class III AM daytimers nighttime authority by late summer, the committee also recommended a comprehensive study be undertaken to prove that daytimers on Class I clear channels deserve night

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Exhibitors To Choose Booths

Washington DC ... According to a recently approved "priority point" system, exhibitors at the NAB's 1988 convention in Las Vegas will be able to pick their booth space rather than have it assigned to them.

The new system, which will give priority to firms based on the size of previous booths and the number of years they have exhibited, was endorsed by the NAB Exhibitors' Advisory Committee at a 22 April meeting with NAB convention officials.

The booth selection process is now "exhibitor driven as opposed to NAB driven," according to the new NAB Exhibit Director Rick Dobson, who replaced former director Ed Gayou following the March 1987 convention.

Irwin Ungerleider, head of the exhibitors' advisory committee, which is composed of a variety of firms, said that in addition to the point system, the NAB and Dobson are working to remedy the problem of a shortage of floor space at the Las Vegas Convention Center.

Point system

Under the new point system, booth selection will be based on a formula that takes into account the size of a firm's booths at previous NAB shows, as well as how many years the firm exhibited.

A company will receive 10 points for each year it exhibited at previous NAB shows. However, only the past 25 years will be counted. Therefore, the maximum number of points available for longevity will be 250.

Those points will be added to points accumulated separately based on booth size. According to the formula, companies will not only receive 10 points for each year they exhibited since 1978, but also one point for each 100 square feet of space occupied each year during the past 10 years.

Ungerleider said the 10-year cap was placed on points accumulated for size because 1978 was the first year the NAB show moved from a hotel environment to a convention center. It was also the first year that booth space exceeded the 100,000 square foot level.

Sony reportedly has the most points—in the 1,100 range, with Ampex a close second at about 1,000.

However, some smaller firms that have a long attendance record and have occuppied large-sized booths, such as Pacific Recorders, wound up near the top of the point list.

Ungerleider added that a formula has also been devised to deal with company mergers. In such cases, the exhibit histories of both firms will be examined.

The best point total in each year from only one of the affected companies will be used for the new company's point total.

"That procedure will give an advantage, as opposed to a windfall, to a firm

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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.

AM Daytimers

The FCC issued a proposal in early May that could allow daytimers on regional and even clear channel frequencies to add nighttime operations. (See the article in this issue for more details.) If implemented, the plan would call for night powers similar to those now being used by US daytimers on Canadian and Mexican clear channels.

For information on the daytimer applications freeze contact Lenore Cunningham at 202-632-6485. For details about the new night power proposal, which is contained in docket MM 87-131, or the DST PSA limit plan, which is contained in docket MM 87-3, contact Louis Stephens at 202-254-3394.

AM Stereo

The FCC is waiting for the National Telecommunications and Information Administration (NTIA) to complete its study of multimode receivers before responding to a September 1986 request filed by Texar Inc. The firm had asked the FCC to abandon its marketplace approach and choose an AM stereo standard.

While the FCC has said it will not reopen the AM stereo issue to recommend a standard, there are indications the Commission may release a statement, possibly as early as this summer, indicating that a defacto standard—presumably Motorola's C-QUAM system—has been reached.

The NTIA, which as of early May was still waiting for equipment from Motorola, said its multimode study was still in the preliminary stage with no timetable for completion. The study follows the NTIA's backing of multimode receivers in a report released in February.

Despite the FCC's reluctance to abandon its marketplace approach, Mass Media Bureau Chief James McKinney said at the March NAB show that he personally believes a defacto AM stereo standard—C-QUAM—has been reached. He also advised broadcasters not to wait for any more studies before going stereo.

In other news, a petition calling for the Commision to require that all AM stereo receivers to be equipped with a multimode chip was filed by Press Broadcasting in November 1986. No action has been taken by the FCC.

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

Synchronous Transmitters

At press time, the FCC had not acted on a January rulemaking proposal that would allow the use of synchronous AM transmitters, which extend a station's signal via additional transmitters operating on the same frequency.

The FCC said it is investigating several issues in the matter including technical standards, interference protection criteria, as well as possible distortion from frequency or phase synchronization. It is also studying the use of nighttime synchronous transmitters for reduction of skywave interference and treatment of transmitters under multiple ownership rules.

Several construction permits have been issued by the FCC at stations such as KROL, Laughlin NV, and KKOB, Albuquerque NM, to begin experimental synchronous transmitter operations. Approximately a dozen stations have applied for permission to operate synchronous transmission equipment.

The issue is contained in docket MM 87-6. Action is expected later this summer or fall. Contact Bernard Gorden at 202-632-7792.

Arizona Waivers

So-called "Arizona waivers" for studio location have become a thing of the past. The FCC decided in April to permit radio and TV stations to locate their main studio within their principal community contours, rather than their community of license, as had been the case.

Previously, stations had to apply for the waiver to locate their studios outside their communities of license.

Also eliminated in the action was a requirement that broadcasters originate at least 51% of their non-network programming from their main studio or other points in the community. Stations must, however, maintain a public inspection file in their community of license and must have a local or toll-free telephone number.

The docket number is MM 86-406. Contact Eileen Huggard at 202-632-7792.

RF Radiation

Results of a joint FCC-Environmental Protection Agency (EPA) survey of RF radiation levels emitted by broadcast towers in Denver, CO, indicate that radiation in the area is generally below the 1,000 $\mu W/cm^2$ standard set by the American National Standards Institute (ANSI).

The Denver study, released in March, found that the highest RF value found near the survey area along a public road was 580 $\mu W/cm^2$, the FCC noted. However, the antenna of Denver FM station KYGO showed levels as high as 10,000 $\mu W/cm^2$. KYGO is working to resolve the situation.

Results released in February of a similar study in Portland, OR, showed that typical RF levels near that city's Healy Heights antenna farm were less than 700 $\mu W/cm^2$. Levels in homes near the Portland site were well below 100 $\mu W/cm^2$, the FCC said.

Magnetic fields exceeding the ANSI guideline were found near AM antenna tuning coils, but the report pointed out that the public would not normally have access to these areas.

In other news, the Commission in February moved to exclude some FCC-regulated services and facilities from RF radiation evaluation, although broadcast stations are not among them.

FCC docket number for categorical exclusion is GEN 79-144. For information on the docket or the results of the FCC/EPA surveys, contact Robert Cleveland at 202-653-8169.

FM Translators

After more than a year, action on the FCC's Notice of Proposed Rulemaking to allow noncommercial FM translators to be fed by satellite or land-based microwave is still pending, with no timetable for action.

The rule change plan was released by the FCC in April 1986, in response to several previous requests from Chicago's Moody Bible Institute (MBI).

Many broadcast groups, including the NAB and National Public Radio, oppose the translator feed proposal. Complaints ranged from "objectionable" interference on TV Channel 6 to the possibility of a "de facto" network of translators.

In related news, broadcasters have given their support in comments filed with the FCC, to a plan which would allow FM stations to increase the power of their booster facilities and feed them by microwave or satellite.

According to the plan, the new higher-powered boosters would still be prohibited from causing interference to other stations. The boosters would not be permitted to expand the original station's coverage area beyond its predicted 1 mV/m contour.

Docket number for the translator issue is MM 86-112; the FM booster issue is MM 87-13. Contact Marcia Glauberman at 202-632-6302.

FM Allocations

At press time, Clear Channel Communications indicated that it planned to file a request with the FCC to permit a blanket power increase for Class A FMs. Tentatively, the plan calls for a 6 kW limit, up from the existing 3 kW limit.

The FCC had previously said it would allow Class A's to upgrade to Class B and C status—interference conditions permitting—without having to move off their reserved Class A frequencies.

However, some broadcasters who had been campaigning for an across the board power hike for all Class A's to 4 or 6 kW levels, said the FCC's action will have little effect in many areas because of existing congestion on the FM band.

The docket number for Class A upgrades is MM 86-144. Contact Joel Rosenberg at 202-634-6530.

In another FM matter, the FCC in March turned down a plan submitted by Radio New Jersey for the creation of an "FM2" band between 225 and 230 MHz. The band would have been utilized by daytimers and interference-plagued full-time AMers, according to the plan.

The FCC said that the band was reserved for governmental use and could not be reallocated. However, Radio New Jersey indicated that it would refile its plan using a different band, possibly the adjacent 220-225 MHz band.

Contact Radio New Jersey counsel Larry Roberts at 202-659-4700.

Duopoly Rules

The FCC is accepting comments on a proposal to allow AM/FM radio station and UHF-TV common ownership within the same market, as well as combina-

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Remote Gear Rules Confusing

*In this issue, **RW** continues its multi-part examination of dial-up remote transmitter control. It appears that in spite of FCC rules, some engineers are using the nearest telephone to bypass the required remote "control point" and duty operator to make changes in transmitter operation.*

In this installment, we look at the FCC's rules and whether they are enforceable. In upcoming issues, we will examine how equipment manufacturers, broadcasters and consultants deal with the growing problems posed by dial-up remote technology.

by David Hughes

Washington DC ... The FCC, in its overall campaign to deregulate broadcasting's technical rules, has removed many of its "how to" methodology sections.

While many of the rules—including those regarding dial-up remote transmitter controls—are still on the books, the Commission gives stations wide leeway in how to meet such rules.

Since this leeway generates its share of questions, it's becoming increasingly evident that there is little the FCC can do to prevent an engineer from picking up the nearest telephone, thereby bypassing a formal, required transmitter control point, to make changes in transmitter operations.

There is really no way the FCC can judge the amount of dial-up abuse taking place, according to John Reiser of the FCC's Engineering Policy Branch. "Our primary interest is to have the station operate in the best possible manner. We want licensees to take advantage, to use new technology."

"However, one thing is important—the licensee must know what is going on," Reiser says.

Manufacturers, while stressing that their equipment is to be used legally, privately maintain that they have heard of abuse taking place. "Yes, in general, it is happening," one says. "Our system can be programmed to do anything."

The FCC's Field Operations Bureau (FOB) does check if a station's transmitter remote control system is operating properly, and, according to Reiser, has found dial-up equipment abuse at several stations.

Special Report

Yet, industry officials acknowledge there is little the FCC can do to prevent an engineer from bypassing specific transmitter "control points"—which should contain a duty engineer, transmitter shut down facilities and Emergency Broadcast System (EBS) capabilities.

How much is too much?

Stations must have specified remote control points, Reiser stresses. Dial-up remote control is permitted, he adds, provided that the on-duty operator, at a specific control point on file with the Commission, is acting as the "gate keeper."

For example, Reiser notes the FCC has no problem with the use of remote systems in which an engineer performs remote changes with the on duty operator's full knowledge and ultimate control to disconnect the dial-up circuit.

However, Reiser maintains that the FCC rules do not permit an engineer to simply advise the duty operator that some changes will be made and then go about those changes via the dial-up circuit without the operator's direct knowledge.

Yet, there appears to be some confusion among manufacturers about this point.

One manufacturer's representative says he sees little difference in the case of an engineer tweaking the transmitter on premises without the full knowledge of the duty operator and a case in which that engineer is doing the same thing via a pay phone off premises.

Another manufacturer says that dial-up remote control was permitted from any phone as long as the engineer "called the remote control point (operator) first"—and called again when he had completed the changes.

Reiser points out that an engineer can make changes at the transmitter site by only advising the duty operator he is doing so. The duty operator, unlike in a remote control situation, does not have to monitor the engineer's changes since, technically, the engineer on site has final control of the transmitter.

Method to the madness

Broadcast consultant Don Markley says that while the Commission has relaxed the "methodology" behind the rules, the duty operator at a specified control point must still be in ultimate control of the transmitter. He adds that when dial-up control is taking place, the operator must still "be kept in the loop."

While acknowledging that the rules are "confusing," Bill Fink, VP/sales of Moseley Associates, says the intent is to make sure that the FCC is always able to contact the duty operator.

One manufacturer says that "some FCC field office personnel are misinterpreting the rules." Reiser acknowledges that he has fielded questions about dial-up technology from manufacturers, stations and even other Commission officials.

"The rules are incredibly vague," adds Harold Hallikainen, president of manufacturer Hallikainen and Friends. "We often have to rely on pronouncements from Reiser." Hallikainen's firm issues detailed interpretations of FCC rules each time remote gear is sold.

One area of key concern with remote control systems, Reiser maintains, is Emergency Broadcast System (EBS) accessibility.

EBS control, according to Reiser, does not have to be available at the control point if it can be accessed by available studio personnel.

But if there are no studio personnel on duty, then the duty operator—even at the remote control site—must be able to monitor the EBS warning system.

Jesse Maxenchs of TFT, which does not make a dial-up remote product, says the EBS requirement can be an obstacle to a legal remote control point. "There are difficulties. Every remote control point needs an EBS receiver." Few CE's bedrooms are so equipped, he suggests.

In our third installment, in our next edition, we will take a look at the manufacturers and the dial-up hardware.

NAB Tech Center Plans Begin

by Alex Zavistovich

Washington DC ... Work on the NAB Broadcast Technology Center, a non-profit facility with a goal of maintaining the "technical superiority of terrestrial broadcasting," is in progress, but the scope of that goal—as well as possible projects—remain largely undetermined.

Also unresolved is possible interaction between the technical center and NAB Technologies, Inc., the for-profit NAB subsidiary announced in March to "develop and promote new technologies."

NAB VP/Science and Technology Tom Keller said a direction is still being established for the technical center, which was announced by NAB President Eddie Fritts during the association's convention in late March.

At press time, Fritts had put together an internal working group to launch the tech center. Keller said meetings had just begun.

According to the NAB, the internal working group is comprised of Executive VP/Operations John Abel, General Counsel Jeff Baumann, VP/Research and Planning Rick Ducey, and Keller.

NAB officials involved in NAB Technologies, the for-profit venture, include Fritts, Abel, Baumann, NAB Joint Board Chairman Ted Snider, and Executive VP/Chief Financial Officer Mike Harwood.

Research will be conducted over the next several months to determine how broad the scope of each facility should be.

Dwindling ranks

Keller would not speculate on when internal preparations for the tech center would be completed, commenting that the NAB's executive board will have to approve the work "and probably have other committees look it over."

However, he underscored the importance of such a facility, echoing the sentiments of Fritts' convention speech, which commented on dwindling ranks in technological development groups.

National Public Radio (NPR), PBS and RCA were cited by Keller as cases in which development groups have either diminished in size or have been done away with entirely.

Last year, during the cost-cutting fever which gripped the networks, the CBS Technology Center was shut down.

Earlier this year, RCA announced its donation of the David Sarnoff Research Center to Stanford Research Institute.

The introduction of the NAB Tech Center is an answer to this decrease in broadcast technical facilities, Keller said, but he stressed that its aim is research, not strictly development.

"I think a lot of people misunderstood where we're heading (with the center)—they may have thought we were going to invent new equipment," Keller speculated.

He explained that the purpose of the center is "to support terrestrial broadcasting where it is not now being supported, even by the offshore companies."

Keller said the center will aim to compile information and data on a variety of broadcast-related issues.

"We (NAB) do not want to have crisis management every time someone says they want to do something with the spectrum," Keller said.

Although there might be some very practical problems that the center could research, Keller commented, much of its work may entail answering "questions that broadcasters have today and questions for the future."

One possible avenue for the tech center would be research into AM antennas, Keller said. The NAB is presently sponsoring a project for development of an AM antenna which would minimize or eliminate skywave interference.

The antenna project would "definitely" involve the tech center, Keller maintained. He anticipated that, in that case, work on the project might be "expedited faster," because the whole center staff would be working on it.

The center would also monitor the technological developments in AM, FM and TV broadcasting, Keller commented.

"We (the AM industry) have 3 kHz receivers today because we drifted that way," he explained. As part of the tech center's responsibilities, developments would be scrutinized to ensure that technology was "not going off in a direction which would damage the industry," Keller said.

Better methods for computing coverage areas and interference curves of FM and television stations may also be explored, he suggested, as well as standards for FM antenna measurements and directional antennas.

NAB Technologies

Keller was unsure of the interaction between the NAB Tech Center and NAB Technologies, Inc. He acknowledged that some of the research undertaken by the tech center may precipitate invention ideas.

In order to support itself, Keller speculated, the center may choose to patent the ideas, which might then be taken up by the association's for-profit subsidiary for further development.

Abel commented that use of royalties from NAB Technologies to support the tech center had been considered. However, he added, income substantial enough to support the center is "still a long way off" in NAB Technologies' development.

Although the two arms of the NAB would probably cooperate, Keller said, their lines of separation are still uncertain.

Snider, who is also chairman of the board of NAB Technologies, concurred. The purpose of the for-profit subsidiary is "research and development in the broadcast field," Snider acknowledged, but he added that the board is still investigating possible directions for the facility.

"We (NAB Technologies) are still at the very preliminary stages of seeing what our options are," Snider commented. "We still have not decided on whether to build a lab or anything like that."

NAB Technologies will, however, be a partner in Broadcast Technology Partners, a group of investors which is working to develop and promote the FMX FM stereo extension system. The system was developed by Keller and Emil Torick, formerly of the now-defunct CBS Technology Center.

For additional information contact Tom Keller at 202-429-5346 or Ted Snider at 501-661-7500.

Hazeltine Challenges Decision

by David Hughes

Ottawa Ontario ... Hazeltine, a partner with Kahn Communications in the ISB AM stereo system, has indicated to a Canadian court that it intends to challenge the March decision by that country's Department of Communications (DOC) to select the rival Motorola C-QUAM system as a national standard.

On 30 March, Hazeltine filed an "originating notice" with Canada's federal court indicating that it plans to challenge the DOC decision, which requires that all Kahn/Hazeltine-system stations cease AM stereo operations by 31 March 1988, or switch to C-QUAM.

Sources familiar with the situation confirmed to **RW** that Kahn Communications or Hazeltine had been planning to legally challenge the DOC decision. However, Kahn Communications President Leonard Kahn refused to discuss the matter with **Radio World**.

According to DOC Director General Ron Begley, the Hazeltine notice "does not detail the grounds" of a possible future legal fight to set aside the department's AM stereo ruling. "It is just a statement of intent," he said.

As of early May, Begley said he had heard of no further actions from Hazeltine to follow-up on its March notice.

Begley added that the notice was filed on behalf of Hazeltine by the Toronto-based law firm of MacBeth and Johnson. A representative of the firm could not be reached by **RW** for comment.

In the meantime, the DOC's decision to select C-QUAM is unaffected by the Hazeltine action, Begley said. The one-year time from to phase out all Kahn stations by 31 March 1988 is still in effect.

DOC officials said they selected C-QUAM because the majority of Canada's AM stereo stations had selected the system; they stressed the decision was not based on technical grounds.

For more information contact Ron Begley at 613-990-4820.

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).

Time to build our own

Dear **RW**:

It was very gratifying to see from the 1 May issue of **RW** that AM broadcasting received so much attention at the recent NAB Convention.

I have long been a fan of AM broadcasting and listen to it almost exclusively in my car and about 40% of the time at home when working.

My home-built relatively hi-fi AM stereo (Motorola—of course) tuner really comes alive when the stereo light comes on, and I just wish more stations were in stereo.

On the other hand, several letters published recently in **RW** point out a difficult problem for the listener and broadcaster.

There aren't any good tuners available, the stores don't have antennas to demonstrate any if they were available, and the dealers aren't interested in AM.

I have been in the business of designing tuners, both AM and FM for about 20 years and have attempted to stay in the consumer radio business in this country even though most of it, with the exception of car radios, is in some other country.

Does anybody out there have an idea for getting something going?

I can design the tuners, lay out the board and get the units assembled, but how do we get them out in the field?

One possibility might be low cost hi-fi AM radios tuned to a local station. They could be mono or stereo. Maybe the daytimers would be interested in this. Maybe more of the specialty manufacturers would be interested.

Unfortunately, this guarantees that the tuners will be too expensive for most listeners.

For my personal use, I prefer a dual bandwidth AM stereo tuner with a provision for an external whip antenna and an optional active antenna which can be mounted away from sources of interference.

An internal noise blanker is also a great help in many situations. Another possible option would be a synchronous detector for mono stations. This does wonders for skywave fading.

I also still feel strongly about the clear channel nighttime broadcasters. They serve an important purpose and should be protected.

In many cases, they provide both nighttime and daytime service over a very wide area and provide a variety that, in many cases, the FM stations do not.

Jon GrosJean, Consulting Engineer
South Woodstock, CT

Petition of protest

Dear **RW**:

We are students currently enrolled in classes of the Broadcast Engineering curriculum at Northern Virginia Community College.

We are writing to you in the hope that you can make your readers aware of the injustice being imparted to us, the students, and you, the professional community.

Through the short-sightedness of Dr. Josef Horowitz, the Engineering Division Chairman at the Annandale campus (where we attend), a decision has been made to eliminate the Broadcast Engineering Program over the protestations of the students and the Broadcast Engineering Advisory Board.

Our arguments to save our program and our professor, Mr. Edward T. Montgomery, have fallen on deaf ears at the college level.

We are now appealing to you, the media and professional community, to help us in alerting our elected officials, namely, Governor Gerald Baliles and Senator Clive DuVal, to the impact that the elimination of this program will have on the professional broadcasting community.

One of the main reasons cited for the elimination of the program is its lack of graduates.

Simply put, the reason for this is the lack of qualified personnel to fill job vacancies in the area.

Students are absorbed into the local job market before they *can* graduate!

We feel that if this point was made abundantly clear to those with the power to reverse it, the decision to do so would be made and that in the future, meddlesome axe-wielders like Dr. Horowitz will think twice before tossing away a program that *works* for everybody.

Thank you for your support.

Ryan Remson, Howard D. Craig, Yolanda C. Edmunds, Donald A. Bowlden, Carolyn Payton, James S. Theuer, Deborah Lynch, Rob Bowie, Ronald H. Norman, Vincent R. Forcier, Beatrice A. Brant, Michael Spurlock, Jim Powell, Steven Sund, Michael R. Coalson, M. Dakwala

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If It Ain't Broke

The FCC's plan to eliminate the geographical distinction between K and W station call letters and to allow more than one station to have the same calls is probably the worst idea to come from the Commission in a long time.

Is there a need for such action? Is the FCC in danger of running out of available four-letter combinations?

With our 26 letter alphabet there are more than 17,000 possible combinations for "W" calls, and the same number for "K" combinations.

Even deducting for obscene or other undesirable combinations, there should certainly be enough distinct calls to assign to the 10,000 stations in this country.

If eventually the time comes when there are not enough to go around, the Commission should take a lesson from radio history and simply start assigning five-letter calls, as it switched from three to four-letter calls in days gone by.

But the idea that two stations could have the same call letters is even more disturbing.

Call letters are a station's identity. For some, there's a great deal of history behind those three or four letters. Many stations have built up reputations over years of effort, and their good work has come to be associated with their station call.

Allowing another station, perhaps a newer one, to use the same letter combination would give it an unfair advantage by letting it ride on the original owner's reputation.

Arbitron has also stated that duplicate calls would cause a great deal of confusion in listeners' minds, which is a real danger for stations when it comes time to fill out those rating diaries.

The whole proposal seems ill-founded, with no good reason put forth by anyone on the Commission for why this action is necessary. Hopefully it's not a foreshadowing of what broadcasters can expect from the Patrick Commission.

Leave the call letter system alone. Deregulation just for deregulation's sake doesn't help anyone.

—**RW**

Not all deals ideal

Dear RW:

I too have been reading with interest your newspaper for many years and enjoy the articles very much.

I recently read the letter from Mark Croom of Pequot Lakes, MN concerning an article written by Tim McCartney about broadcast engineering.

My story was not as pleasant an experience as his.

I spent five years in the military learning electronics and part of that time with AFRTS. I enjoyed that time and the knowledge I gained.

When I got out of the military I went to work for a station in Memphis, TN.

I worked with a very smart engineer for one year, then he left and went to work for another station in town, which, looking back, is what I should have done.

I spent a number of months maintaining a Class C FM and a 5,000 W directional by myself.

When I thought about leaving, management would dangle the proverbial carrot in front of my face that they were looking for a CE and I might just be the one for the job. So I stayed.

A man was hired as my boss who didn't have the years I had in electronics but had a degree in an unrelated field, and was a friend of the DE.

Time was spent rebuilding the production room, and no matter what work I did, my boss would find a way to get the all the credit and see to it that I received none!

Many stories could be related to show this, but one day the final blow was struck that showed me it was time to leave.

One of the FMs in town let their CE go, and my boss told me he was thinking about hiring this man.

I told him that would be good because it would give us three people for the upcoming major rebuild.

My boss then told me that if he hired the other man, he would let me go, and I wondered how cold one individual could be to say that—especially one who could not find out too much about the station from me when he first came and was now ready to discard me when he was through using me.

I then left and went to work as CE for another station, and rebuilt some studios for them.

To my surprise, when I laid the last wire and the last cabinet was bolted shut, I was given my last check.

I believe that readers need to see both sides of this issue.

I'm not saying that there's some perfect place out there . . . we certainly all have to give and take.

I find, though, that there are a lot of shady operators more worried about the bottom line than the engineering of their stations or the people working for them.

I found that broadcasting is a business made up of some who will take advantage of you on impulse or a moment's notice.

I know most people only want to accentuate the positive side of the business, but let's consider the negatives, too.

Mike Hughes
Cleveland, MS

New K-W Call Plan Criticized

by Alex Zavistovich

Washington DC ... Citing mostly confusion among listeners, comments filed with the FCC by broadcasters, service companies and trade associations voiced opposition to a Commission proposition which would change FCC call sign assignment practices.

In February, the Commission issued a Notice of Proposed Rulemaking which would eliminate the geographical distinction between the letters "K" and "W" in station call signs. The prohibition on assignment of the same call signs to stations not commonly owned and operating in different services would also be lifted.

The proposed changes would also streamline the "first-come-first served" rules in call sign transfers for station ownership transactions.

Confusion possible

By far the most frequently mentioned problems with the Commission's proposal were that the changes could cause confusion in the marketplace and do not act in the public interest.

The NAB, while supporting the FCC's efforts to streamline the call sign assignment process, objected to the elimination of both the geographical restriction on K and W assignment and the prohibition on assigning the same signs to stations in different services, providing they are not commonly owned.

The NAB maintained that the changes to the call sign rules would "cause confusion to those in the broadcast industry and the public."

"Instead of creating a less burdensome environment, the Commission through these proposals could create more work for the agency, local courts and broadcasters, without any real benefits," the NAB held.

The Maryland-District of Columbia-Delaware Broadcaster's (MDCD) Association also urged that the FCC reject its "deregulatory objectives."

The proposed changes would cause listener confusion, hurt the broadcasters economically, and promote unfair competitive practices in certain markets, the group said.

Service marks and corporate logos are protected, MDCD pointed out, maintaining that stations should likewise be able to protect the individuality of station call signs, "or else the broadcasting business is at serious risk."

Arbitron, a radio and TV rating service, also argued that the proposed rulemaking could cause confusion in the identification of broadcast stations, possibly causing "negative impact in accuracy of audience measurement."

Call letters remain the "unique identifier" of a station and will increase in their prominence as new technologies emerge in the marketplace, the company said. "There is not another unique identifier available which would serve as a replacement."

Many licensees also spoke in opposition to the changes. For example, Taft Television and Radio Company and EZ Communications, Inc., in a joint filing urged the Commission to abandon the proposed modifications.

Use of similar call signs in different communities, the groups said, "would extend an already poor present FCC policy which permits commonly owned stations in different communities to use the same call signs."

There are so many available letter combinations that there is no need to allow use of identical calls in different market areas, Taft and EZ stated.

Station owners Gannett Company and Lee Enterprises also filed a common statement, maintaining that stations, advertisers and the audience have grown used to the K and W distinction as a tool for identifying the general location of a station.

Unless it can be clearly shown that there is a shortage of call letters, there is no reason to change a rule which has become part of "the basic fabric" of the broadcast industry, the companies said.

The changes in call letter use "do not advance the public interest meaningfully and should not be considered," Gannett and Lee stated.

Networks comment

Concern about the Commission's call sign proposal extends beyond broadcast associations and licensees. The three major commercial networks, as well as National Public Radio (NPR), also protested the modifications.

NPR warned of possible listener confusion between noncommercial public radio and commercial stations, and said that erosion of the noncommercial station's public image and donor base would be likely to occur if the Commission carries out its proposed changes to current call letter regulation.

The FCC proposal "poses a direct threat to the bond of trust established between a public radio station and its listeners" because of potential confusion, (NPR) stated.

NBC said the present call sign assignment rules are working in the public interest without imposing undue burdens on the Commission's staff or limitations on the public or broadcasters.

If the changes go through, NBC said, the FCC should require prior written consent of a licensee if a different licensee wishes to use the same call letters, whether or not the stations were in the same service or the same market.

Like NBC, Cap Cities/ABC opposed the changes and suggested that if the changes are adopted, written consent for use of a call sign should be obtained if the stations are in "overlapping markets."

However, prohibiting different licensees from using the same call sign, the network said, is the only foolproof way to prevent confusion and trademark abuse.

CBS pointed out that the proposal to eliminate limitations on the use of the K and W call letters would "multiply the possibility of audience confusion."

Docket number is MM 87-11. For more information on the FCC proposal contact Sharon Briley at 202-632-6302.

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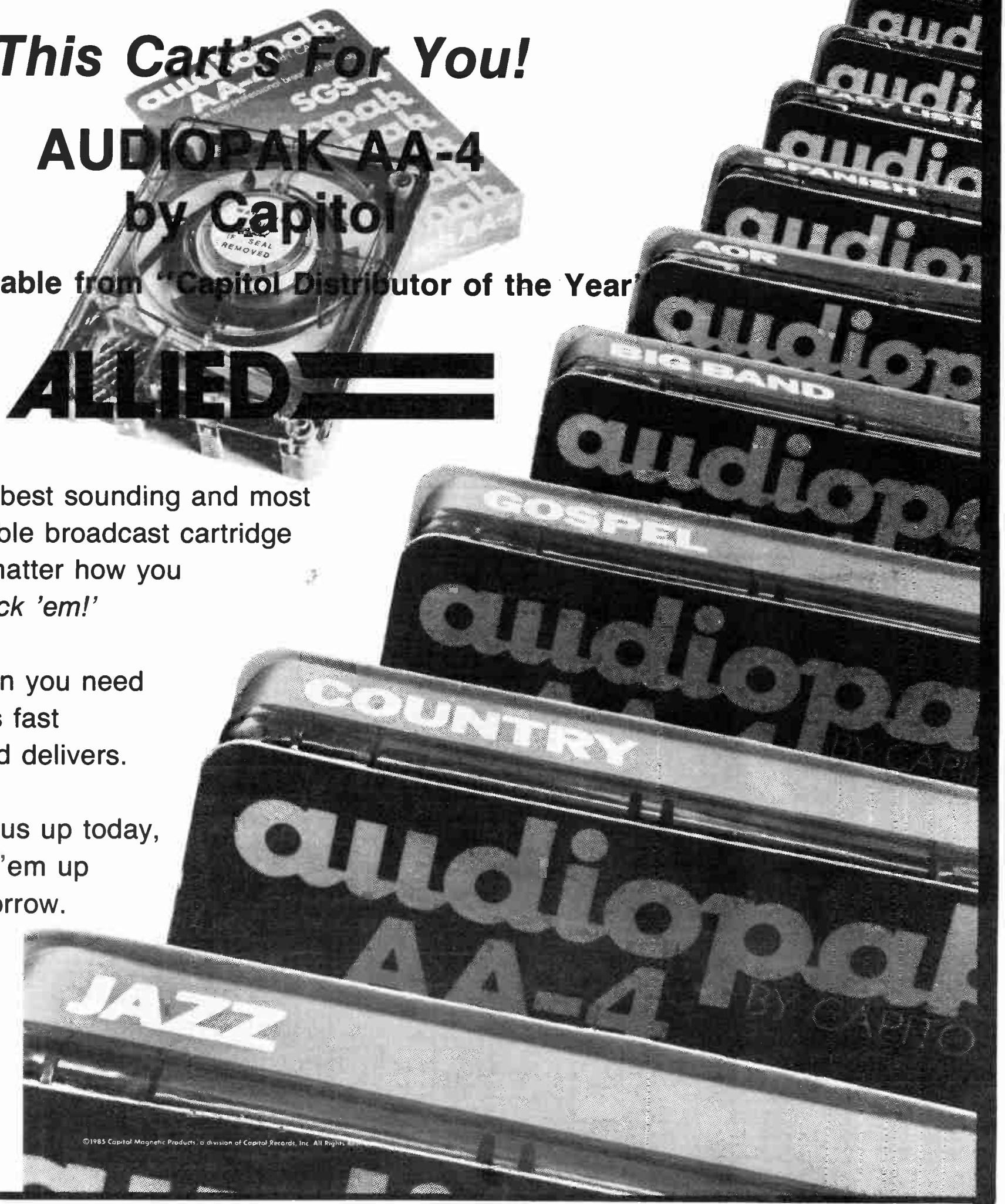

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Indecency Action a "Warning"

by Michael Starling

Washington DC ... Mass Media Bureau Chief Jim McKinney told broadcasters at the recently concluded Public Radio Conference that the FCC should continue to set and enforce stringent policies regarding the broadcast of indecent material.

McKinney also discussed regulatory policies in an era of deregulation, and urged broadcasters to embrace emerging technologies such as digital transmission, and he also appeared to renounce a recent Commission plan to change call letter regulations.

The primary focus of the session was the Commission's warning letter against three broadcasters charged with airing indecent programming.

Only a warning

In response to numerous questions McKinney stressed that an occasional expletive in song lyrics or unforseeable language used during a live show will not necessarily be the subject of Commission action.

Yet in underlining the Commission's view on indecency McKinney stated, "I will caution you the first actions we took here were in fact only warnings. The next actions may not be warnings."

He added that action against stations could take the form of forfeitures, or revocation if the violation is considered severe enough.

In its original indecency ruling, the Supreme Court held that time of day could be taken into consideration when handling indecency complaints.

But citing Arbitron research McKinney said, "When you look at national statistics there are 2 million kids listening at 10 PM which drops off to 1 million at midnight and it isn't until 3 AM that it goes to virtually zero."

He maintained that when considering the broadcast of indecent material, broadcasters must act as if there are children listening at all times as adults.

Responding to broadcasters who maintained that increased ratings for a program like the Infinity Broadcasting-based Howard Stern program would seem to indicate that the show is not in violation of community standards, McKinney said "It doesn't mean a damn thing."

He pointed out that a given program can garner a top rating with relatively few listeners, especially in large markets such as New York City.

McKinney also stressed that broadcasters must understand that community standards do not necessarily refer to just the local community, "but in effect say that the FCC sitting in Washington can make that decision for your station wherever it is in the United States."

Time for digital

McKinney also urged broadcasters at the session to think about digital transmission, although he emphasized that his remarks were solely his own observations, and not indicative of any FCC policy.

"Let's face facts. Digital is taking off in the United States and you can't do digital in the FM band. You may need the ability to go digital over the broadcasting medium in the not too distant future, if you're going to maintain a competitive edge against tape recordings."

> *'The next actions may not be warnings.'*

McKinney speculated that digital signals could be put in the spectrum adjacent to TV stations, loaded through a "spread spectrum technique" or delivered by satellite.

McKinney offered no timetables on his prophesy of when digital broacasting might become a reality but stated, "The Commission is sort of thinking about it. It hasn't opened anything and we're not prepared to open anything."

No routine inspections

McKinney played down some broadcasters' fears of site inspections indicating it is now a rarity for the Field Bureaus to send out inspection teams on their own initiative.

But McKinney had a strong warning for broadcasters who believe that the recent climate of deregulation at the Commission gives them total freedom from accountability.

"This Commission under this Chairman [Dennis Patrick is not going to look favorably on stations that aren't doing what little bit is left after deregulation," McKinney maintained.

He also told the public radio audience that some of the commercial broadcasters, starting with license renewals coming up in 1988, "are going to be in some considerable deep trouble."

Regarding the proposal to deregulate call signs by relaxing the traditional East-West W/K separation he confessed, "When you've been in government service for some 24 years, there are going to be some few incremental things that you wished you'd never done. I wished I'd never suggested it. It's a 90% certainty the Commission will not adopt the proposal."

FM Improvements Discussed

by David Hughes

Washington DC ... FM improvements —including new methods for predicting signal coverage, advanced receiver and antenna designs to reduce multipath effects and the latest developments in a plan for an across-the-board power hike for Class A's—were examined 29 April by the NAB's FM Transmission Subcommittee.

In addition, the FCC has opened up for comment a plan that could allow short-spaced FM stations to use directional antenna systems to reduce distance separations between adjacent channel and co-channel facilities.

FM coverage patterns

The NAB's FM subcommittee, which was formed earlier this year, is in the early stages of studying FM coverage patterns and developing more accurate models, according to group co-chairman John Marino, of NewCity Communications.

"We are studying what differences there are between real world coverage versus theoretical," he said. FM broadcasters need a "better model."

Marino said that broadcasters should not have to make as many contour measurements in order to predict coverage.

He maintained that the subcommittee would continue the work at its next meeting, including the creation of a working group to study the matter.

The FM subcommittee is also looking at ways to reduce multipath effects, including methods of determining more accurately how different types of antennas, antenna heights, tower mounts and other factors affect multipath.

A key point of the group's multipath study focuses on talks with receiver manufacturers, especially about the production of diversity FM antennas for automobiles.

A diversity system, used in automobiles, features two antennas—often a rear window mounted unit in addition to the traditional whip unit—to reduce multipath effects.

Marino said he anticipates more discussions with receiver manufacturers in the future.

Marino added that the group at its April meeting also discussed the FMX stereo coverage extension system. System co-developer Emil Torick indicated that receivers could be available by next year.

Class A's

The subcommittee also discussed a possible Class A across-the-board power increase.

Subcommittee member John Furr, CE with Clear Channel Communications, told **RW** that his firm expects to file a rulemaking petition with the FCC by early June asking that Class A's be allowed to upgrade from their 3 kW limit at 100 m HAAT (or the equivalent) to 6 kW at 100 m.

Furr said that a "compromise" had been worked out with representatives of higher powered FMs—Class B's and C's—to minimize the effects of interference created by the Class A power hikes, if the plan is approved.

"We have proposed using the existing FCC rules, framework and procedures for handling short spaced problems," Furr added.

Directional inquiry

In addition to the subcommittee's actions, on 1 May the FCC initiated an inquiry to consider authorizing directional antenna systems to reduce separations between adjacent channel and co-channel stations.

The Commission said that "the limited use of directional antennas for short-spaced transmitter sites may provide more efficient use of FM broadcast spectrum."

"FM directional antennas have been used successfully for many years, and their use in short-spaced situations may offer some licensees the opportunity to expand or enhance their coverage," the FCC added.

The FCC maintained, however, that the use of directional antennas is not under consideration for channel allocations.

"Rather, this proceeding only considers the extent to which directional antenna systems can be tailored to accommodate short-spaced stations' transmitter/antenna sites within the framework of the Table of Allotments," it said.

The docket number of the FCC's directional antenna proposal is MM 87-121; contact Bernard Gorden at 202-632-9660. The next FM transmission subcommittee meeting is slated for 17 June in Washington DC. For more information on the FM group's activities contact John Marino at 202-333-4800.

Tariffs Exclude CD

by Alex Zavistovich

Washington DC ... Revision to a list of affected items has allowed broadcast equipment manufacturers to escape from tariffs on certain Japanese products, imposed in response to that country's alleged violation of a 1986 semiconductor chip agreement with the US.

The Reagan administration on 17 April leveled approximately $300 million in 100% sanctions against a variety of Japanese color televisions, computers and power tools. Initially, however, the sanctions would have also been directed at most types of audio equipment.

Bill Sacks, president of Straight Wire Audio, which sells a modified CD player for broadcast use, said tariffs were to be levied against any Japanese product containing a small motor. Such action would have affected broadcast equipment and, consequently, broadcasters who used the Japanese devices.

However, Sacks, who spoke with a White House liaison regarding the tariff, discovered that the administration did

(continued on page 13)

Broadcasters Need RF Policy

by Alex Zavistovich

Washington DC ... RF radiation measurement and the effect of RF regulations on broadcasters were among issues discussed at the annual meeting and symposium of the Electromagnetic Energy Policy Alliance (EEPA), held 22 to 24 April at the Westin Hotel in Washington DC.

The EEPA, an association of manufacturers and users of non-ionizing electromagnetic equipment, conducts the yearly conference to disseminate current RF information to the telecommunications community. However, attendance at this year's symposium was sparse.

EEPA President Barry Umansky acknowledged that the number of symposium attendees was lower this year—approximately 60 to 70, compared with last year's 100—but stressed that the decrease does not indicate lessened interest in RF issues.

"Public focus on electromagnetic energy has increased this year, if anything," Umansky maintained. He attributed the small size of the audience to a "conflicting date" with an event held by the Association of Home Appliance Manufacturers, which "drew from the same base" as the symposium.

"We've been lucky the last couple of years to find a date with no conflict," Umansky said. "We were less lucky this year."

Focus on Broadcasting

One of the most pertinent sessions of the symposium was titled "Focus on Broadcasting." Moderator Ralph Justus of the NAB Science and Technology department maintained that "sound, reasonable, and scientifically-based RF protection guidance" is required for the broadcast industry.

The need for such guidance was reiterated by Dan O'Brien, GM of KONG-TV, an independent television station in Seattle, WA.

O'Brien explained that an antenna farm in Seattle atop Cougar Mountain provides a direct line of site to the cities of Seattle, Takoma and Everett. Broadcasters in the area need to ensure they are getting a city grade signal into Everett, he said.

KONG's problems began, O'Brien maintained, when the station submitted a plan to redesign the antenna site, increasing the number of antennas while attempting to reduce ground level radiation.

Residential groups and Seattle city officials have kept the KONG request in the courts for years, he said, with various complaints and allegations of potentially harmful ramifications which may result from the proposed change in design.

The problems are compounded, he said, because experts in the field disagree on matters such as measurement techniques and exposure criteria. Such disagreements spark further questions among concerned residents, O'Brien said.

On the federal level, FCC Physical Scientist Robert Cleveland spoke about compliance with Commission guidelines concerning RF radiation exposure. He pointed out that much of the Commission's policy on RF radiation is detailed in the FCC's Office of Science and Technology Technical Bulletin Number 65.

Cleveland discussed several methods for guaranteeing compliance, distinguishing between public and occupational exposure.

Public exposure to RF radiation can be minimized by restricting access to the area with fencing, he said. Signs warning that the site is a high level radio frequency energy area may also be used.

In some cases, redesigning the antenna, increasing antenna height or relocating the antenna site should also be considered, he said.

Occupational exposure can be limited by taking into account the American National Standards Institute (ANSI) six-minute time averaged exposure criteria. Other possibilities include shielding the RF source, temporarily reducing power, or using an auxiliary transmitter when the main is being worked on.

Measurements discussed

In a session titled "Measurements: Fact and Fiction," Holaday Industries VP/Engineering David Baron noted that "proper application of the ANSI radiation protection guidelines implies the ability to measure both spatial and temporal variations."

Complex radiating structures and proximity to other conducting elements produce uneven variations in field intensity, Baron said. This makes it difficult to use only a few widely spaced measurements to get a realistic picture of potential RF exposure levels.

Baron said rugged, portable broadband equipment is available which can measure variations over time and space and compute time-averaged RF field exposure.

However, Richard Tell, chief of the Electromagnetics Branch of the EPA's Office of Radiation Programs, stressed there may be problems in obtaining accurate RF measurements.

In many cases, Tell said, measurements can yield faulty data because of bad instruments or operator error. Operator error includes not looking at the performance specifications of a given instrument, and focusing too much on a maximum value—a "hot spot"—and not enough on typical exposure values over the entire area.

Tell attributed some equipment shortcomings to the fact that "manufacturers aren't real-world users." Much of the equipment could be improved if manufacturers did more field-testing, he said.

NAB plans for RF education

Umansky, who is also the deputy general counsel of the NAB, noted that the NAB has plans for disseminating RF radiation information to the broadcast community.

The association intends to videotape a presentation by Dan O'Brien on his experiences in Seattle, for distribution to various state broadcasters' association meetings, Umansky said.

"In the absence of federal preemption or other standards, a situation like Dan's could happen to anyone," Umansky said.

A counsel memo dedicated to compliance with the FCC's RF radiation rules will be included in *Radioactive*, the NAB's magazine for its radio broadcasting members.

Other Commission RF information will be available through the NAB in a booklet titled "A Broadcaster's Guide to FCC RF Radiation Compliance." The booklet is a revised reprinting of a similar guide first issued in November 1985, Umansky said, and will highlight such issues as categorical exclusion of certain services from RF level measurement.

At press time, the book was to be available from the NAB in May.

Umansky stressed that, by spreading information on RF compliance, the NAB is seeking to ensure that "stations are doing whatever has to be done to certify compliance, to facilitate renewals and modifications."

For additional information contact the EEPA at 202-452-1070. Contact Barry Umansky at the NAB: 202-429-5456.

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Daytimers May Add Night Power

(continued from page 1)

powers.

The committee, at its 26 April meeting in Washington DC, passed a resolution asking the Commission to "immediately" proceed with a rulemaking proposal that would allow Class III daytimers to operate at night.

Following the recent Commission proposal, Palmer said he was not surprised that the FCC acted so quickly after the committee submitted its request.

The committee had asked the FCC to implement the Class III nighttime operations "not later than" 1 September 1987.

Palmer said the committee told the FCC that it needed help by this fall—when the days grow shorter—for Class IIIs. "Lots of stations have (nighttime) sports committments," he said.

The daytimers committee request is not the first time the FCC has been asked to authorize night powers for Class IIIs. In March 1986, the NAB, joined by the Association for Broadcast Engineering Standards (ABES), asked the Commission to authorize "full nighttime authority at reduced power."

They recommended that Class III daytimers be given night power levels equal to their "second hour after sunset" post-sunset authorization (PSS) levels. Most affected stations, the 1986 petition claimed, would receive less than 250 W.

Also acting before the most recent FCC daytimers plan came out, the daytimers committee had set the wheels in motion to get night powers for daytimers on Class I, clear channel frequencies.

While Palmer stressed that the committee has "its plate full" with other work, including the Class III issue and is not yet ready to begin a major campaign for daytimers on Class I channels, it is asking for "hard data."

At its April meeting, the daytimers committee asked the NAB to work with Congress, ratings services and the National Telecommunications and Information Administration (NTIA) to develop "reliable information on AM night audience licensing patterns."

Palmer pointed to a study conducted last year in a North Carolina town on listening habits for clear channel stations, but he maintained that more detailed, comprehensive data is needed.

"We have to find a way to extract data and make it meaningful," he said.

Rather than concentrating on interference criteria and protection ratios, Palmer said the new study should focus more on listening habits.

Daytimers are hoping to confirm what they already surmise—that relatively few radio listeners rely on distant clear channel signals, he added.

Palmer said the committee plans to push the FCC for night operations for Class I's after the study is completed and the data is analyzed. He added that the Commission's recent plan would not have any effect on the study.

Umansky, commenting after the FCC plan was released, said that the clear channel study results will be "tied into the FCC proceeding."

DST ruling, other issues

Also at its April meeting, the daytimers committee passed a resolution asking the Commission to reverse its March decision to establish a 10 W minimum power limit for daytimers during the three week extension of daylight savings time (DST).

"We're going on the record," Palmer said. "We're angry about it."

In January, the FCC proposed establishing a 50 W pre-sunrise authority (PSA) power level during the three week extension of DST in April. Starting this year, DST started on the first weekend of April instead of the last.

Daytimers complained that they would lose a key hour of morning drive-time because of the shift.

However, because of the required comment periods on the rule change and the lack of time to study those comments before April, plus opposition to the plan from fulltimers, the FCC instituted only a 10 W minimum limit.

The Commission said it would study the issue later this year and possibly revise its ruling in time for the start of DST in April 1988.

The daytimers committee also asked the FCC to give high priority to the two antennas in the NAB's Washington DC-area AM antenna project.

Palmer said the committee is doing what it can to make sure the antenna project, which includes the testing of two antennas that improve groundwave coverage and reduce skywave, does not face future delays.

Also discussed at the April meeting was the issue of Bahamian clear channel frequency 1540 kHz. US daytimers on that frequency still cannot add nighttime operations because the Bahamas, unlike Canada and Mexico, have not had talks with the US to allow night operations on foreign clears.

At **RW**'s press time, no date had been set for the next daytimers committee meeting. For more information on the group contact David Palmer at WATH/WTXQ, Athens, OH: 614-593-6651.

The docket number of the FCC's night operations for daytimers plan is MM 87-131. At press time, comment and reply comment deadlines had not been set. For more information contact Louis Stephens at 202-254-3394.

CDs May Have Audible Notch

by Alex Zavistovich

Washington DC ... Anti-copying legislation under consideration by Congress for digital audio recording may produce an audible effect in recorded music, including compact discs aired on radio stations.

Legislation recently introduced in Congress would make mandatory the inclusion of an anti-copying device in digital recording.

This is in response to requests from the music recording industry, which fears that the introduction of Digital Audio Tape (DAT) recorders into the market without such devices would result in widespread "bootleg" recording of CDs.

While most radio broadcasters are apparently unaware of the pending legislation, it is being opposed by home recording supporters as the swan song for digital audio tape (DAT).

Audible dropoff

Under Senate Bill S.506, introduced 5 February, and a similar House bill introduced in early March, HR1384, copy-code scanners would be required in all digital audio recording devices.

The anticopying device considered the standard, CBS's Copycode, is believed by some to produce an audible signal dropoff in encoded material. CBS spokespersons, however, deny this allegation.

The copy-code scanner, a circuit in the recording mechanism of a digital recorder, would scan in the audio frequency range of 3500 to 4100 Hz. The circuit would search prerecorded source material for an encoded notch in the audio range of 3700 to 3900 Hz.

If such a notch is detected in the source material, the bill specifies, the scanner would stop the digital recording process for at least 25 seconds.

The encoding of the notch during recording of CDs and other digital media is supported by the Recording Industry Association of America.

The proposed legislation also stresses that "no person shall manufacture, assemble or offer for sale, resale, lease or distribution in commerce any digital audio recording device which does not contain a copy-code scanner." Scanner deactivating devices and the removal of scanners from recording devices are prohibited under the bill.

Monetary awards are also stipulated in the bill.

CBS Laboratories has already developed a built-in anti-copy device, an integrated circuit microchip called the CBS Copycode. The CBS system, if approved, will be the standard anti-copying device installed in digital equipment.

However, the notch read by the system, at 3840 Hz, is being criticized by some engineers and broadcast professionals as being detrimental to the sound quality of recordings encoded with it.

John Sunier, producer of the syndicated hi-fi radio program *Audiophile Auditions*, said that, in reading the specifications of the chip, the notch has to have a "gross effect" on sound quality.

"The whole thrust in audio has been to get flatter frequency response," Sunier maintained. A notch "puts a crevasse in that flat frequency response, so it has to have some effect on the audible sound," he said.

Opposing sides of the notch issue further squared off on 2 April, at a joint session of the House and Senate Judiciary Subcommittees. At the time, Home Recording Rights Coalition (HRRC) spokesperson Charles Ferris said that the bills "would effectively kill the digital audio tape as a new format."

In addition to the statement from Ferris, Congress was also presented a demonstration of the effectiveness of the

(continued on next page)

Anti-Copying Device Audible?

(continued from previous page)
CBS Copycode device, by both supporters and opponents of the technology.

The official CBS position was taken by David Stebbings of CBS Records Technology. Len Feldman, audio consultant for the HRRC, took the opposing stance.

During the session, Feldman maintained that notching of source material can affect sounds in the 3715-3965 Hz range.

Feldman also questioned the necessity of a copycode device in DAT machines, noting that the recorders use a 48 kHz sampling rate for recording, rather than the 44.1 kHz rate used for CDs, which in itself prevents copying.

Speaking to RW later in April, Feldman pointed out that the notch would color encoded music by affecting harmonics and overtones present in the recorded material.

In future demonstrations to Congress, Feldman said a band pass filter the exact reciprocal of the notch will be used to indicate precisely what, if anything, is lost in the music.

Feldman stressed that the anticopying device for DAT is "a foot in the door" for its proponents. If successful, he speculated, anticopying supporters would fight to get the system on video and radio as well, ostensibly to prevent home taping.

Many recording engineers and artists have expressed dissatisfaction with the anticopying system, Feldman maintained, adding that the system addresses the issue of home recording poorly.

"I'm not saying there isn't a problem (with home recording)," he said. "But if there is, sucking out frequency response is a bad way to address it."

Feldman also noted that DAT machines contain a flag code, part of the digital subcode, which inhibits digital-to-digital recording. All DAT machines recognize that flag code, he maintained, and shut down if digital-to-digital recording is attempted, even with a sampling rate converter.

No effect on music

Larry Gardner, an engineer with CBS Records, admitted the notch, at 3840 Hz, is "definitely within the audio range." But he stressed that the notch frequency lies between the fundamental tones and the overtones or harmonics of recorded instruments.

Therefore, fundamental tones and their harmonics in recorded music are not affected by a notch at that frequency, Gardner maintained.

Further, he said, listening tests conducted by CBS and various recording industry groups on a variety of music have not indicated any audible degradation of the signal encoded with the notch.

Gardner also acknowledged that test results presented before Congress on the audibility of the notch varied when made by CBS and by opponents of the system. However, he criticized the latter testing.

One of the tests performed by Feldman during the Congressional presentation was an oscillator sweep through the notch filter, showing that the signal attenuates over time, Gardner said.

He stressed that such a test is not a true reflection of how the system would work with music.

Opponents of the encoding measure also do not have access to an approved, working Copycode encoder, Gardner continued. Test presentations by Copycode detractors are made using equipment which may not perform in the same way the CBS system does, he said.

Gardner labelled the argument against encoding "ridiculous," saying that the recording industry is proud of its accomplishments in recorded music and would not degrade the music with an audibly detectable anti-copying system.

At press time, however, special demonstrations of the Copycode at London's Abbey Road recording studio in early May indicated that the system did audibly degrade the quality of some encoded music, at least in the opinions of approximately 30 recording engineers on hand.

CBS's Stebbings reportedly maintained that the system could be turned off during "problem passages" in recorded music. Such passages could include audio reproductions of piano sounds, in which the Copycode apparently audibly distorts the quality of recording in the upper registers.

CBS spokespersons were unavailable for comment on the London demonstration.

For additional information, contact the Home Recording Rights Coalition at 202-663-8452. Contact John Sunier at 415-457-2741, Larry Gardner at 203-783-4033, Len Feldman at 516-482-5629, or Edward Davis at 415-441-5332.

CD Players Not Included in Tariffs

(continued from page 9)
not want to enact any policy which might "harm the consumer."

As a result, he said, all Japanese products currently targeted by the US for sanctions can be competitively manufactured by Korean or American companies, he said. That would not include CD players.

Tariff supporters believe the Reagan administration's action will help reduce Japan's estimated $59 billion trade surplus with the US.

No impact on broadcast gear

Because of the modifications to the original tariff proposal, broadcast equipment manufacturers managed to squeak by unaffected, and company spokespersons seemed unconcerned by the duties.

Sony spokesperson Alec Shapiro said the tariff has "no relevance whatsoever to the broadcast market."

He noted that the sanctions could have "just as easily zeroed in on broadcast equipment" as any other products, but did not.

Otari Product Manager John Carey said that Otari's products are not included in the tariff. He expressed concern, however, about the "protectionist" policies of the US Congress.

Tascam/Teac Product Manager Jonathan Bliese said none of his company's broadcast line has been affected by the tariff, and he speculated that, even if other equipment is added to the tariff list, the duties would be unlikely to affect sales in the near term.

Tascam is less concerned about the current tariff action than it is about the state of currency exchange rates between the US and Japan, Bliese said. The yen has increased in value by approximately 40% since last fall, he noted.

JVC spokespersons declined to comment on the duties, except to say they would not affect the company's sale of broadcast products.

Nakamichi National Sales Coordinator Michael Wuellner said the sanctions have had no effect on the firm's broadcast line, and he did not anticipate any adverse effect in the future.

Gephardt Amendment

While the 100% tariff on Japanese products may not affect broadcast equipment, it remains unclear whether the same may be said about the so-called "Gephardt Amendment"—a plan intended to improve the US trade deficit situation with a number of countries, including Japan.

On 29 April, less than two weeks after the tariff action, the House of Representatives approved an amendment to Section 301 of the Trade Act of 1974. The amendment, piloted by Missouri Congressman Richard Gephardt, would impose tariffs and taxes on countries which have not removed trade barriers to the US.

The tariffs would reduce by 10% per year the trade surplus of nations such as Japan, West Germany, Taiwan and South Korea.

At press time, the Gephardt Amendment had not gone to the Senate. Speculation in Washington was that the measure would not go through without major revision, but opponents fear that, in any form, Gephardt's proposal may signal a "trade war" with other nations.

FCC Files

(continued from page 2)
tions of an AM facility with either a UHF or a VHF TV station.

The multiple ownership decision, part of a January rule proposal, also suggested a relaxation of the FCC duopoly rule allowing common ownership of two or more AM stations whose 5 mV/m groundwave contours do not overlap.

Two or more FM stations may likewise be commonly owned, as long as their 3.16 mV/m contours do not overlap, according to the FCC plan.

Under current regulations, ownership of commercial broadcast services in the same market is limited to one AM/FM combination, or one TV station, or one daily newspaper per market. Common ownership of two or more AM or FM stations whose 1 mV/m contours overlap is prohibited.

The comment deadline for the proposal, contained in docket 87-7, is 15 June; reply comments are due by 15 July. Contact Andrew Rhodes at 202-632-7792.

Transmitter identification

At press time, the FCC was expected to rule in May on a plan to require an automatic transmitter identification system (ATIS) on satellite uplinks, radio transmitting devices and other broadcasting services.

The ATIS system, proposed last August, modulates a unique number onto the radiated signal of each transmitter. The number acts as a broadcast "signature."

FCC action may take the form of a final rulemaking or an advisory committee proceeding.

Docket number is 86-337. Contact John Hudak at 202-632-6977.

Cuban Interference

Responding to the Cuban AM band interference problem, the FCC has recommended granting nine monetary awards since 1985 in a program to compensate AM stations for transmission system improvements made to battle Cuban interference. The most recent recommendation was made in February—a second request filed on behalf of St. Petersburg FL's WSUN.

The requests total more than $1.5 million. However, Congress has recommended appropriation of only $500,000 to the US Information Agency (USIA) which distributes the funds. Funds for the first six claims were expected to be dispersed by this summer. The other three claimants will have to wait for the USIA to file another request for funds from Congress.

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

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

RF Lighting

The FCC Office of Engineering and Technology (OET) is preparing a recommendation regarding emission limits for RF lighting interference to AM radio. The OET's deadline is the end of June.

Last year, the FCC proposed radiation limits on RF lighting devices at frequencies below 30 MHz. Such devices have been reported to cause interference to AM radio reception.

Comments in response to the proposal included a statement by 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.

FCC officials could not provide a date for an order on the issue, but speculated that it may remain pending until the end of September.

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

Minority Policy

In December 1986, the FCC said it was asking for comment on its female/minority ownership policy and is postponing action on applications for distress sales that relate to that policy.

The policies in question deal with the application of racial, ethnic and gender preferences in comparative proceedings for broadcast licenses, the administration of its minority distress sale policy and the issuance of tax certificates for broadcast station sales to minorities.

The comment period lasted through April, with the reply comment period extending into June. Docket number is MM 86-484. Contact Bob Ratcliffe at 202-632-5414.

Call Letters

In comments recently filed with the FCC, broadcasters opposed a proposal which removes the geographical restriction for K and W call letters, and allows the use of the same call letters by more than one station.

The most common complaint raised in the comments was that the FCC plan would cause confusion in the radio audience. Broadcasters also feared the policy would lead to new stations "trading" on the good reputation established by other stations with the same calls. (See the article in this issue for details.)

Docket number is MM 87-11. Contact Sharon Briley at 202-632-6302.

Point System For NAB Exhibits

(continued from page 1)
that has had a merger," he said.

One final provision of the new plan calls for companies to lose all of their points if they fail to exhibit for two consecutvie years.

Procedure started

Before exhibitors are allowed to select booth space according to point totals, the totals themselves will have to be verified.

To do this, according to Dobson, the NAB was scheduled to mail two lists to each exhibitor in May—one listing firms and points alphabetically and the other

> *Firms will then be able to select desired space.*

in order of point totals.

Companies will then have an opportunity to "challenge" their total and submit a form stating what was wrong with NAB calculations. Companies that fail to respond will be contacted by phone.

Following a three week challenge period, the NAB will issue a final list and mail that to exhibitors with a space application form.

Firms will then be able to select desired space, including alternates should the first choice not be available, and note any booth size changes.

When those forms are received by the NAB, they will be placed in order of point totals and processed, Dobson said.

Firms that cannot select their ideal space can be placed on a "better space waiting list," Dobson said. The list will offer space that becomes available in the future on a "first come, first served basis."

Exhibitors on this list will have priority over companies that have never exhibited at an NAB show before. Those companies will be on another waiting list, he added.

While the new system will provide a mix of radio and TV booths, Dobson added that a special "radio only" area will be available should an exhibitor want to locate there.

The "Hilton" problem

The NAB also hopes to avoid problems associated with a shortage of exhibit floor space at the Las Vegas Convention Center.

In 1985, the last time the NAB show was held in the gambling mecca, exhibitors complained about low attendance at an exhibitor overflow site at the nearby Hilton hotel center.

Dobson said several options are being examined to remedy the problem.

He indicated that the NAB is considering using another exhibit area, dubbed "the west hall," across a parking lot from the main convention center. One possibility would be to have the outdoor exhibits serve as a link between the main center and the overflow west hall.

Dobson added that the NAB may decide to use the Hilton center again. But if it does, it would probably also have convention registration facilities there, to draw traffic.

He added that a food service area would also be located there, and the secondary floor may open a half hour before the main floor to attract traffic.

Problems associated with the secondary hall should also be eased because it will be incorporated into the grand scheme of the show, rather than added as a last minute item like it was in 1985, Dobson said.

"The secondary site must be part of the plan from the beginning. We will have major companies in that facility; it will not be an afterthought," he maintained.

Next year's NAB convention is scheduled for 9 to 12 April, 1988.

For more information about the new point system contact Rick Dobson at the NAB, 202-429-5335, or Irwin Ungerleider at Sony, 201-833-5200.

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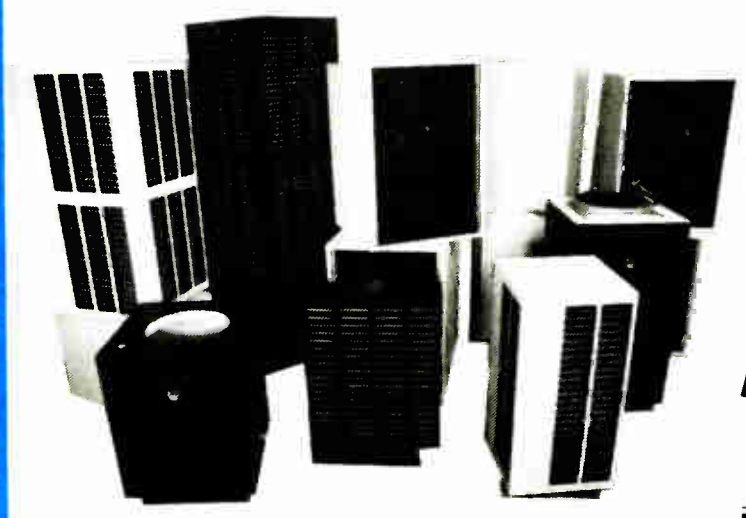

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Circle Reader Service 46 on Page 22

One Dark and Stormy Night . . .

by John "Q" Shepler

Rockford IL ... January 5, 3:00 AM. The thermometer reads −13° F. Wind gusts fill the air with hard little snow crystals that blast the top layer of skin right off your face.

One garage light in the neighborhood is on. Inside, chief engineer Joe is muttering to his Jeep. The dashboard is in pieces. Wires are everywhere.

Joe had been installing some new accessories last evening and knew perfectly well which wires had been disconnected and where they went. That was early in the evening. Who can think straight at this hour?

"The heck with it," Joe mumbles in exasperation, "Station's off the air. I gotta get there." With that he jumps into his old wagon, the one with the broken heater, and blasts out of the driveway.

The station is ghostly quiet. Jimmy Tunes, the overnight guy, is sipping a Coke and reading the *Enquirer* when Joe yanks open the back door and makes a beeline to the transmitter room.

The AM is humming along but the FM transmitter is completely silent. The main circuit breaker is tripped off.

Joe jerks the circuit breaker to ON and pushes the filament button. The button lights green and the blower starts. Joe drums his fingers on the cabinet. After a couple of minutes, he punches the plate button and the station comes to life. Meters are okay.

"Hey, Jimmy," he yells, "get some music on." Jim aims the remote control over his shoulder and activates the CD player. Everything sounds fine.

John Shepler is a broadcast consultant, teacher, writer, former CE and regular **RW** *columnist. He can be reached after 8 PM at 815-654-0145.*

Q-Tips

Joe sticks his head into the studio. "Hey, guy, why didn't you turn the transmitter back on? It was only the circuit breaker."

Jimmy looks aghast. "Huh? Where's the circuit breaker? I don't know anything about that."

Joe points toward the transmitter. "Come here," he says, leading the befuddled DJ to the controls. "This belongs UP. Just flip it up and turn the transmitter back on. Simple, right?"

While Joe is pausing to let this soak in, the transmitter shakes with a loud clunk from inside the center cabinet. The meters drop and the transmitter goes quiet. Jimmy glares at Joe with a "now-what-smart-guy?" look.

Joe frowns and runs back to the shop for some tools. He knows this problem. It has to be that same divider resistor that went out two months ago. The symptoms are the same.

Joe spreads screwdrivers, pliers, and dikes on the floor in front of the transmitter. He plugs the soldering iron in to start heating and unlatches the front center panel of the transmitter.

After touching the grounding stick to the big caps and tube sockets, he reaches in and peeks inside. "Now, where is that troublemaker," he mumbles.

Joe cuts out R32 and flips it over his shoulder. He puts another 10K 25 W wirewound in its place and solders the wires back on.

It's 4:30 AM now, and he's anxious to finish this project. With a sigh, Joe punches the transmitter PLATE ON and waits for the time delay.

After what seems like five minutes, the contactors thunk into place. Something isn't right, though. The transformers groan, the meters flicker, and the breaker goes again.

Now what? Joe is getting irritated. Jimmy's no help. He's sacked out on the kitchen table. Joe heads for the shop to grab a schematic.

Joe paws through all four drawers of the file cabinet and his desk. No transmitter schematic.

Frantically, he tears into the pile of manuals stuffed behind an equipment rack. At the bottom of the pile is a coffee-stained transmitter schematic torn nearly in half. It's after 5 AM.

Joe tries to match up the schematic with the component labels in the center cabinet. He scratches his head. R32 which he just changed is shown at 1K, not 10K. That's strange.

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Sorting Substance From Dazzle

by Tim McCartney

Boise ID ... The 41st Annual NAB Broadcast Engineering Conference in Dallas was predictably a massive display of the most modern technology.

In order to achieve such force, thousands of individual efforts were brought out front by exhibitors, designers, managers, salespeople, engineers and attendees.

Technical expertise

Unfortunately, even the whopping 36 hours of floor time was inadequate to tap a modest piece of the wealth of available technical information.

KBSU's experiences were productive particularly because the exhibitors' attitudes matched the station's needs. We needed to talk with representatives about current problems using their equipment, without being squeezed to buy more.

The reps were eager to respond to these inquiries and tactful enough not to put on the hard sell when inappropriate.

Then, of course, there was a great need for us to talk with representatives of products we plan to purchase over the next two or three years.

A *standing ovation* is in order for those firms who brought their technical and design personnel out on the floor! The sales personnel usually are not trained in the many intricacies of the equipment: frequently, that's what we need to discuss.

Learning vs. bragging

Have you ever been to a conference where conversations are centered solely on either bragging or complaining? Fortunately, this year the NAB show was not such a place.

The approach in Dallas was geared to specific needs such as providing technical support, assisting, explaining, clarifying research, troubleshooting, questioning, and of course, selling.

So, it became an opportunity to learn a lot about current and future products. That alone is worth the cost of attending.

Attendees had their own shopping lists to work through on the floor. KBSU's included the established basics such as transmitters, antennas, STLs, RPUs, telephone interface units and microphones.

The fun of exploring all the new technologies is something like the way a five-year-old child sees Christmas morning. Some of the areas we zeroed in on were advancements in cart machines, 23 GHz STLs, audio routers and phone line developments.

Son of cart

Once again, it seems as though the "son of cart" *may* be surfacing. Two firms—one big and one small—had their new items out for the show, each wanting to replace the cart machine.

ITC put its razzle-dazzle on the new HCDA 3000 Digital Audio System with a slick videotape presentation and regular floor demonstrations. Compusonics brought out its DSP 1500 Digital Audio Cart Recorder on optical disc as well.

Comparing the two products easily identifies strengths and weaknesses, but eventually leads to your own "big company vs. little company" philosophy on new technologies. A year of fence sitting at this point may be wise.

23 GHz

With at least five exhibits of 23 GHz gear shown this year, broadcasters can tap into an already developed technology they might not usually use.

The 23 GHz bands for STL also received attention in several of the radio engineering papers.

The use of digital technology on the band's video channels is attractive enough, but excess capacity for additional 15 kHz audio channels with −90 dB noise floors really dresses up the package.

In the right situation, 23 GHz is vastly superior to the 950 MHz STL bands. It's almost a necessity in communities with one mountain where all the TV and FM stations try to locate and subsequently load up the conventional STL spectrum.

It's most practical in areas with low rainfall amounts and over short distances. In arrid Boise for a short hop, we win!

Audio routers

Sophisticated audio routers eliminate the need for patch bays and distribution amplifiers. So, to a growing station like KBSU with no patch bays yet and just three DAs, these routers have extra appeal.

Grass Valley Group markets its 8560 Stereo Audio Distribution System to stereo TV and radio stations.

ITC debuted its new "Audio Switcher," designed for stereo radio stations. At a steep price, it can literally do anything you dream up, including automatic switchovers triggered by its clock.

This is one of those areas that shows how careful or adventurous we are about such advances.

At least one CE at a large radio network plans to move very slowly, since the station already has existing patch bays and dozens of DAs.

In our own case, we're ready to move when the funds allow, in view of the long-term advantages for the station.

Phone line advances

One additional item of interest were advances in telephone line quality research detailed by Bell Communications Research. They refer to it as "Commentary Quality Audio."

The idea is to provide a 7 kHz dial-up capability nationwide using the new ISDN digital service. It will require special equipment from local phone companies, which surely will delay its introduction in all but the largest markets.

But when it arrives, it will certainly be welcome.

In all, we found the trip to Dallas well worth our time. A look at new technology and person-to-person expertise from design engineers is hard to get in one place at one time, and the information will prove invaluable in future equipment buys.

Tim McCartney, a regular contributor to **RW,** *is CE of KBSU, Boise State University, Boise, Idaho. He is an SBE Broadcast Engineer, has a masters degree in human resources development, and is a former GM. He can be reached at 208-385-3760.*

NPR Plans Sat Net Remodeling

by Mike Starling

Washington DC ... The overiding technical topic at this year's Public Radio Conference was the future remodeling of the satellite interconnection system.

Depletion of station-keeping fuel aboard Westar IV, which houses the public radio transponder, is expected by 1992.

Wayne Hetrich, Senior Engineer for National Public Radio's Distribution Division, presented an exhaustive analysis of possible system design options based on each of four digital systems and three analog modes of audio transmission.

Hetrich is considered by many to be the father of modern satellite networking as the principal architect of the NPR satellite system, which was the first complete shift to satellite interconnection in 1980.

Despite the preliminary nature of the studies, the option for remodeling of the satellite system with a convervsion from C-Band to Ku-Band is not likely, due to cost.

Hetrich projected a system renovation cost of perhaps $25 to 50 million using the current C-Band based spectrum versus a $90 million preliminary figure for converting to Ku-Band.

The budgetary estimates have been confirmed with an outside accounting firm.

Last year, with recovery from National Public Radio's $9.1 million dollar debt (which surfaced in 1983) complete, the system began allocating $500,000 annually towards replacement of the public radio transponder.

Thus, the transponder replacement coffer will reach only $2.5 million by 1992. So, with some 90% of the necessary funding to cover even the less expensive C-Band options in question, prospects for a Ku-Band conversion are highly doubtful.

Funding aside, system design margins in achieving a usable footprint over the entire Puerto Rico/CONUS/Hawaii/Alaska enclave are significantly higher principally due to moisture absorption at Ku frequencies.

Primarily affected are the Gulf states from Florida to Oklahoma, requiring a 10 dB design margin for those outlets to achieve the current less-than-53-minutes-per-year outage figure (99.99% reliility).

Additionally, it is not technically feasible to retrofit the existing C-Band dishes for Ku-Band operation due to the more stringent dish curvature tolerances at Ku-Band frequencies.

Public radio stations currently utilize an analog Single Channel Per Carrier (SCPC) satellite delivery system which employs a 3:1 companding ratio achieving a 70 dB SNR (relative to maximum operating level), frequency response ±1 dB from 30 Hz to 15 kHz, and less than 1% total harmonic distortion.

Yet even with the present "better than FM broadcast performance" specifications and the added cost of digital receiver conversions the enthusiasm for full evaluation of digital alternatives was apparent with station engineers.

Reinforcing the consideration of digital alternatives were the comments of the Federal Communications Commission's Mass Media Bureau Chief, Jim McKinney, who told the attendees at the "FCC Town Meeting" that, "Digital is taking off in the United States." (See related story in this issue.)

NPR's training services coordinator, Skip Pizzi presented a possible timetable for stations to consider planning for full digital conversion of the broadcast signal path over the next five to ten years.

Although Hetrich's analysis of the alternatives was couched with caution, several existing and emerging digital techniques appeared to offer favorable bandwidth channeling capacity and au-

(continued on page 22)

Mike Starling is CE of KPBS, San Diego. He can be reached at 619-265-5025.

VCRs Provide Digital Options

by John Sunier

Ross CA ... Several years ago stations airing concert music, especially public stations, were faced with a dilemma as a result of satellite distribution.

Many companies and networks that had been sending tapes through the mail discontinued that process entirely, and relied solely on satellites to get the music to the stations.

On one hand, receiving satellite feeds of taped concerts meant better audio quality and a faster mode of distribution than receiving 1/4" open reel tapes through the mails.

But at the same time, stations wishing to air the music at a later time now had to tie up their own reel-to-reel recorders for hours, plus find available reels of tape and the staff to switch reels when necessary.

In the beginning, stations taped satellite concert feeds on their own 1/4" analog tape, usually without the benefit of a noise reduction system.

The old bugaboo of tape hiss and loss of sonic quality again reared their ugly heads as a result.

In addition, the cost of blank tape became a major part of most station operating budgets.

A few forward-looking stations began turning to the new PCM digital process to record local concert remotes.

Their reasons for doing so included the compact portability of the gear compared to open-reel decks, higher quality sonics possible with digital, and great savings in blank tape, as well as the possibility of much longer recording times.

It all started with the Sony PCM-F1.

At a cost of about $2000, this processor converts analog signals from mics or lines into digital data streams recorded on tape for later playback.

Playback through the same unit converts the pulses back to analog signals for broadcast.

(continued on page 20)

John Sunier is the producer/host of Audiophile Audition, *carried weekly on over 165 public radio stations nationwide. He can be reached at 415-457-2741.*

Satellite Times

VCR for Digital Audio

(continued from page 19)

Ordinary analog tape lacks the wide bandwidth necessary to preserve the complex digital signal.

But the video tracks of VCR tape—U-Matic, Beta or VHS, are perfect for the task.

The digital data stream is recorded onto the video portion using the video record heads of the VCR rather than the fixed-head audio track.

In fact, with a monitor, the signal can be viewed to check its quality.

It looks something like a rack full of horizontally-striped neckties, with the black and white stripes constantly changing according to the nature of the sounds being recorded.

Many stations also record the audio simultaneously onto the videotape's analog audio track, to have as a back-up or use as a cue/monitoring track.

Recording via the PCM method results in an instant savings in the cost of blank tape.

Three hours of Beta II or two hours of VHS standard speed may be recorded without reel changes on a blank videocassette purchased almost anywhere for about five dollars.

Contrast this with up to $40 or more for three hours worth of good quality 1/4" tape at 7.5 ips speed.

Economy is the prime reason many stations have become PCM converts. Clean, wide-range and distortion-free sound, along with superb SNR are equally as attractive.

Another bonus for the station is the greatly extended life for analog open reel decks. A replacement head for just one 1/4" deck costs $300—almost exactly what a basic Betamax VCR costs.

This makes a VCR's lifespan virtually academic, since it can be as disposable as an analog head with no cost increase.

A hidden benefit of consumer VCRs is the auto-record timer. For stations without DACS teletype or NPR's NETCUE system, the timer may be used to start and stop recording with a fair degree of accuracy.

This can be done on a daily or weekly basis, since most VCRs have at least a seven-day timer function.

Stations airing concerts live through playback with the PCM are able to preserve the first generation quality of the broadcast.

And now that digital satellite broadcasts are becoming a reality (see related story, this section) this method carries more benefits than ever.

Editing concerts recorded this way are another matter, however.

Most stations using PCM processors for recording live concerts transfer to analog 1/4" tape for editing purposes.

The videotapes could be edited with video editing equipment, but that is expensive and more time-consuming than simple cut-and-splice with a razor blade.

Most of the symphony series edited for play by public stations and then distributed by satellite are transmitted from 1/4" edited tape, resulting in some degradation in quality.

However, two symphony series are not only transmitted directly from the digital master, they are also available by mail on Beta or VHS from the producers.

These are offered from the St. Louis Symphony and the Baltimore Symphony at no extra charge, and it's hoped that other concert producers will follow suit.

While its use for taping live concerts proves most valuable, the majority of stations using the PCM processor/VCR combination do so for taping delayed programming from the satellite.

The longer recording time has done away with reel changes during operas and longer concerts.

Stations often find that using the digital method is actually simpler than recording with analog tape.

It is almost impossible to set too low a recording level because of the excellent SNR characteristics of the system.

Overly high levels register clearly on the meters, and levels on satellite transmissions are generally well-maintained.

Although it may be fast losing favor with consumers for video recording, Betamax seems to be the preferred format to use with PCM processors.

For digital audio recording purposes it has the advantages of longer recording time at the standard speed, faster cueing and start/stop operation, BetaScan high-speed audible checking of the tape and a more compact cassette for storage and mailing.

The original PCM units, Sony's F1 and Nakamichi's DMP-100 version are no longer available. Processors previously manufactured by Hitachi, Technics, Sansui and others are also unavailable now.

Sony has produced three other models since the PCM-F1. The Model 701 is available from only a few sources, and is usually modified for increased compatibility with professional broadcast equipment.

The Model 601 is the most recent, but it has added features not vital to broadcast useage.

The Model 501 has become the standard, at least among public stations, for PCM use. It is also the lowest priced of the three, at about $1000 retail.

More highly-developed error-compensation circuits in the 501 are more forgiving of possible tape dropouts than the F1, making it possible to produce excellent PCM recordings at slower VCR speeds, or with tapes that have seen some use.

The 501, however, does lack the mic preamps of the F1, and is also more bulky, thus requiring additional equipment for remote recording.

Crisis on a Cold, Dark Night

(continued from page 17)

He distinctly remembers replacing an open 10K wirewound two months ago. Oh, no, that must have been R31, right next to it.

Or was it? His eyes just don't want to focus at this hour.

Joe wishes he had drawn a partial schematic on the back of the maintenance log to remind him of what he had changed. Even a clean transmitter schematic would be a welcome sight now.

Joe bites his lip and then rounds up some more resistors. The clock is sweeping past 5:30 as he changes both R31 and R32 just to be sure. He hits the PLATE ON button again ... and waits.

This time the transmitter comes up and stays but the meters are hanging low. Joe clicks the multimeter knob through its positions.

The meter indicates at every detent, but are the readings right? Where's that instruction book?

Now, Joe thumbs through the instruction manual looking for sample readings. "Geeez," he mutters, wishing he had made a chart of those readings when the transmitter was up.

Joe makes a mental note to tape a chart of correct readings to the front of the transmitter next time it's working ... that is, if it is ever working again.

Six o'clock has come and gone and the station is still not on the air. Victoria, the morning announcer, is fielding phone calls from perturbed listeners. Joe is sweating profusely. What can it be?

Joe's head is swimming. He breaks for a cup of coffee and sips it while his whole life flashes before his eyes.

In an instant, Joe can visualize a hundred things he could do to make his life easier and, more importantly, allow him to deal with these crises faster and more efficiently.

First comes instructions for the operators. Call it "transmitter by numbers."

Joe will put colored dots next to each switch, numbered in the order they are supposed to be activated. He'll put a chart of the numbers on the nearby wall with step-by-step instructions.

Next comes emergency procedures: a checklist of things to try in order to get the station back on the air. This gives the late night people a fighting chance.

Joe needs his own documents, too. He'll record the normal readings of every meter and label them as such on the transmitter.

That goes for plate tuning and loading counters, too. In the heat of late night panic, it's too hard to remember at what number you started out.

The schematic isn't going to be hidden under the books any more. He'll make a wooden holder for it and the transmitter manual and keep them within arm's reach in the transmitter room. Any modifications will be neatly noted.

Modifications! Suddenly Joe sits straight up in his chair with eyes wide open. "That's it," he cries, jumping back into action.

Joe heads back for the transmitter and shines his trouble light inside. He can see where he made new crimp connections last year.

Joe had changed the divider network when he installed the factory upgrades for automatic power control. Grabbing the schematic, he makes the notations he should have made at the time.

Now, Joe knows what the circuit should be. He paws through the box of resistors and fishes out two used ones.

He whips the soldering iron into place and changes out the resistors. So much for R34 and R35. R31 and R32 get put back to what it shows on the schematic since they only affect the plate current reading—the same reading that was low.

Now, Joe hits the plate button yet another time. A minute later, the transmitter comes to life but the meters still flicker. He convinces himself the meters are alright.

There is a snapping sound every couple of seconds from the upper left cabinet. Joe pops the transmitter off and takes a look.

This compartment contains only the IPA tube and its associated circuitry. Joe reaches to change the tube when he notices a cracked capacitor.

It was one he changed before but didn't have an exact replacement. Even so, luck is on his side.

The replacement had been ordered and shoved over to the side of the workbench when it came in. Is it still there? Yup. Joe's on a roll now.

Several flicks of the Phillips screwdriver later, the new cap is in and the transmitter is buttoned up.

Good thing he ordered the right part number from the manual. That substitute capacitor didn't even have a readable voltage rating. "Must have been wrong," he thinks. "Otherwise it wouldn't have broken."

It was also lucky somebody else didn't have to face the problem. Only Joe could have known about the replacement cap.

It was now 7 AM and the General Manager was shaking his boots off outside the front door. Joe meets him on the way out. The manager looks at him. "Trouble, Joe?"

"Yes, sir, a little. But we're okay now."

Joe bites his lip again and heads for his wagon. It would be a cold ride home but he was warmed up with some new ideas.

From now on, he would leave tracks everywhere. He wouldn't have to depend on a tired brain in the middle of the night.

His notebooks, logs, charts and organized bins of parts would automatically lead him in the right direction.

Satellite Times

Sat Net Rebuilding

(continued from page 19)
dio performance tradeoffs comparable to the characteristics of the current SCPC system.

But even the experimental ADCOM TCPC design, which at 43 boasted the largest number of channel combinations, falls short of the current 59 channel capacity—an important consideration given the substantial revenues generated by the leasing of excess channel capacity.

A number of engineers felt the switch to a digitally based system would eliminate the residual modulation noise of the vigorous 3:1 companding ratio.

Hetrich, however, pointed out that the current state of the art with the digital systems studied, especially those employing some form of bit compression, result in significant quantization errors creating noticeable distortion at low modulation levels.

Moreover, Hetrich's studies indicate the quantization errors are not fully solved by "dither," a process whereby noise is injected below the digital noise floor to stimulate an improved bit error rate (BER).

In commenting on the looming costs for C-Band transponder replacement alone, Bill Hay of South Carolina Educational Radio indicated his complete satisfaction with the current system stating, "We don't want to wind up with a $50 saddle on a $5 horse."

Debate on the advisability of a digital conversion also emphasized the inefficiencies of backhauling feeds to a single digital uplink point and the resulting reduction in flexibility with the loss of instant regional access via the regionally distributed 19 public radio uplinks.

With the state of the art progressing rapidly there was a consensus that a final decision on redesign should be postponed as long as possible to preserve the maximum number of latest-generation choices.

The current timetable, however, has set a membership vote on the plan of choice for the Spring of 1989.

The systems studied by Hetrich included AES, T1, S/A DAT, and the developmental ADCOM TCPC digital systems.

Also under review are the performance characteristics for the current analog SCPC system, analog composite FM, and SCS audio subcarriers on video carriers.

Jim McEachern, NPR's Director of Distribution, told **RW** some hybrid form of digital and analog SCPC might be integrated on the new transponder.

A transitional phase prior to a possible complete switch to digital audio would lessen the financial impact on public radio stations while preserving a bailout option should a new digital scheme show unexpected flaws.

In fiscal year '86 the distribution system cleared $600,000 above operating expenses due to the purchase of the public radio transponder.

This enabled the system to keep all of the channel leasing revenues previously shared with Western Union.

The source for the anticipated $30 to $50 million replacement funds for a C-Band transponder is likely to be some combination of increased distribution and interconnect fees, the Corporation for Public Broadcasting, direct Congressional funding, public and private fundraising, foundation grants, and/or the Public Telecommunications Financing Program.

Live Digital Music From Japan

Boston MA ... The first live, digitally transmitted broadcast from Japan to North America was aired by WGBH recently when the station carried the 150th performance of the New Japan Philharmonic.

In May the public station carried the program live via satellite from Tokyo, in a three-hour broadcast beginning at 5:30 AM (EDT).

The broadcast was also aired live by FM Tokyo, and was co-hosted from Japan by WGBH'S Richard Knisely and FM Tokyo's Midori Tanaka, with both Japanese and English commentary.

The broadcast signal was sent via microwave from the Tokyo Bunka Kaikan Hall in Ueno, Tokyo, to FM Tokyo, where it was relayed to facilities in Otemachi.

From there it was converted to digital audio using a Sony PCM-F1 processor, and relayed to an international uplink in Ibaraki.

The signal was downlinked in Jamesburg, CA, and relayed to Western Union facilities in San Francisco, then uplinked to Westar IV.

WGBH dowlinked the signal in Needham, MA, and fed it to its Boston facility for decoding and broadcast.

In addition to the live broadcast on WGBH, the concert was offered to public radio stations nationwide at 8 PM the same day it was broadcast.


WGBH Radio aired a digital broadcast of the New Japan Philharmonic.

At **RW**'s press time, about 80 public radio stations were scheduled to air the delayed broadcast.

In the past, much of the digital benefits of such a transmission would have been lost in a delayed broadcast, due to the need for recording it onto regular analog reel-to-reels.

But since many public radio stations now use half-inch video equipment with PCM processing to record concerts, the benefits of digital audio can be preserved. (See related story, this section.)

Unfortunately, WGBH was not able to offer a digital feed of the concert to stations airing it at the later time.

The station planned to record it digitally, then decode it for regular satellite transmission. But the digital recording process would help preserve at least some of the sonic quality of the original digital transmission.

The digitally-transmitted program marked the completion of an exchange relationship initiated with the first concert broadcast from the US to Japan in January of 1986.

The concert featured New Japan Philharmonic conductor Seiji Ozawa, with special guest coloratura soprano Kathleen Battle.

D. Bradford Spear, WGBH Radio manager called the digital broadcast "a significant event in radio history, both culturally and technically."

Katuzo Ohno, president of FM Tokyo said the perfomance helps promote cultural exchanges between the two countries which "at this time of trade conflicts and the drastic rise of the yen will not only contribute to understanding between the two nations but also add a new page to the history of broadcasting."

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RadioWorld

Broadcast Equipment Exchange

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AMPLIFIERS

Want to Sell

Ampex speaker amp, matches Ampex 601 style, not working, $50. K Retzer, KGRZ, POB 4106, Missoula MT 59806. 406-728-1450.

Mirage D-24 RF power amp, brand new, ham type, $150. K Retzer, KGRZ, POB 4106, Missoula MT 59806. 406-728-1450.

Home brew in Vector cage D/A, 1 in 6 out each card (6) w/power supply, $600. D Abdoo, WTRY, WTRY Rd, Schenectady NY 12309. 518-785-9061.

Marantz 140 $190/BO. B Van Prooyen, 2111 Shangri-la Dr SE, Grand Rapids MI 49508. 616-243-2026.

Gray Research 602C phono preamp, mono. A Bendix, KGWY, POB 1179, Gillette WY 82716. 307-686-2242.

Pioneer SA-5200 power amp, $75. K Retzer, KGRZ, POB 4106, Missoula MT 59806. 406-728-1450.

Radio Shack MPA-20 AC/DC 20 W audio power amp, $35. K Retzer, KGRZ, POB 4106, Missoula MT 59806. 406-728-1450.

Gates 994-6690-001 solid state mono TT amps (2), $80/pair. K Retzer, KGRZ, POB 4106, Missoula MT 59806. 406-728-1450.

Radio Shack PA amp, 35 W w/priority page, $50. R Kerbaway, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

Elec Navigation Indus 310L w/meter, 250 kHz, 110 MHz, 50 dB RF power amp, 10 W output, $600. M Rakoff, WQVM, 114-41 Queens Blvd #148, Forest Hills NY 11375. 718-591-0002.

Collins 356H-1 TT preamps & phone EQ. L Wilson, 409 Hillaire Dr, Hopkinsville KY 42240. 502-886-1678.

Gates Courier 70 2 chan remote amps w/power supply & schematics, needs work, less VU meters. L Wilson, 409 Hillaire Dr, Hopkinsville KY 42240. 502-886-1678.

RCA TT preamps (4). J Lies, WTRC, POB 699, Elkhart IN 46515. 219-293-5611.

Utility tower, 274' w/18" face, gd cond, on ground. M McKenzie, KALL, 312 S East Temple, Salt Lake City UT 84111. 801-364-3561.

Acoustic 260 amp, built-in reverb, fuzz, tremelo & tuning fork, BO. S Russell, Russell Music, 60410 Klett Dr, Decatur MI 49045. 616-782-9258.

Edcor HA-100 8 chan headphone amp, new w/rk mts, $1300. M Fiedler, Mahoney Fiedler Prods, 5346 Dupont Ave S, Minneapolis MN 55419. 612-822-0013.

UREI 6250, $500. M Fiedler, Mahoney Fiedler Prods, 5346 Dupont Ave S, Minneapolis MN 55419. 612-822-0013.

Langevin WE clones, #AM-101-D 50 W tube, $275; AM-128XZ 25 W tube, $125; also SS & tube power supplies, amps, preamps, line amps & mixers by WE, Langevin, RCA, ADC, Altec, Ampex, call for list. R Van Dyke, Van Dyke Inc, Squires Ave, E Quogue NY 11942. 516-728-1327.

Altec 1570B tube power amp 165 W very clean, $280 for pair. W Busseti, Lizard Stds, 1124 W 2nd St, Florence CO 81226. 303-784-3540.

Langevin AM-16 preamp; **AM17** program amp; EQ251-A EQ's; PS221 power supplies; mounting trays of instruction books, excel cond. B Anderson, Anderson Prods, 1157 Sunshine Terr, Studio City CA 91604. 818-769-6569.

ITC WRA stereo record amp, $900. D Gowens, WESE, POB 660, Greenville SC 29602. 803-242-4660.

Want to Buy

McIntosh MC-50 (2) & (2) McIntosh MC-30 power amps. JP Robillard, 1803 N 1st East St, Haynesville LA 71038. 318-624-0105.

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, 10919 Oasis, Houston TX 77096. 713-723-5281.

ANTENNAS & TOWERS

Want to Sell

Dielectric BFH 2 bay, CP, never used, pole mt hardware, 99.9 MHz, $1200. R Lane, KTYD, 5360 Hellister, Santa Barbara CA 93111. 805-967-4511.

Scala 2CA5-150HV yagi HP, 98.7 MHz, new in box, $440. D Abdoo, WTRY, WTRY Rd, Schenectady NY 12309. 518-785-9061.

RCA 6-1/2" transmission line, 75 ohm, 900', $600/20' section. B Richert, WPCB, Signal Hill Dr, Wall PA 15148. 412-824-3930.

TFU 30J chan 48 RCA antenna, $40,000. B Richert, WPCB, Signal Hill Dr, Wall PA 15148. 412-824-3930.

ERI 6 bay HP antenna, 104.3 MHz, BO. C Schipper, KQKS, 9191 Sheridan #205, Westiminster CO 80030. 303-427-7700.

Andrew air dist manifold w/4 valves & 4 gauges, $160. S Hasskamp, KDLH, 425 W Superior St, Duluth MN 55802. 218-727-8911.

Cablewave FLC78-50J, 7/8" foam, 250' unused on spool, $795 & frt. G Thomas, KELI, POB 3834, San Angelo TX 76902. 915-655-9879.

Steel guy cable, 5/16", (3) 200' sections, BO; (2) 50' sections 3/8" Phillystran guy cable w/connectors, $100; (2) new Andrew 1062-3 90° mitre elbows, $75 ea; Bird 51.5 ohm in-line wattmeter w/25 kW element, BO over $50; Andrew 6710 coaxial switch, 3PST for parts, w/drawings, BO. R Kerbaway, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

Jampro JSCP-12 12 bay FM, 94.5 MHz, rebuilt, still in crates incl leg mt brackets. J Wagner, KFMX, 5613 Villa Dr, Lubbock TX 79412. 806-747-1224.

Cablewave FLC158-50J 1-5/8" foam, 110' unused, not on spool, $875 & frt. G Thomas, KELI, POB 3834, San Angelo TX 76902. 915-655-9879.

Collins 37CP 8 bay, 97.9 MHz, mounted on tower, BO. J Banoczi, KNOB, POB 3159, Anaheim CA 92803. 714-772-5662.

Collins 637D-1 HF antenna, high power broadband, 2-30 MHz w/50-650 Colin balon, termination resistors & paperwork, new in large box, 120' x 120' when erected, installation avail, serious offers. Z Smith, Airwaves Comm's, 4801 Lamar Ave, Paris TX 75460. 214-785-8881.

Stainless tower, 370', 320' Windcharger, 320' solid leg tower, last to be taken down, BO. J Tidwell, WAFT, Box 338, Valdosta GA 31603. 912-244-5180.

Fisher AM towers, (3), 330' high, 2' face, insulated, guyed, vgc, take all three & we'll dismantle, $5000 ea, you transport. B Glasser, WHBC, POB 9917, Canton OH 44702. 216-456-7166.

Collins (ERI) G5CPS 4 bay antenna, $2000. B Harlan, WFAH/WDJQ, 393 Smyth Ave NE, Alliance OH 44601. 216-821-1112.

ERI 403 isocoupler, 10 kW, 102.3 MHz. B Statham, WSTU, 1000 Alice, Stuart FL 33494. 305-692-1000.

Tower, used, heavy duty galvanized, on ground, will ship, you pay frt. J Pickett, ABC Ent, Rt 1, Sturgeon MO 65284. 314-687-3932.

Andrew LDF5-50, 120', 7/8" heliax trans cable, brand new never used, $250 plus ship. B Mountjoy, Custom A/V Srvs, Box G1240, Elizabetheon TN 37644. 615-543-5849.

Bare copper wire, •No10, 150,000 + ft, 4¢/ft. W Blackwelder, KTBB, Box 7935, Tyler TX 75711. 214-581-0606.

Andrew 1920A air dehydrator, gd cond, $700. S Hasskamp, KDLH, 425 W Superior St, Duluth MN 55802. 218-727-8911.

Andrew RG322 355', brand new on spool, flanged on both ends, $4-5/ft. B Husband, 215 Taylorsville Rd, Yardley PA 19067. 215-493-4467.

Foam Heliax xmission line, 288' 7/8" & 270' 7/8". M McKenzie, KALL, 312 S East Temple, Salt Lake City UT 84111. 801-364-3561.

Harris dual cycloid 12 bay CP FM antenna, BO; Gates AM antenna tuning unit w/RF relay for different patterns, BO. P Shirley, Lafayette Bdctg, POB 52046, Lafayette LA 70505. 318-233-7003.

Delta TCT-1 torroids (2). M McKenzie, KALL, 312 S East Temple, Salt Lake City UT 84111. 801-364-3561.

Cablewave HCC50J 3-1/8" air dielectric coaxial cable, approx 450', as is, BO. P Shirley, Lafayette Bdctg, POB 52046, Lafayette LA 70505. 318-233-7003.

Phelps Dodge CPFM-8 8 bay CP, tuned 101.1 MHz, BO. R Goodman, WCKN, POB 650, Anderson SC 29621. 803-226-1511.

Rigid coax, 20 sections of 3-1/8", 20' length, w/bullets & non insulated hangars, BO. R Goodman, WCKN, POB 650, Anderson SC 29621. 803-226-1511.

Cablewave FCC-38-50J sampling lines, 335' lengths (2). M McKenzie, KALL, 312 S East Temple, Salt Lake City UT 84111. 801-364-3561.

Phasor & LTU's for 2-tower array. M McKenzie, KALL, 312 S East Temple, Salt Lake City UT 84111. 801-364-3561.

Stainless 1" guy wire, 3000' on reels of 1000', approx 2 yrs old, BO. R Goodman, WCKN, POB 650, Anderson SC 29621. 803-226-1511.

Kintronics LTU-5B antenna tuning unit, w/remote sensor AM-1 & chokes LC-3, like new, $950. AH Bott, BHP Inc, 340 S 24th St, Quincy IL 62301. 217-224-1076.

Want to Buy

Diplexer for FM station, send details. R. Gold, Suwebe Bdctg, 19355 NE 36th Ct Ste 11J, Miami FL 33180.

FM antennas, 2-4 bay, 1-10 kW tuned to 91.7. E Goetsch, WXPR, 303 W Prospect, Rhinelander WI 54501. 715-362-6000.

Tower light beacon. R Wright, WLLX, Box 156, Lawrenceburg TN 38464. 615-762-2916.

Any 4 bay FM antenna, 107.1 MHz; also any 360' tower. E Kazmark, KAZZ, Box 1369, Deerpark WA 99006. 509-276-8816.

CP antenna, 10 bay, 96.5 MHz. B Oliphant. KDZN, Glendive MT. 406-365-6996.

FM 8-12 bay CP, 105.7 MHz. B Dodge, Harvest Bdct, POB 105FM, Hinsdale NH 03451. 802-254-2560.

Foam heliax, 200', 7/8", plug connectors. A Bowab, WDLT, 2402 Wolf Ridge Rd, Mobile AL 36618. 205-344-3698.

FM 2-3 bay CP, 96.3 MHz, w/deicers or radomes. B Dodge, Harvest Bdct, POB 105FM, Hinsdale NH 03451. 802-254-2560.

Tower, 500' w/top mounted pole for FM 4-bay antenna. J Stitt, WLLT, 250 W Court Ste 300E, Cincinatti OH 45202. 513-241-9500.

6-bays on or close to 105.9 MHz. M McKenzie, KALL, 312 S East Temple, Salt Lake City UT 84111. 801-364-3561.

Tower, wind load B, 1200' & 500' tower, wind load B. F Hinds, WJIZ, POB 5226, Albany GA 31706. 912-432-7447.

AUDIO PRODUCTION OTHER

Want to Sell

Northern Electric R5461C 4-input portable mic mixer, accepts internal batteries or AC line power, carrying case, vgc, $95. M Byrnes, WAMU, 4400 Mass Ave NW, Wash DC 20016. 202-885-1030.

Melcor GME-20 console mount parametric EQ's, gd cond, (2), $25 ea; Haeco CSG-2 compatible stereo gens, perf, no center chan buildup for stereo to mono conversion (3), gd cond, $75 ea. T Steele, Frankford/Wayne Mastering Labs, 1697 Broadway. NY NY 10019. 212-265-5563.

Gates GE-3, working in 1/87 when removed, $700. BJ Hunsinger, WNTE, Box 84 South Hall, Mansfield Univ, Mansfield PA 16933. 717-662-4650.

Telex CS91 sports bdctrs headsets w/boom mic (5) in need of repair, $195/all. CJ Pringle, Trinity Entrp, Box 831, Webster City IA 50595. 515-832-1263.

Eventide RD 780 (2) Monstermat matrix encode-decode, $200 ea. R Dietterich, WAMO, 411 7th Ave, Pittsburgh PA 15219. 412-471-2181.

Conex Systems 675 bleep mute; (2) BE TG-2 dual tone gen; UREI 535 dual graphic EQ; Orban 424A dual graphic EQ; Ramko ARA 1612 audio router; SAE impulse NR; CN Rood stereo decoder SM0203. A Bendix, KGWY, POB 1179, Gillette WY 82716. 307-686-2242.

Inovonics 355 w/power supplies (900 Series), BO. T Low, Foster Communications, 115 W First, San Angelo TX 76903. 915-653-3387.

Orban stereo synthesizer, $175; **MAPII** Inovonics, mint cond, $650; Ramko 8 chanl stereo console, new pots, $999; SMC automation, MSP10 w/3 Carousels, 4 singles, brain, rack wired, $10,000. B Kramer, WQXO, Box 3176, Longwood FL 32779. 305-682-5463.

Shure M267 mixer, near new cond, $260. CJ Pringle, Trinity Entrp, Box 831, Webster City IA 50595. 515-832-1263.

Shure M63 audio master EQ's (2), gd cond, $75 ea; Orban 526A de-esser, vgc, $125. M Byrnes, WAMU, 4400 Mass Ave NW, Wash DC 20016. 202-885-1030.

Shure M-625 Voicegate, $100. W Brown, KVNI, Coeur d'Alene ID. 208-664-9271.

Studio Tech AN-2 stereo simulator, 1 yr old, just taken out of service. L Davis, WKOV, 287 E Main, Jackson OH 45640. 614-286-3023.

Studio package: 16 input console, 2 trk Scully, 8 trk cart machines, D150 Crown amp, Russco turntable, 2 Altec limiters, 1 Fairchild limiter, 2 Mix down speakers, 8 mic booms, cassette recorder, Sony & AKG mics, all for $7000. B Burchett, Bur-K Inc., 842 Bellefont Princess Rd, Ashland KY 41101. 606-324-4812.

Fostex 3180 2 chan spring reverb, new cond, BO. R Schumacher, KENO, 4660 S Decatur Blvd, Las Vegas NV 89103. 702-363-1808.

Castle dual phaser 3, (2) complete in 2 rack spaces, very low hrs, 4-16 stage phasing, $325. R McMillen, 13515 SW 72nd, Tigard OR 97223. 503-684-1973.

RCA BA-43 program amps, rack mount w/VU meter (2), $75 ea. S Portier, WNOE, 529 Bienville St, New Orleans LA 70130. 504-529-1212.

Eventide digital delays, 3.5 sec unit & 7 sec unit. M McKenzie, KALL, 312 S East Temple, Salt Lake City UT 84111. 801-3645-3561.

dbx 142 encoder/decoder (4), $175 ea; dbx 148 decode only (6) w/408 mod's, $50 ea. G Faltus, WKGR, 600 Atlantic Ave, Ft Pierce FL 33450. 305-461-0099.

Timestar 2400C prototype timer, programmable, will give station ID's at top of hour, $2700. E Moore, 1102 N 31st Ave, Omaha NE 68131. 402-556-4999.

Garron STE-100, stereo phase enhancer, $150. S Portier, WNOE, 529 Bienville St, New Orleans LA 70130. 504-529-1212.

Eventide FL201 flanger, excel cond w/manual, bal in/out, $450. C Cooper, Admix Bdctg Srvs, 960 Woodward Dr, Charleston WV 25312. 304-744-0022.

Want to Buy

SAE 5000A impulse NR, will pay up to $200 & would like 2 ea. T Hall, Radio Program Srvs, 3815 E Unidah #10, Colorado Springs CO 80909. 303-574-8628.

Color weather radar weather system, hard or software. S Voros, WLZR, 1537 S 81st, Milwaukee WI 53214. 414-475-6200.

Grey Research EQ, mdl 603 or 602C. J Burdeau, WBEE, 15700 Campbell, Harvey IL 60426. 312-933-1570.

Sennheiser HD224 headphones, gd to excel cond. B Sheridan, WFAS, Box 551, White Plains NY 10602. 914-693-2400.

AUTOMATION EQUIP.

Want to Sell

IGM Instacart new heads, new pinch rollers, BO. D Haworth, KFGO, 1020 S 25th, Fargo ND 58108. 701-237-5346.

Cetec-Schafer owners, add 48 trays of random access multicart to your automation system, Audiofile IIA's, $2250 ea. JD Belt, CommTech Inc., POB 1622, Bluefield WV 24701. 304-327-0090.

Systemation 9 deck & 2 deck prod system, w/RCV316 Fairchild satellite receiver & down converter, set up for Transtar, $8500. S Karman, KCMJ, 490 S Farrell Ste C202, Palm Springs CA 92262. 619-320-6818.

Gates random access automation control unit; Gates automation timer; Gates SSA-3 silence sense; Gates FA-25 25 Hz tone filter; Gates STC source transfer control; (2) Gates 900-0206-001 Carousel interfaces; Gates TG 25, 25 Hz tone gen. A Bendix, KGWY, POB 1179, Gillette WY 82716. 307-686-2242.

Schafer 901 system w/IGM 48 cart stereo Insta-Cart, (2) Sono-mag 250 Carousels, Sono-mag 350 Carousel, Extel printer. A Bendix, KGWY, POB 1179, Gillette WY 82716. 307-686-2242

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RW Broadcast Equipment Exchange

AUTO . . . WTS

SMC w/DP1 digital programmer w/fixed 24 cart Carousels, 3 Scully SLJ10 R-R's, you take out, ready now, $8000 cash. T Graham, WKAA, 106 4th St, Ocilla GA 31774. 912-468-9898.

BE Control 16 system, auto logging, cart encoder, (3) CRTs, (2) control stations, battery backup & charger, (5) racks, (4) IGM Go-Carts, ITC 3D cart deck, (2) ITC 770 open reel decks, all stereo & operational when removed from service. G Capogna, WYBR, POB 7180, Rockford IL 61125. 815-874-7861.

SMC 521 mono dual play on pull out drawer w/aux cards, solid state, $400. W Hoisington, WTCG, Andalusia AL 36420. 205-222-8849.

Harris w/4 Sonomag Carousels, 4 Ampex R-R's, misc parts, call for details, BO. R Huggler, WSUL, 250 Broadway, Monticello NY 12701. 914-794-0242.

IGM Basic A complete 3K system, w/everything. P Soito, WBAZ, Box 1200, Southold NY 11971. 516-765-1017.

Microprobe Elec 100 programmer, rarely used, remote 8 machines, 24 events, $2500. J Yinger, WBCM, 301 The Davidson Bldg, Boy City MI 48708. 517-894-4543.

IGM Instacart, 48 tray stereo, working when removed from service, $3500. M Meyer, KLQP, POB 70, Madison MN 56256. 612-598-7301.

SMC TAC-1 time announce controller w/book & cables, cards all check, $350. W Hoisington, WTCG, Andalusia AL 36420. 205-222-8849.

Schafer 8000 automation control system w/4 stacks of memory, BO. B Harlan, WFAH/WDJQ, 393 Smyth Ave NE, Alliance OH 44601. 216-821-1112.

Shafer 7000 48 tray Audifile, 2 Otari R-R, 2 Carousels, 1 yr use, $14,000. D Monce, WDNY, 129 Main, Dansville NY 14437. 716-335-2273.

Capital SMC TS25 dual tone sensor, never used, mint cond, $400. A Weiner, WREM, Monticello MA 04760. 207-764-8300.

SMC ESP1, comp system inc brain, 4 Carousels, 2 PB R-R, 4 single plays, backtime unit, time announce, ADC-5 time update clock, Extel printer, RAC-30 remote control, wiring, manuals, excel cond, must sell. L Ellis, WAKE, 2755 Sager Rd, Valparaiso IN 46383. 219-462-6111.

Harris 995-7867-001 RR source interface cards (2) for System 90 or 9000 automation, $150 ea. C Bryson, Comserv, 93 Robinhood Dr. Zelienople PA 16063. 412-776-5204.

Cetec Beehive B100 CRT on-air automation, 4 stereo ITC PB machines, 4 stereo 24 cart SMC Carousel, extra source boards, call for price. E Stern, KSPL, POB 2150, San Marcos TX 78666. 512-396-3354.

Cetec 7000, Level 2, memory load/dump, real time clock, VEL logger/encode ctr, 2 Audiofile 2A's, 2 R-Rs, comp tested & checked, on-site interfacing & training avail, $14500. D Gatherun, WBDY, POB 509, Bluefield VA 24605. 703-326-3519.

Cetec 7000, 4 Otari ARS 1000, 2 Go-Cart 24, 2 Audiofile 48 Carousel, encode terminal, remote terminal, BO. S Scott, KEED, 1330 Day Island Rd, Eugene OR 97401. 503-686-9123.

Gates SSA-1, silence sensor, $95. S Portier, WNOE, 529 Bienville St, New Orleans LA 70130. 504-529-1212.

Shafer 7000 automation system, used less than 1 yr, 3 racks, 2000 event memory, 48 tray Audiofile Carousel, (2) R-R Otari's, $15,000. D Nance, WCDO, 75 Main St, Sidney NY 13838. 716-335-2273.

Want to Buy

Tone gen/encoder 25 Hz & service manual for Schafer 800. B Van Prooyen, 2111 Shangrila, Grand Rapids MI 49508. 616-243-2026.

IGM 392 network switcher, w/all the relays, an earlier model. J Robinson, KOMW, Box 151, Omak WA 98841. 509-826-0100.

CAMERAS (VIDEO)

Want to Sell

Houston Fearless PD-3 pedestals (2); GE 400 camera heads, CCU's, PS & cables. K Knowles, Knowles Video Prod, Box 12127, Tallahassee FL 32317. 904-575-6689.

ITE P-5 w/H-2 head, perfect cond. T Smith, CCI Comm, 192 Lancaster Ave, Frazier PA 19185. 215-289-1725.

RCA TK76 spare parts & assbly, also parts for TK86, TK760, TK761, TK781, TK86. T Smith, CCI Comm, 192 Lancaster Ave, Frazier PA 19355. 215-289-1725.

RCA lenses, TK-76-86-781-760 Fujinon, Schneider 17:1, 20:1, 30:1, 14:1, zoom lenses, BO. T Smith, CCI Comm, 192 Lancaster Ave, Frazier PA 19355. 215-289-1725.

Hitachi SK70 3 tube w/CCU, AC power supply, battery patch w/2 battery, 300' camera cable & shipping case, $4500. J Workman, Maritz Comm, 600 W Layfette Blvd, Detroit MI 48226. 313-963-1200 ext 501.

Hitachi FP40 3 tube saticon w/access, BO or trade. M Glaser, MRG Assoc, 679 Nassau RD, Uniondale NY 11553. 516-489-1071.

RCA TK43 camera parts & access, BO. L Saldona, A/V Prod, 1801 Nickerson St, Austin TX 78704. 512-444-3959.

Hitachi FP-10 w/1.5" viewfinder, 10X zoom lens, AC adapter, tripod adapter, carrying case, BO. J Johnson, Interand Corp, 3200 W Peterson, Chicago IL 60659. 312-478-1700.

Hitachi FP40, 3 tube Saticon w/all access & travel case, low hrs on tubes, will trade for newer chip cam plus cash, $3000/BO. M Glaser, C&G Ent, 679 Nassau Rd, Uniondale NY 11553. 516-489-1071.

Philips LDH-20 (2) w/CCU's, cable, hand controls, 12:1 Canon lenses, 1" plumb, ITE T10 tripod head & dolly, $6000 for both. T Smith, CCI Comm, 192 Lancaster Ave, Frazier PA 19185. 215-289-1725.

Ikegami HL79A w/Angenieux 95:126, AC adapter, batteries w/charger, shipping case, cables & more; Sony BVH 500 1" VTR w/case, batteries, charger, AC500 power supply, HT500A chroma stabilizer, assorted cables, will sell VTR separately, call for price. T Cereste, Lightscope Prod, 420 W 45th St 4th FL, NY NY 10036. 212-757-0204.

RCA pedestal, gd cond, BO. L Saldona, A/V Prod, 1801 Nickerson St, Austin TX 78704. 512-444-3959.

ITC730 w/CCU, 1.5" viewfinder, Fujinon 1:1.6, 11-110mm zoom lens, tripod adapter & carrying case, ITC-62, BO. J Johnson, Interand Corp, 3200 W Peterson, Chicago IL 60659. 312-478-1700.

Want to Buy

Panasonic Recam B-100 system cameras; AK-100, extension board, AC adaptor, batteries & chargers, power supply & any/all access. B Briggs, KCAM, 827 Meridian St, Nashville TN 37207. 615-226-1122.

Sony SVP330 video camera. M Glaser, MRG Assoc, 679 Nassau Rd MS 25A, Uniondale NY 11553. 516-489-1071.

Viewfinder & trinicon tube for Sony DXC1210 camera. C Lunde, Cycle Sound & Video, 167 Madison St, Waterbury CT 06706. 203-756-7751.

Philips LDH1 & LDH20 w/ or w/o tubes, in any cond as long as complete. G Odell, TFG, Box 9, Wethersfield CT 06109. 203-527-2972.

CART MACHINES

Want to Sell

Spotmaster 400A record/play mono, works, $95; Spotmaster 405A play only mono, needs pullup solenoid, $40; Tapecaster 700P (2) mono playback, working, $60 ea. M Byrnes, WAMU, 4400 Mass Ave NW, Wash DC 20016. 202-885-1030.

Lauderdale Labs Splicemaster MK2 splicefinder, fair cond, $75. K Retzer, KGRZ, POB 4106, Missoula MT 59806. 406-728-1450.

BE 3000, excel cond, just off air, play, mono, $500. P Remaker, WQHS, 3905 Spruce St, Phila PA 19104. 215-898-9553.

Tapecaster 700 R/P fair cond, $250. K Retzer, KGRZ, POB 4106, Missoula MT 59806. 406-728-1450.

Tapecaster 700RP, $350; Tapecaster 600 RP, $300; (2) Tapecaster 700P, record, $225; Tapecaster used start, stop & record buttons, $1; Spotmaster 500 rackmount RP (2), $200 ea; Spotmaster 400 RP, $250. AD Ishkanian, 9521 Riggs Rd, Adelphi MD 20783. 301-439-7222.

Spotmaster 5304 stereo 3-spot PB deck, complete w/all three cue tones & manual, spare motor, vgc, $725. M Byrnes, WAMU, 4400 Mass Ave NW, Wash DC 20016. 202-885-1030.

Spotmaster 505 mono cart deck; BE cart rewinder. A Bendix, KGWY, POB 1179, Gillette WY 82716. 307-686-2242.

McCarta 510 cart machines (2), BO. L Olsen, Koss Comm, 4824 Fir Ln NW, Gig Harbor WA 98335. 206-858-7312.

ITC RP excel cond, 3 tones, like new, $2000. H Buttermore, WHYT, 2100 Fisher Bldg, Detroit MI 48202. 313-435-3932.

ITC mono PB (2) w/130 carts, excel cond, BO. J Griffin, Comm Services, 2900 E 6th St #75, Stillwater OK 74074. 405-377-3666.

Spotmaster 500 Series, $325; Spotmaster 500 Series, $200. J Emmel, Emke Media, POB 401, Olyphant PA 18447. 717-383-1118.

Scully 270 PB decks (3), $700 ea; Gates Criterion R/P deck, $350; Gates Criterion decks (2), $200. B Harlan, WFAH/WDJQ, 393 Smyth Ave NE, Alliance OH 44601. 216-821-1112.

BE 4300 RPS excel cond, R/P stereo, $950. B Anthony, Rt 3 Box 185, Cornelius OR 97113. 503-357-6120.

ITC PD2 R/P, new heads & motor, $825. D Goerg, Creative Eng, 2680 Edgerton St, Little Canada MN 55117. 612-646-7683.

Ampro CT2500B PB stereo, 3 tone FF (2), $400 ea. D Stebbins, KELK, 1800 Idaho, Elko NV 89801. 702-738-7118.

Harris R/P, as is, $300. R Sanchez, Lincoln Fine Arts Radio, 3800 S 48th St, Lincoln NE 68506. 402-426-2520.

Ampro CT3500B R/P stereo, 3 tone FF, $500. D Stebbins, KELK, 1800 Idaho, Elko NV 89801. 702-738-7118.

ITC RPFP R/P stereo 3 tone like new, $2000. H Buttermore, WHYT, 2100 Fisher Bldg, Detroit MI 48202. 313-873-9821.

Tapecaster 700P mono PB, works gd, $200/BO. S Streitenberger, WFCB, 45 W Main, Chillicothe OH 45601. 614-773-3000.

UMC Beaucart Type 20, 3-cue tones, motorized azimuth adjust, $2500. S Portier, WNOE, 529 Bienville St, New Orleans LA 70130. 504-529-1212.

Tapecaster X700RP, $250; X700P, $200. M Gottesman, KAMP, POB 1018, El Centro CA 92244. 619-352-2277.

Audicord A-10 mono, PB (4), like new, $350 ea; BE 3200 RP mono, excel cond, $950. AH Bott, BHP Inc, 340 S 24th St, Quincy IL 62301. 217-224-1076.

Harris Criterion 90-2 stereo cart R/P w/all three tones, never out of original box, $2100. J Newman, 143 WBUC Road, Buckhannon WV 26201. 304-472-3932.

ITC 3D matching WRA record head, mono 1 cue, 1 owner, unit has never seen bdct use, factory rebuilt last year w/svc man & spares, $2150. P Appleson, Appleson Stds, 1000 NW 159 Dr, Miami FL 33169. 305-625-4435.

RCA RT-7 cart deck, $50; Sparta 300-CP cart deck, $50. J Ross, NW Audio, 3860 Ritamarie, Columbus OH 43220. 614-459-4292.

Ramko ACL-25/E cart loader, $250. S Portier, WNOE, 529 Bienville St, New Orleans LA 70130. 504-529-1212.

ITC 3D stereo PB w/WRA record amp, $1850. D Gowens, WESE, POB 660, Greenville SC 29602. 803-242-4660.

Collins 642A-1 rack mount. S Portier, WNOE, 529 Bienville St, new Orleans LA 70130. 504-529-1212.

Want to Buy

Rapid Cue, any cond, mono PB. J Breitner, Breitner Assoc, 7 S Monroe St, Monroe MI 48161. 313-242-6600.

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.

WRA record amp for ITC triple decker. J Viekelich, Metro Recdg, 4551 Flag Ave N, Minneapolis MN 55428. 612-537-1431.

ITC triple deck stereo play in working cond. R Lane, KTYD, 5360 Hellister, Santa Barbara CA 93111. 805-967-4511.

RCA RT-27 mono cart decks, or version w/4 decks, will consider other brands. F Vobbe, 706 MacKenzie, Lima OH 45805. 419-224-1335.

ITC SP, WP, RP, 3D, any cond. S Streitenberger, WFCB, 45 W Main, Chillicothe OH 45601. 614-773-3000.

CASSETTE & REEL-TO-REEL RECORDERS

Want to Sell

Scully 280-B, 4 trk 1/2" tape, $2500. K Retzer, KGRZ, POB 4106, Missoula MT 59806. 406-728-1450.

Ampex 605 mono R-R. A Bendix, KGWY, POB 1179, Gillette WY 82716. 307-686-2242.

Ampex 351 FT, $300. W Preist, Classic Sound & Recd, 1249 Bayshore Blvd, Dunedin FL 33528. 813-726-4474.

Tape-a-thon 702-10P repro stereo (13) in portable case, 7.5-3.75, 10-1/2" reels, continuous duty. R Carson, POB 42582, Phila PA 19101. 215-632-7227.

MCI JH1120B (6) w/cabinets in gd cond, $2500 ea. M Drayton, WPFW, 700 H St NW, Wash DC 20001. 202-783-3100.

Sony TC-5K tabletop cassette R/P, $50. K Retzer, KGRZ, POB 4106, Missoula MT 59806. 406-728-1450.

3M M64 2 trk stereo, 15/30 ips, console mounted, excel cond, $650/BO; Ampex 350-2 2 trk stereo, rack mount, gd cond, $300; Ampex 351-2 (2), $350. T Steele, Frankford-Wayne Mastering, 1697 Broadway, NY NY 10019. 212-582-5473.

Magnecord PT-6, w/options PT6-AH, amp & record sections PT6-J, PT6-M. R Elm, WWJC, 1120 E McCuen St, Duluth MN 55808. 218-626-2738.

3M Mincom, one 2 trk & one 2 or 4 trk, old, big, but restorable, call for info. M Wiist, WAUS, Andrews Univ, Berrien Springs MI 49104. 616-471-3400.

Infonics cassette dup equip, (2) systems avail w/open reel masters, 1 w/cassette master also, 8 slaves ea, call for info. M Wiist, WAUS, Andrews Univ, Berrien Springs MI 49104. 616-471-3400.

Teac 3300S 1/4 trk stereo, rack mounted, vgc, $150/BO; Ampex 350-2 elect only master & slave, R/P electrs for Ampex 350, power supply, gd cond, rack mount, $40/pr; Technics 676 stereo cassette, rack mount, gd cond, $75; Akai GX-630D 1/4 trk stereo, $400. T Steele, Frankford/Wayne Mastering Labs, 1697 Broadway, NY NY 10019. 212-265-5563.

Otari MKII-4 excel cond, 1/2" 4 trk, BO; Nakamichi 550 batt oper, excel cond, BO; Eumig FL-1000 cass deck, excel cond, BO. R Kaufman, Solid Gold Time Machine, POB 29804, Atlanta GA 30359, 404-636-9911.

Otari ARS-1000 10" R-R w/25 Hz detector, 7.5-15 ips, $800, you ship. R Kerbaway, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

Nagra IV-L Type L-3, w/single preamp & sync, mint cond w/manual, $2600. R Sumner, CAVU Corp, 3351 Contessa Ct, Annandale VA 22003. 703-560-0233.

MCI JH10 16 trk w/opt 8 trk head stack & rollers, $6000 or will trade for mixer. G Bishop, Reel Time Recording, 3205 E Bessemer, Greensboro NC 27405. 919-378-1034.

Ampex 350-2 2 trk stereo, 10.5" reels, rack mount, gd cond, $275; Ampex 351-2 2 trk stereo, 10.5" reels, Inovonics Tentrol Constant tension controller, rack mount, vgc, $350; Ampex 375 Varispeed control unit/oscillator for Vari-speed of 300 or 350/351 series recorders, gd cond, rack mount, $60. T Steele, Frankford/Wayne Mastering Labs, 1697 Broadway, NY NY 10019. 212-265-5563.

Ampex 602 stereo R/P electrs only for 600 series, rack mounted, vgc, $45; Scully 280 TM 4-chan 280 series PB only electrs w/4-VU meters, level & EQ controls, rack mounted, vgc, $95/BO; Ampex 351/300 (4) multi-chan R/P electrs complete, tube type, gd cond, $45 ea. T Steele, Frankford/Wayne Mastering Labs, 1697 Broadway, NY NY 10019. 212-265-5563.

Telectro 351-2, 2 trk stereo, rack mount, 10.5" reels, fair cond, $100; Telectro 352, deck only, no electrs, 2 trk stereo PB heads, fair cond, $25; Scully 280 R/P electrs (2), no cards, w/power supply, gd cond, $25 ea or $50/both w/pwr supply. T Steele, Frankford/Wayne Mastering Labs, 1697 Broadway, NY NY 10019. 212-265-5563.

3M M64 2 trk stereo, 1/4", console mounted, vgc, $600; 3M M64/23 2 trk stereo PB only, 1/4", Lang console mounted, gd cond, $250; Ampex 300 series 2 trk stereo, 1/2" PB only, Inovonics 376 dual PB elect, console mounted, vgc, $350. T Steele, Frankford/Wayne Mastering Labs, 1697 Broadway, NY NY 10019. 212-265-5563.

3M M23 4 trk, $1250; Ampex transports, power supplies, top plates, parts, etc, also Scully parts. J Price, Price's Rcdg Srvs, 2651 Globe Ave, Dallas TX 75228. 214-321-6576.

Dictaphone 5042 4 trk logger, 2 transports, time code unit, audio controller, $4500. E Turner, British Bdct, 630 5th Ave, NY NY 10111. 212-581-7100.

Teac A3300SX 2 trk 7.5-15 ips, $400 plus frt. J Shepard, Globe Prod, 539 Westminister Ln, Salem VA 24153. 703-389-1670.

Teac 80-8 w/dbx 8 NR, $1850. G Bishop, Reel Time Recording, 3205 E Bessemer, Greensboro NC 27405. 919-378-1034.

Telex Magnecord 1022 1/2 trk R-R, owners manual, schematics, recently totally serviced, $450. S Campbell, Sound Crafters, 105 Cool View Dr, Seneca SC 29678. 803-882-2762.

Tascam Pro Series 70, 1/2" 4 trk w/dbx in Scully roll-around, $2000/BO. P Dickson, 3011 211th Ave NE, Redmond WA 98052. 206-868-4942.

Ampex 440C 2 trk has 2 new head stacks, excel cond, $1750. P Dickson, 3011 211th Ave NE, Redmond WA 98052. 206-868-4942.

Otari 7800 1" 8 trk, less than 300 hrs, $5K/BO. P Dickson, 3011 211th Ave NE, Redmond WA 98052. 206-868-4942.

Tascam 80-8 1981 w/dbx, low hrs. M Baykian, Granny's Kitchen, 4261 Iverness, Orchard Lake MI 48033. 313-626-4075.

Ampex AG600 (2), gd cond, $300 ea. M McAnally, WEKC, POB 1071, Williamsburg KY 40769. 404-943-3437.

Ampex 602 (2) FT, gd cond, $250 ea. D Ibel, KICD, 2600 N Hwy Blvd, Spencer IA 51301. 712-262-1240.

Magnavox R-R duplicator, 1/4" audio duplicator w/5 slaves w/dual 1/2 trk heads w/FT heads, gd cond. S Evans, Imperial Intl Learning, Box 548, Kankakee IL 60901. 815-933-7735.

Wollensak (5), needs work & heads; Magnecord 1021, bad switch bank; Ampex PR-10 for parts or repair, has tube type amp. L Wilson, 409 Hillaire Dr, Hopkinsville KY 42240. 502-886-1678.

RW Broadcast Equipment Exchange

CASSETTES ... WTS

Magnecord 1021 R-R, mono, solid state, working, $350. K Trimble, Elizabethtown Bdct, Box L, Elizabethtown KY 42701. 502-769-1400.

Ampex 357 FT, excel cond, new Inovonics 370 elec, $950. D Goerg, Creative Eng, 2680 Edgerton St, Little Canada MN 55117. 612-646-7683.

Ampex 440C, (3) 2 trk stereo, excel cond, $1700; FT mono, excel cond, $1300; Ampex 440B, (3) 2 trk stereo, excel cond, $1400; FT mono, $1000; Ampex ATR700, (2) 2 trk stereo recorders, vgc, $100 ea; Ampex AG350, 2 trk stereo, vgc, $900; FT mono w/Inovonics elec, $700. S Streitenberger, WFCB, 45 W Main, Chillicothe OH 45601. 614-773-3000.

Tascam 133 cassette w/cue chan, 2 speed 1-7/8, 3-3/4, Dolby rack mount included, excel cond, $600 incl ship. A Nadav, Accusound, 50-40 207th St, Bayside NY 11364. 718-229-5605.

Ampex AG350, mono, $400/BO. L Houck, Rollin Recdg, 210 Altgelt, San Antonio TX 72801. 512-736-5483.

Otari MX5050 1/2 trk R-R, $1250. D Weeks, Sharpe Bdct, 515 E Park Dr, Monroe NC 28110. 704-283-7085.

Otari MX5050-8SD 1/2" 8 trk excel cond, w/manual & custom roll-a-round, $2850. D Weeks, Sharpe Bdct, 515 E Park Dr, Monroe NC 28110. 704-283-7085.

Ampex AG440, stereo RP 7.5-15 ips in roll console w/manual; ITC 750 stereo RP w/manual; Revox A77 w/wood carry cabinet. B Securo, WGLH, POB 2127, Chapel Hill NC 27514. 919-942-8765.

Tascam 38 8 trk R-R, 1 yr old, low hrs, $1800. R Visel, Super Sound, 6300 Weddington Ct, Mobile AL 36609. 205-660-1400.

Otari 5050B 8 trk, 8 chan, dbx 154 in walnut cabinet, gd cond, $3000. B Castner, Castners Ltd, 747 W Maple, Birmingham MI. 313-433-3530.

Tascam 234 (5) cassette decks, 1 yr old, excel cond, $400. A Wentt, Faith Prod, 1441 Guthrie Dr, Cleveland TN 37311. 800-251-4024.

Crown SX81 w/FT mono heads, solid state mono electr, operating w/gd heads, $250/BO. T Adams, Wisc Pub Radio, Box 5541, Madison WI 53705. 608-246-2052.

Sony TC755, 10-1/2" capacity, 7.5-3.75 ips, 1/4 trk stereo, excel cond, $400/BO. R Wells, KREO, POB 1598, Santa Rosa CA 95402. 707-433-4895.

Ampex 440 FT mono, 7.5 & 15 ips, in Ruslang roll-around cabinet, $1100. D Flynn, Continental Recd, 102 South St, Boston MA 02111. 617-426-3131.

Scully 280-8 1" 8 trk, $3750. C Neilson, West Bank Sound, 1413 Washington Ave S, Minneapolis MN 55454. 612-370-0098.

Ampex PR10, $100/BO. L Houck, Rollin Recdg, 210 Altgelt, San Antonio TX 72801. 512-736-5483.

Otari MX5050 2 trk, $1050. S Bogart, Bogart Prods, 9 Twin Lakes Court, Arlington TX 76016. 817-467-0158.

Ampex AG350 2 trk, gd cond, $600/BO. L Houck, Rollin Recdg, 210 Altgelt, San Antonio TX 72801. 512-736-5483.

Pioneer RT2022 1/2 trk 10-1/2" reel w/TAU-11 elect, gd cond, new heads, BO. C Cocxis, Rejouyssance, 2820 Raymond Ct, Falls Church VA 22042. 703-237-2590.

Metrotech logger, 10.5" reels, $100/BO. L Houck, Rollin Recdg, 210 Altgelt Ave, San Antonio TX 78201. 512-736-5483.

Pentagon cassette duplicators w/R-R & cassette masters, one 12-slave, one 4-slave system. Nigel, Technichrome, 1212 S Main St, Las Vegas NV 89104. 702-386-2844.

Scully 280-4 4 trk, rack mount, rolls tape & heads look gd, as is, $995. R York, Jewel Records, POB 31078, Cincinnati OH 45231. 513-522-9336.

Ampex 351 2 trk in wooden custom console, vgc, excel heads, $1100. R York, Jewel Records, POB 31078, Cincinnati OH 45231. 513-522-9336.

Revox A77; Sony TC630, both excel cond. B Michaels, Tye Bdct, POB 5105, Abilene TX 79608. 915-695-7300.

Sony 1/2 trk, 766-2, closed loop, dual capstan, 10-1/2", 7.5 & 15 ips, 4 head w/remote, gd cond, $550. R York, Jewel Records, POB 31078, Cincinnati OH 45231. 513-522-9336.

Tascam 22-2, used twice, in new cond, orig box & manual, $600/BO. K Demucci, Bethany Lutheran Church, 35 W Messenger St, Rice Lake WI 54868. 715-234-3177.

Teac X7R R-R, dual capstan, bi-directional record & play, excel cond, $375. R York, Jewel Records, POB 31078, Cincinnati OH 45231. 513-522-9336.

Tascam 32 7.5 & 15 ips, $575. J Englander, Prod Block Stds, 906 E 5th, Austin TX 78702. 512-474-6043.

Tascam 40-4 4 trk R/R w/dbx, excel cond, $950. J Englander, Prod Block Stds, 906 E 5th, Austin TX 78702. 512-474-6043.

Metrotech 552A Series 500 logger elects & reel machine (2), $250 ea. S Portier, WNOE, 529 Bienville St, New Orleans LA 70130. 504-529-1212.

Ampex PR10, $100/BO. L Houck, Rollin Recdg, 210 Altgelt Ave, San Antonio TX 78201. 512-736-5483.

Revox B225, CD player, $1200. S Portier, WNOE, 529 Bienville St, New Orleans LA 70130. 504-529-1212.

Ruslang tape cabinet, roll-around, never used, $150. J Green, WHPC, Stewart Ave, Garden City NY 11530. 516-222-7438.

Ampex AG351, FT, $500. L Houck, Rollin Recdg, 210 Altgelt Ave, San Antonio TX 78201. 512-736-5483.

Ampex AG351 2 trk, gd cond, $600. L Houck, Rollin Recdg, 210 Altgelt Ave, San Antonio TX 78201. 512-736-5483.

Want to Buy

RCA RT21 manual or photo copy, also parts & pieces, units working or not. M Salvaggio, MFS Prod Srvs, 417 Lauback St, Hellertown PA 18055. 215-838-9274.

Revox A-77 R-R's, don't mind one that needs repairs. F Vobbe, 706 MacKenzie, Lima OH 45805. 419-224-1335.

Pioneer RT707 1/4 trk reversible. J Viekelich, Metro Recdg, 4551 Flag Ave N, Minneapolis MN 55428. 612-537-1431.

Ampex 3200 custom duplicator, 10 slave 1 master, 8-1 dup sys, all solid state, Saki heads, reel time quality copies, call for more info. P Hogan, TM Comm, 1349 Regal Row, Dallas TX 75247. 214-634-8511.

Capstan motor for Tascam 7030SL. C Lunde, Cycle Sound & Video, 167 Madison St, Waterbury CT 06706. 203-756-7751.

Technics RSM85 cassette in gd cond. R McDaniel, KJRG, Box 567, Newton KW 67114. 316-283-5150.

1/2" 2 trk, record, reproduce & erase heads. D Love, Coincidence Digital Recdgs, 3700 Wingate, Waco TX 76706. 817-662-2551.

Ampex 15/30 ips servo motor. D Love, Coincidence Digital Recdgs, 3700 Wingate, Waco TX 76706. 817-662-2551.

Elect for Ampex 351. D Love, Coincidence Digital Recdgs, 3700 Wingate, Waco TX 76706. 817-662-2551.

CATV-MATV EQUIP.

Want to Sell

Catel FMS cable modulator, like new, $1000. W Vos, KYJR, POB 79, Wenatchee WA 98801. 509-663-5186.

CONSOLES

Want to Sell

Collins 212J-1 PA mixer; Gates Studioette mixer, tube type; Howe 7012 stereo 12 chan mixer rotary; Howe 7512 stereo, 12 chan slide; Ampro Microtouch 5 chan stereo mixer. A Bendix, KGWY, POB 1179, Gillette WY 82716. 307-686-2242.

Howe 7512A factory reconditioned stereo console, 12 mixer, 22 input, $4500. E Gene Norman, Parl Leasing Co., POB 1719, Des Moines IA 50306. 800-843-3932.

Ramko BC8-M mono, 8 chan, full docs, needs work, $400 plus ship. P Remaker, WQHF, 3905 Spruce St, Phila PA 19104. 215-898-9553.

Collins, 50's vintage tube type console, $200. C Ratliffe, WADE, POB 1210, Wadesboro NC 28170. 704-694-2175.

Gates Stereo 80 w/manual, missing 1 meter, working when removed, $800. R Lane, KTYD, 5360 Hellister, Santa Barbara CA 93111. 805-967-4511.

McMartin B502 mint cond, custom snake & breakout box, $1000. B Mountjoy, Custom A/V Srvs, POB G1240, Elizabethton TN 37644. 615-543-5849.

Custom recording console, 16 x 16, w/Spectrasonics components, Orban 111B w/dual reverb, 2 Gates 3-speed TT's & EV Sentry 100, $1500/all. G Bender, Commercial Features, 3650 Washington, Indianapolis IN 46705. 317-926-5570.

Gates M-6540-C Stereo Statesman (in storage), $950. K Retzer, KGRZ, POB 4106, Missoula MT 59806. 406-728-1450.

Electrodyne 16 in 16 out, 144 patch, full 16 trk monitor, includes 16 trk Scully M-100 R/P 2" machine w/remote, excel cond, $12K for both. Mr. York, Jewel Recdg, POB 31078, Cincinnati OH 45231. 513-522-9336.

QRK Futura 10S stereo w/10 pots complete w/back-up console, circuit cards & new pots, BO; Harris Stereo 5, 5 pot, BO. T Low, Foster Comm, 115 W First Ave, San Angelo TX 76903. 915-653-3387.

Gates M-5526 Yard, mono w/pwr supply, gd cond, in service, $225. D Sparano, WVCR, Rt 9, Loudonville NY 12211. 518-783-2990, call & leave message.

BE 8M 200 mono dual buss console, mint cond, Daven step attenuators, $2500. B Mountjoy, Custom A/V Srvs, POB G1240, Elizabethton TN 37644. 615-543-5849.

Collins 212T-1 audio control system, mint cond, w/manual, $1200. R Sumner, CAVU Corp, 3351 Contessa Ct, Annandale VA 22003. 703-560-0233.

McMartin B502 stereo, 5 chan, $575. J Griffin, Comm Services, 2900 E 6th St #75, Stillwater OK 74074. 405-377-3666.

Tascam M-35 studio console, 8 inputs, talkback, slate, cue, slate tone, 8 band EQ, separate controls for control room, studio, headphones, ideal for prod room or 8 trk facility, $1250/BO. Mr. York, Jewel Recdg, POB 31078, Cincinnati OH 45231. 513-522-9336.

GE 4BC1A1, BO. B Harlan, WFAH/WDJQ, 393 Smyth Ave NE, Alliance OH 44601. 216-821-1112.

Sparta A-16R rack mountable console, 5 chan, 15 input, 2 chan output, $850. W Brown, KVNI, Coeur d'Alene ID. 208-664-9271.

Shure Production Master sub-mixer, mates to M67/M267, $150. W Brown, KVNI, Coeur d'Alene ID. 208-664-9271.

Harris Medalist 10 w/P&G linear faders, in service, fully operational, $1750. M Golchert, WVBR, Box 298, Russellville KY 42276. 502-726-3555.

Harris Executive 10 chan w/integrated outboard elec, fully operational when taken out of service 12/86, $1800/BO. K Gordon, Key Comm, 10622 SW 100thSt, Miami FL 33176. 305-271-1671.

Quantum 128, 12 in 8 out w/144 position tiny telephone patch bay, housed in walnut cabinetry, vgc, $4100. B Castner, Castners Ltd, 747 W Maple, Birmingham MI. 313-433-3530.

RCA BC18-8, gd cond, $600. P Nicholson, Hollis Bdctg, POB 7008, Columbus GA 31908. 404-322-2220.

Tascam 8 x 4 mixer, $800. D Weeks, Sharpe Bdct, 515 E Park Dr, Monroe NC 28110. 704-283-7085.

Gates Yard 8 ch mono, $400 & frt. M McAnally, WEKC, POB 1071, Williamsburg KY 40769. 404-943-3437.

MCI JH618, fully automated, less than 200 hrs, w/#12 phase meter, #no9, #7, #13, #21 options, phantom power, $19,000. J Simons, EVS Fleetwood Stds, 321 Revere St, Revere MA 02151. 617-289-6305.

Apache 100 mono, gd for news, $300. K Trimble, Elizabethtown Bdct, Box L, Elizabethtown KY 42701. 502-769-1400.

RCA BC7A w/7 extra chan, $500. J Lies, WTRC, POB 699, Elkhart IN 46515. 219-293-5611.

Automated Processes, 40 x 8 x 24 w/Optimix automation system, 550 & 554 EQ's, (4) cue mixes. R Robinson, TNA, 10 George St, Wallingford CT 06492. 203-269-4465.

Ramko DC38-8S stereo, 8 chan, 32 inputs, $2900. S Streitenberger, WFCB, 45 W Main, Chillicothe OH 45601. 614-773-3000.

Want to Buy

Gates President, Executive or Diplomat. J Alexander, KARV, Box 190, Russellville AR 72801. 501-968-1184.

DISCO & SOUND EQUIP.

Want to Sell

AKG BX20E reverb, mint cond plus second unit for parts, $990 firm. K Heyne, German Masterworks, 1301 45 Ave, San Fran CA 94122. 415-664-0163.

Distributor Directory

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

Can't Find It? Call 1-800-426-8434 For Immediate Action! Want To Sell It?

RW Broadcast Equipment Exchange

DISCO, ETC.... WTS

JBL N1200 crossovers, 1200 Hz, vgc (4), $30 ea. T Steele, Frankford/Wayne Mastering Labs, 1697 Broadway, NY NY 10019. 212-265-5563.

Quantum QM12P mixer; MicMix Super C, BO. L Olsen, Koss Comm, 4824 Fir Ln NW, Gig Harbor WA 98335. 206-858-7312.

MXR pitch & digital display transposer, like new, $550. J Price, Price's Rcdg Srvs, 2651 Globe Ave, Dallas TX 75228. 214-321-6576.

EMT 240 plate reverb system, 0.7-5 sec delay w/ch board model 262 amps, mint cond, w/manual, $1850/BO. J VonVleck, V-Tech, 2844 Beachtree Ln, Woodbridge VA 22191. 703-221-6984.

EV Sentry II's, $400/pr. W Preist, Classic Sound & Recd, 1249 Bayshore Blvd, Dunedin FL 33528. 813-736-4474.

Soundcraftsman 20-12-600 stereo full octave graphic EQ's, 600 ohm output, vgc, rack mountable (3), $65 ea; dbx 187 4-chan R/P type I prof NR unit, rack mount, vgc, $350/BO; Dolby A301 stereo type A NR unit, switchable R or PB, rack mount, vgc (2), $280 ea; Dolby A301 stereo type A NR unit w/auto R/P changeover unit, latest mods, rack mount, vgc, $350. T Steele, Frankford/Wayne Mastering Labs, 1697 Broadway, NY NY 10019. 212-265-5563.

Master Room reverb units (2), one MRII, $225 & one MRIII, $325. J VonVleck, V-Tech, 2844 Beachtree Ln, Woodbridge VA 22191. 703-221-6984.

Orban 245F stereo synthesizer (2), new, $340 ea. B Salzman, Stevens Comm, 2600 Lupino St, Unit F-5, Vail CO 81657. 303-476-6786 aft 6 PM MT.

Eventide instant phaser, gd cond, $250; Orban 111B stereo reverb, excel cond, $350. B Castner, Castners Ltd, 747 W Maple, Birmingham MI. 313-433-3530.

Travel rack case w/angled top & space below, 30 space, flash hardware, $250. M Baykian, Granny's Kitchen, 4261 Iverness, Orchard Lake MI 48033. 313-626-4075.

Audio gear inc: Eventide 1745A, 2830; Ursa Major 323, SST282; Yamaha R1000; UREI 920-16, 964; Ursa Major 8X32; Lexicon 224, 1200B; Roland RE201; Lexicon 93, 95, 1025; Eventide PA101A, FL201A, 910-06; Countryman 968; dbx 216; EMT 251, call for details & prices. R Burton, Audio Rents Inc, 7237 Santa Monica Blvd, LA CA. 213-874-1000.

EMT 140-T plate reverb, mono, $1500. D Flynn, Continental Recds, 102 South St, Boston MA 02111. 617-426-3131.

Fairchild 658 echo unit w/rack & remote, triple spring, $100/BO. A Tucker, Foothill Prod, 70 W 83rd St, NY NY 10024. 212-877-0973.

Fairchild 359 reverb, $295. D Flynn, Continental Recd, 102 South St, Boston MA 02111. 617-426-3131.

Ursa Major 323 digital reverb, 8 room, 320 ms delay, bal in/out, $699. P Vredenburgh, Brainzville Recdg, 12 Taylor Ct, Beardstown IL 62618. 217-323-2208.

Want to Buy

Lyrec timer or other 1/4" tape timer, 7.5 or 15 ips OK. A Tucker, Foothill Prod, 70 W 83rd St, NY NY 10024. 212-877-0973.

LIMITERS

Want to Sell

Inovonics MAPII, $500. W Vos, KYJR, POB 79, Wenatchee WA 98801. 509-663-5186.

CBS 445 stereophonic level controller; Collins Level Devil; (2) Harris Solid Statesman AGG units; (2) Harris Solid Statesman limiters. A Bendix, KGWY, POB 1179, Gillette WY 82716. 307-686-2242.

CBS Labs 400 stereo Volumax limiter amp, latest mods, gd cond, (2), $250 ea; Neumann HK-66 dual chan high freq only limiter w/PS, rack mounted, perf for disk cutting or FM bdct, vgc, $290. T Steele, Frankford/Wayne Mastering Labs, 1697 Broadway, NY NY 10019. 212-265-5563.

Gates M6629 Solid Statesman AGC (3), $100 ea plus ship. J Shepard, Globe Prod, 539 Westminister Ln, Salem VA 24153. 703-389-1670.

CBS Labs 410 FM Volumax & 444 FM Audimax w/manuals, $125 ea or $225 for both, you ship. R Kerbaway, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

UREI LA3A (2), excel cond, BO. R Kaufman, Solid Gold Time Machine, POB 29804, Atlanta GA 30359. 404-636-9911.

Gates Solid Statesman AGC, mono, $150; CBS Volumax 410 FM limiter, mono, $200. R Dietterich, WAMO, 411 7th Ave, Pittsburgh PA 15219. 412-471-2181.

CBS Model 444 Audimax III, gd cond, $125. R Sumner, CAVU Corp, 3351 Contessa Ct, Annandale VA 22003. 703-560-0233.

Orban 9100A/XT for 8100A/1, $1250. B Harlan, WFAH/WDJQ, 393 Smyth Ave NE, Alliance OH 44601. 216-821-1112.

Orban Optimod 8100A, perfect cond, $3750. Ken Stevens, KTUX. 318-635-9999.

UREI 1178 for stereo dual peak limiter, looks, works new, $500. K Blevins, Snider Corp, 4021 W 8th, Little Rock AR 72204. 501-661-7590.

Harris MSP-90 stereo AGC limiter assem, triband, w/all extender cards, manuals & cords, $990. K Blevins, Snider Corp, 4021 W 8th, Little Rock AR 72204. 501-661-7590.

Aphex Compellor, like new, just out of box, BO. J Saunders, WLIM, 45 Penna Ave, Patchoque NY 11772. 516-475-1580.

Gates SA 39A, 20 yrs old; FM Audimax 4450A stereo; Volumax 411 peak controller stereo; AM 2 Volumax 400 peak controller; Audimax III level controller. L Wilson, 409 Hillaire Dr, Hopkinsville KY 42240. 502-886-1678.

Orban 8000A (2), $2000 ea. S Streitenberger, WFCB, 45 W Main, Chillicothe OH 45601. 614-773-3000.

Gates Sta-Level M-5167 works fine, $60. W Brown, KVNI, Coeur d'Alene ID. 208-664-9271.

Dorrough DAP 310 AM, BO ASAP. J Coursolle, Coursolle Bdct, 609 Lome Ave, Waupun WI 53963. 414-324-4441.

dbx 903 module, brand new, for F900 mainframe. $175. E O'Brien, Our House Recdgs, 3041 Crawford, Terre Haute IN 47803. 812-238-9312.

Allison Research Kepex 500's (4) & (4) Gain brains w/16 unit power supply rack, all in excel cond, $1200. B Castner, Castners Ltd, 747 W Maple, Birmingham MI. 313-433-3530.

CRL stereo FM4G, SPP800, SEP800(20), SMP800, $4000/BO. J Hawkins, KGGI, Box 1290, San Bendino CA 92404. 714-889-2651.

Gates SA-39A limiter, $150. W Brown, KVNI, Coeur d'Alene ID. 208-664-9271.

Optimod 8000A recently taken out of service. $1900. K Trimble, Elizabethtown Bdct, Box L, Elizabethtown KY 42701. 502-769-1400.

Symetrix 525 dual gated C/L, BO or trade for LA4. R Wells, KREO, POB 1598, Santa Rosa CA 95402. 707-433-4895.

CBS stereo FM Volumax Mod 411, $250. B Harlan, WFAH/WDJQ. 393 Smyth Ave NE, Alliance OH 44601. 216-821-1112.

UREI 535 dual graphic EQ, excel cond, $350. R Wells, KREO, POB 1598, Santa Rosa CA 95402. 707-433-4895.

Want to Buy

RCA BA45 & BA43 manual for both units. M Salvaggio, MFS Prod Srvs, 417 Lauback St, Hellertown PA 18055. 215-838-9274.

Orban Optimod AM mono, must be bargain. A Caswell, C&G Bdctg, POB 171, Linden MI 48451. 313-735-4545.

MICROPHONES

Want to Sell

Audio-Technica ATM41 new, white finish, uni-directional w/20' cable & connectors, $165. CJ Pringle, Trinity Entrp, Box 831, Webster City IA 50595. 515-832-1263.

HME 252 wireless mic xmtr (3), sell or trade for HME rcvr; (2) Com-Tek MR72 rcvrs, one M72 xmtr. BO; Vega AV72 rcvr, Vega AV71 xmtr, $595; Telex WT200 xmtr, Telex WT50 xmtr, BO; TOA WT402-31U rcvr, (2) handheld WM140-2 xmtr, BO. J Price, Price's Rcdg Srvs, 2651 Globe Ave, Dallas TX 75228. 214-321-6576.

Sennheiser binaural rec system, new, BO. R Sanchez, Lincoln Fine Arts Radio, 3800 S 48th St, Lincoln NE 68506. 402-426-2520.

AKG C12A variable pattern power supply, 65' cable, vgc (2), $550 ea; AKG C60 w/power supply & 65' cable, excel cond, (2), $290 ea. B Castner, Castners Ltd, 747 W Maple, Birmingham MI. 313-433-3630.

E-V 666, vgc, $100 plus ship. J Emmel, Emke Media, POB 401, Olyphant PA 18447. 717-383-1118.

Want to Buy

RCA 77D mic, gd cond, please call. B Landrum, Allison Gas Turbine/GM, Indianapolis IN. 317-242-7559.

RCA 88A, working or not, need chassis parts. B Robinson, WTOK, POB 2988, Meridian MS 39302. 601-693-1441.

Shure SM5B mic or RE-20 in gd cond, reasonable. J Emmel, Emke Media, POB 401, Olyphant PA 18447. 717-383-1118.

Sennheiser MD421, 2 ea wanted. G Stafford, Capital Magnetics, 1030 E Hruard Rd, Burbank CA 91501. 818-843-7987.

MISCELLANEOUS

Want to Sell

Soundolier 300-61 relay racks, (2), white, $175 ea. K Retzer, KGRZ, POB 4106, Missoula MT 59806. 406-728-1450.

Standard Electric 60S 60-min electric timers w/mech & elect reset (2), $30 ea; Lyrec TIM-4 high speed rewind or fast forward tape timers for Ampex or Scully recorders, gd cond (2), $50 ea; API 361 3.5" VU meters (4), $30 ea. T Steele, Frankford/Wayne Mastering Labs, 1697 Broadway, NY NY 10019. 212-265-5563.

CBS network alert receiver, $450. B Mountjoy, Custom A/V Srvs, POB G1240, Elizabethton TN 37644. 615-543-5849.

Sonex 3" natural blue, 96 sq ft per box, 6 sheets, each 4 feet square, 3 boxes, BO. G Vanderwerff, Record-A-Song, 746 W Roanoke Cir, Murray UT 84123. 801-265-9501.

Teletype ASR 33 w/tape reader, $75; Centronic 588 parallel dot matrix printer w/serial interface, $100; Hitachi FM-T44 AM/FM tuner, $150; Cobra telephone answering machine, $50; Square-D 3 phase dbl pole 100 A safety switch, $150; HSC-1 video hum stop coil, $75; Heathkit HD-10 dist analyzer, $10; Radio Shack 64K color computer & 40 column printer, $150. R Kerbaway, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

Sola Model 28-2128-1 constant voltage DC power supply, 28 VDC output at 15 A, vgc, $45. M Byrnes, WAMU, 4400 Mass Ave NW, Wash DC 20016. 202-885-1030.

Quick-Set QHT-1 Hercules tripods, w/QHD-1 dolly, no heads, 150 lb cap, $250 ea. R Sumner, CAVU Corp, 3351 Contessa Ct, Annandale VA 22003. 703-560-0233.

Phone Mate 300S battery operated automatic telephone answering machine, very little use; (2) new Christmas tree terminal blocks, 80 & 78 terminals; (2) used 80 terminals blocks; (1) used 60 terminals block; (1) 30 terminal block, mounted on frame. L Wilson, 409 Hillaire Dr, Hopkinsville KY 42240. 502-686-1678.

Spart parts bargain: Harris tube-type limiter, RF amp, also EGS unit & 2 intercom substations, all 99 percent complete but not working, $75. D Sparano, WVCR, Rt 9, Loudonville NY 12211. 518-783-2990, call & leave message.

Bird 3128 Wattcher RF power monitor (2), up to 10 kW, 450 kHz to 2300 MHz, mint cond w/manual, $350 ea. R Sumner, CAVU Corp, 3351 Contessa Ct, Annandale VA 22003. 703-560-0233.

Business telephones 1A2 type 6 & 10 button, ITT models, 564, 2564, 830, 2830, gd cond, $35 & up plus ship. C Zalinski, Eds Comm Srvs, POB 92, Johnson City NY 13790. 607-798-7111.

Oak equip rack, 33" high 19" wide 16" deep w/casters, $100. J Nigro, Nigro Assoc, 25 Patton Ct, Wayne NJ 07470. 201-790-1415.

Rainbow case 2'9" x 2' x 2' insert rack mount incl, $300/BO. R Sanchez, Lincoln Fine Arts Radio, 3800 S 48th St, Lincoln NE 68506. 402-426-2520.

Timer, up or down, to 9 min 59 sec, presettable, home brew, momentary contact for remote, $35. C Zalinski, Eds Comm Srvs, POB 92, Johnson City NY 13790. 607-798-7111.

ASR-33T send & rcv teletype, BO. J Emmel, Emke Media, POB 401, Olyphant PA 18447. 717-383-1118.

Plate transformer, 3 phase 220/4000 V at 1 A, never used, $450. S Streitenberger, WFCB, 45 W Main, Chillicothe OH 45601. 614-773-3000.

Comp phone system inc 10 ITT 9 line phones, Sanbar KSU w/7 line cards w/intercom system, BO. R Wells, KREO, POB 1598, Santa Rosa CA 95402. 707-433-4895.

Beau motor (new) for Ampex 440 3 speed, 7.5-15 & 30 ips, $295. D Flynn, Continental Recd, 102 South St, Boston MA 02111. 617-426-3131.

Teletype 33 (2), ASR, w/punch & reader, w/ or w/o stands, take one or both, $250 ea or BO & you pick-up; many 16mm projectors to sell; Fairchild Galaxy (rear screen) salesman's projector. DMT A/V, Box 9064-RW, Newark NJ 07104. 201-484-5291.

Record-A-Call 560 answering units, (2), not remoted, like new, $60 ea plus ship. J Emmel, Emke Media, POB 401, Olyphant PA 18447. 717-383-1118.

Antique radio parts: tubes, ballasts, transformer, speakers, etc, SASE for list. N Carlson, Mobile Sound Group, 721 W Melrose, Chicago IL 60657. 312-871-7459.

Tandy TRS-80 Mod II w/2 expansion drives, $500. B Harlan, WFAH/WDJQ, 393 Smyth Ave NE, Alliance OH 44601. 216-821-1112.

Copper wire, #10, more than 12,000', $500 & frt. M McAnally, WEKC, POB 1071, Williamsburg KY 40769. 404-943-3437.

Coex 80F/T dot matrix printer, used once, no manual, $75. J Martin, Box 160326, Mobile AL 36616. 205-460-2395.

Want to Buy

Elect wanted, shortwave/hi-fi/radio, tubes, parts, etc. M Disch, 427 W Capital Dr, Hartland WI 53029. 414-367-5719.

Used equip for new AM, mod mon, EBS rcvr, console, EBS gen, AGC limiter, tape decks, auto. system, etc. F Kavenik, WLMV, Box 187, Vernon Hills IL 60061. 312-680-7557.

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

Eng, 7 yrs AM/FM, certified, West Coast only. Write to: Radio World, POB 1214, Falls Church VA 22041. Attn: Box 6-1.

Disc Jockey, exper, 30's-60's music, will furnish. Amanda Schauberger, 2003 Aldrich Ave S, #304, Minneapolis MN 55405. 612-872-9376.

Radio CE, FCC genrl, former CE in Boston, Houston, Miami, Ft Lauderdale, non-drinker, non-smoker. M Gottesman, 3377 Solano Ave #312, Napa CA 94558. 619-352-5688.

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.

Corp CE, hard working, self-starter, wanting FT position w/single or group owner stations, 10 yrs hands-on exper in AM/FM, for KS, CO, MO, NE, OK, TX, IA, IL, avail immed. L Timmons, RR 2 Box 41, Stockton KS 67669. 913-425-6509.

Hard working, dedicated exp (18 yrs) morning man/news/prod/admin, married, stable, avail, gd voice, warm climates, medium/larger markets. L Kay, 203 Harvestview N, Mount Joy PA 17552. 717-653-2500.

Chief position, 30 yrs in radio-TV bdct maint, prefer West. Rick, 916-674-3532.

Seeking asst or CE position in central US, major market asst & CE exper, FM/AM/DA, studio/TX repair & maint exp. TS, N143 W6175 Pioneer Rd, Cedarburg WI 53012.

CE, radio, FCC gen'l lic, BS Engr, exp in FM, pro sound systems & computers (H/W & S/W). A Melnyk, 200 Stockbridge Rd, Lenox MA 01240. 413-637-0838, X105.

New eng looking for place to grow & learn, have some exp, want more, ready to go! M Forster, 702 S Cherry St, Hammond LA 70401. 504-345-8963.

Prof high energy DJ seeks PT position in upstate NY, have refs/exp. G Collette, 237 N Huelson Ave, Stillwater NY 12170. 518-664-5094.

Journeyman TV control engr seeks employment in any aspect of video, cable or commercial TV bdctg in Denver area, Bdct major, AS-USNY, Marine radio FCC license, 4 yrs military TV prod/troubleshooting, 4 yrs civilian commercial TV prod. Contact Sharon Smith: 303-430-7159.

Tech person, 10 yrs exper video/film, elect & bdctg. Seeks PT/FT work inhouse/location film/video, Gen FCC, SBE, SMPTE. H Gray, 408-246-5563/241-9637.

Young successful PD seeks OM/GM in small/medium market, AM or FM, challenge a must! B Jones, 870 Pike St, Wabash IN 46992. 219-563-8619.

University of Florida
AUDIO ENGINEER

Responsible for maintaining and installing audio and audio processing equipment in both the studio and transmitter site. Requires a High School Diploma and at least two years of experience in the maintenance, design or construction of Technical broadcasting equipment. Possession of a General Radio/Telephone license is highly desirable. Salary range, $14,073-22,863 commensurate with qualifications. Send complete resume to Central Employment Center, 4th Floor Stadium, University of Florida, Gainesville FL 32611 by June 30, 1987. Refer to ID-11828.

Equal Employment Opportunity/ Affirmative Action Employer

HELP WANTED

Want to Sell

Chief Engineer, good-sized market, in Northwest, gd maintenance skills required w/studios, directional AM stereo, Class C FM, E.O.E. Send resume to: Radio World, POB 1214, Falls Church VA 22041. Attn: Box 5-1.

WANTED: Experienced studio engineer to maintain multiple studios for newly created satellite programming company. Audio expertise and ability to work with programmers are a must. Send resumes to: 3564 Bayside Walk, San Diego CA 92109.

Consultants

Broadcast Equipment Exchange

MISCELLANEOUS . . . WTB

Gates SA10 tech manuals & ops manuals, negotiable. J Pounds, WVLI, POB 902, Lexington VA 24450. 703-463-2161.

Manual or schematics for Ampex SP300 multitrack data recorder. T Adams, Wisc Pub Radio, Box 5541, Madison WI 53705. 608-246-2052.

MICROPHONES

Want to Sell

McMartin TBM4500A FM, stereo mod mon, recently taken out of srvs, needs calib, tuned 102.5 MHz, $500/BO. D Woodcock, WNWV, 5606 Medical Circle, Madison WI 53719. 608-271-1025.

Nems-Clarke 1671 FM monitor, 50-260 MHz, $125. M Disch, 427 W Capital Dr, Hartland WI 53029. 414-367-5719.

Gates MO-2639 mod monitor, gd for parts. L Wiison, 409 Hillaire Dr, Hopkinsville KY 42240. 502-886-1678.

Collins 54N-1 FM freq monitor, $95. D Stebbins, KELK, 1800 Idaho, Elko NV 89801. 702-738-7118.

RCA (Belar) BW-95A SCA monitor, works perfectly, 67 kHz & 97 kHz, BO. K Blevins, Snider Corp, 4021 W 8th, Little Rock AR 72204. 501-661-7590.

RCA **WF-48A** freq monitor, BO. B Harlan, WFAH/WDJO, 393 Smyth Ave NE, Alliance OH 44601. 216-821-1112.

Want to Buy

Gates GTA6741, SCA monitor; also Gates FM RF amp, GTM 88R. B Van Prooyen, 2111 Shangri-la Dr SE, Grand Rapids MI 49508. 616-243-2026.

Gates GTM 88F FM freq monitors. B Van Prooyen, 2111 Shangri-la Dr SE, Grand Rapids MI 49508. 616-243-2026.

MOVIE PROD. EQUIP.

Want to Sell

B&H 1590B 16mm projectors, like new, $400 ea. A Wentt, Faith Prod, 1441 Guthrie Dr, Cleveland TN 37311. 800-251-4024.

Beaulieu R16 camera w/Ang 12-120 zoom lens, 4 gang, synch, rewinds, snd readers, viewers, B&H 816 hot splicer, B&H 202 optical magprojector, w/sync motor, B&H 385 projector, recdg 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.

Want to Buy

Auricon EIF-20 Finder #, auto parallax viewfinder for Auricon 16mm pro camera. H Deans, Deans Prods, 170 Gran St, White Plains NY 10601. 914-949-5920 aft 6 PM.

RECEIVERS & TRANSCEIVERS

Want to Sell

Hallicrafter SX111 ham receiver, mint, w/manual, $150. D Stebbins, KELK, 1800 Idaho, Elko NV 89801. 702-738-7118.

Cushman CE-3 FM comm monitor w/#301 scope, 305B, 360D, 304B, fused pad & misc cable, $1000. Patty, Gabriel Engr, 833 W Main, Mesa AZ 85201. 602-969-8663.

McMartin TRE 6-B SCA receivers xtal controlled, all solid state, $55 ea plus ship. P Lierman, KNIS, Box 1243, Dayton NV 89403. 702-883-5700.

Want to Buy

Bearcat BC101 scanner receiver. J Hurray, Steiger Hurray & Assoc, 6816 W View Dr, Cleveland OH 11441. 216-526-7187.

REMOTE & MICROWAVE EQUIP.

Want to Sell

Moseley PCL505C w/latest Moseley updates on 947.5 MHz, $5000. E Stoltz, KWOD, 777 Campus Commons Dr, Sacramento CA 95825. 916-929-5000.

McMartin 2000B SCA mon (3), $500 ea; Moseley SCG4T SCA mon, $500; McMartin SCA gen, $750. M Daily, Daily Assoc, 311 S Gloucester, Topelo MS 38801. 601-841-1506.

Fairchild Dart 384 SCPC digital receiver, 2 dual chan 15 kHz prog cards, voice cue mod, complete for ABC, BO. R Grindberg, B&G Financial Srvs, POB 206, Minot ND 58701. 701-839-6027.

Sitex CR 1011 color radar, complete, all cabling, BO. D Haworth, KFGO, 1020 S 25th, Fargo ND 58108. 701-237-5346.

Marti RMC 2AXT RC stepping relay coil, brand new, $48 ea. C Smith, KREK, POB 1280, Bristow OK 74010. 918-367-5501.

Moseley PCL101 trans-rec, factory aligned as brand new, never used, $3000. M Bradford, WKHM, 1873 Crouch Rd, Jackson MI 49201. 517-278-7339.

Western Paging AO3JVC2468A pager w/charging stand, freq 152.240 MHz, BO. T Low, Foster Comm, 115 W First Ave, San Angelo TX 76903. 915-653-3387.

Gates xmtr remote control terminal. A Bendix, KGWY, POB 1179, Gillette WY 82716. 307-686-2242.

LAUX analog audio terminal, BO; LAUX analog audio terminal w/dynamic NR, BO; Microwave Assoc 1808300-2 VR-3X satellite rcvr, BO. T Low, Foster Communications, 115 W First, San Angelo TX 76903. 915-653-3387.

Transtar Satcom rcvr for Transtar Adult Contemp service, 6 mos old, mint cond, $4000. R Kramer, WQXO, Box 100, Munising MI 49862. 906-387-4000.

Trade S-A DAT-32 7.5 kHz card for 15 kHz card. R Wright, WLLX, Box 156, Lawrenceburg TN 38464. 615-782-2916.

S-A digital receiver w/15 kHz demod. G Stockman, WMFG, 807 W 37th, Hibbing MN 55746. 218-263-7531.

Wegener Series 1600 SMN receiver w/25 Hz & 35 Hz tone detector boards & 1683 receive translator board, also have video receiver, $2000. S Streitenberger, WFCB, 45 W Main, Chillicothe OH 45601. 614-773-3000.

Orban 8000A Optimod FM, great cond, $2400. J Smith, WIXK, 125 East 3rd St, New Richmond WI 54017. 715-246-2254.

ABC net alert rack mount unit (2) w/digital readouts, $250 ea/$400 pr. B Mountjoy, Custom A/V Srvs, Box G1240, Elizabetheon TN 37644. 615-543-5849.

Moseley (2) for 2-way & Marti 150-174 MHz. B Statham, WSTU, 1000 Alice, Stuart FL 33494. 305-692-1000.

Want to Buy

Marti RMC 2AX RC for parts or rebuild. C Smith, KREK, POB 1280, Bristow OK 74010. 918-367-5501.

Moseley TRC15 in gd cond, w/manuals pref, negotiable. F Kavenik, WLMV, Box 187, Vernon Hill IL 60061. 312-680-7557.

Moseley 303. T Driggers, Driggers Bdct, 818 Quail Ct, Healdsburg CA 95448. 707-433-9370.

TV microwave system, short hop for LPTV. T Pelorbet, WMKE, POB 1844, Midland MI 48640. 517-631-5583.

Cheap, used tube microwave STL for color TV bandwidth. C Alexander, Four Seasons Bdctg Inc, Box 669, Cadillac MI 49601. 517-482-9695.

STATIONS

Want to Sell

North Carolina FT AM station in large coastal city, $450,000, will finance; FT AM station in large western NC city, $350,000, will finance. G Whittle, 8304 Druids Ln, Raleigh NC 27612. 919-848-3596.

Danville VA, 1 kW day, 500 PSA, 330 PSSA, 970 kHz, $35K & terms. J Clegg, Box 3325, Danville VA 24543. 804-836-9700.

Class IV auto AM in Andalusia AL, positive cash flow, owner taking out $30,000/year, land & bldg avail, FM chan avail in area, pos. growth area, $165,000 terms. W Hoisington, WTCG, Andalusia AL 36420. 205-222-8849.

Daytimer, 1 kW, 1580, Class A FM 105.5, 2800 sq ft 3 bedroom, std combo on 3 acres of land, in city limits, comp automated, loads of gd clean equip, clear title, package, $350,000 neg. J Robillard, KLVU, 1803 N First East St, Haynesville LA 71038. 318-624-0105.

Want to Buy

Got an FM CP, about to run out of time to build, we may be interested, call or write. F Morton, KMGZ, POB 7953, Lawton OK 73506. 405-536-7953.

STEREO GENERATORS

Want to Sell

CSI SG-1E rack mount stereo gen, $250. K Retzer, KGRZ, POB 4106, Missoula MT 59806. 406-728-1450.

BE FS30 stereo gen. A Bendix, KGWY, POB 1179, Gillette WY 82716. 307-686-2242.

SWITCHER (VIDEO)

Want to Sell

Grass Valley 900SE-1 special effects for 1400 production switcher. B Briggs, KCAM, 827 Meridian St, Nashville TN 37207. 615-226-1122.

TAPES, CARTS REELS

Want to Sell

Scotch 880 (38) 2" instrumentation tape, (4) 5000' reels of Ampex 456 Grand Master 2", unused. R Knowles, Knowles Video Prod, Box 12127, Tallahassee FL 32317. 904-575-6689.

3M-Scotch 206, 208 & Ampex 632 ¼" on 5", 7" & 10½" reels-repro. Also avail Ampex 406, 456, 3M 250 & Agfa 469 2" audio tape w/no splices & with one splice. Also available Ampex 406 & 456 1" audio tape with no splices. Call for prices. Burlington Audio Tapes, 106 Mott St, Oceanside, NY 11572. 1-800-331-3191 or in NYS 516-678-4414.

Audio-Pak, almost like new, various lengths, $1.25 ea. T Abrego, KVLY, Box 850, Edinburg TX 78540. 512-383-7478.

Ampex 641, 1800' on 7" reels (1000 avail), $1.25 per reel. D Price, Radio Arts, 210 N Pass Ave, Burbank CA 91505. 800-423-2840.

Fidelipac 300 (200) almost all w/HOLN tape, 25¢ ea. M Golchert, WVBR, Box 298, Russelville KY 42276. 502-726-3555.

Pre-recorded music tape, 14" reels, 2 trk stereo, 7.5 ips IGM music, easy listening. F Anderson, 3801 5th Ave S, Great Fall MT 59405. 406-452-2810.

Audiopack AA3 carts, (650), excel cond, 2.5-10min, $2.00 ea. B Anthony, Rt 3 Box 185, Cornelius OR 97113. 503-357-6120.

Sesac radio transcription library, excellent, $1000. R Bellarva, WSBC, 4949 W Belmont, Chicago IL 60641. 312-777-1700.

Audiopak AA3's, (150) various lengths, in gd cond, $1 ea. T Ray, WKSS, 60 Washington St, Hartford CT 06106. 203-249-9577.

Large stock of 10-1/2" metal reels, all for 1/4" tape, all NAB hub, all guaranteed in excel cond w/uniform flanges, $1.50 (1-10), $1.25 (10-100), $1.00 (100+). G. Falk, Falk Recdg, 7914 Fegenbush Ln, Louisville KY 40228. 502-239-1010.

Audiopak A2's, (1000) w/HOLN tape. J Lies, WTRC, POB 699, Elkhart IN 46515. 219-293-5611.

Aristocart carts, $300 takes all. W Brown, KVNI, Coeur d'Alene ID. 208-664-9271.

Fidelipac numerous sized & Aristocart in 8.5 min length, new, BO. J Emmel, Emke Media, POB 401, Olyphant PA 18447. 717-383-1118.

Recortec tape eval, 1", 2" & 3/4", several of each. Nigel, Technichrome, 1212 S Main, Las Vegas NV 89104. 702-386-2844.

Ampex 1/4" tape, 60 min, $10. L McElroy, 875 S Clarkson, Denver CO 80209. 303-722-1109.

Fidelipac & Audiopak 20 sec to 4 min, like new, some unused (450), $1.50 ea. AH Bott, BHP Inc, 340 S 24th St, Quincy IL 62301. 217-224-1076.

Audio tape, 5, 7, 10" reels, each quality checked, gd prices. J Newman, 143 WBUC Road, Buckhannon WV 26201. 304-472-3932.

Memorex 360 2" quad tapes, properly stored, sealed, pckgd w/precision alum. take up reels, BO. A Woontner, 23A Locust Ave, Lark Spur CA 94939. 415-927-0865.

Scotch 1/2 mil bdct quality automated tape in boxes, 900 reels avail, $2 ea. J Geedy, Geedy Assoc, POB 1467, Wilmington NC 28402. 919-251-8800.

Want to Buy

Music library from the 50's. JB Ingram, WBLE, Box 73, Batesville MS 38606. 601-563-4664.

Oldies automation tapes esp those w/Wolfman Jack material. M Salvaggio, MFS Prod Srvs, 417 Lauback St, Hellertown PA 18055. 215-838-9274.

Fidelipac Master Carts, red or gold, any length, need 2000. D Davis, Davis Bdct, 1217 Valencia Dr NE, Albuquerque NM 87110. 505-255-2431.

TAX DEDUCT. EQUIP.

Non profit college station needs bdct gear & test equip. S Walter, WMMR, 328 Coffman Union, 300 Washington Ave SE, Minneapolis MN 55455. 612-625-5926.

Non-profit religious station, new CP request donation FM xmtr, 10 kW or less, audio console, STL, recorders, etc. J Ranch, Fairfield Christian Academy, 1330 E Main, Lancaster OH 43130. 614-654-5550.

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

TAX DEDUCT. EQUIP. . . . WTS

PA & 2-way radio comm equip needed, donations. G Mikkelsen, Deep-Portage Conservation Foundation. 612-338-6455.

Magruder HS, needs equip donations to start school radio station. S Scarfield, 32 Brian Ct, Gaithersburg MD 20877. 301-921-0427 aft 3 PM weekdays.

TEST EQUIPMENT

Want to Sell

HP 1415A TDR; HP 140A scope, accepts TDR plug-in; HP 1416A swept freq indicator, plug-in, all items in excel cond w/manuals, $1150. W Garrison, Garrison Assoc, POB 2760, Greenville SC 29602. 803-298-4401.

Tek 465 scope w/sync trigger option, cal 11/5/85, $1000. G Ricciarrelli, WICZ, 4600 Vestal Pkwy E, Binghamton NY 13902. 607-770-4040.

Telequipment JD-D53 dual trace scope, industrial type, gd cond, needs alignment, $75; Heath IM-16 solid state multimeter, needs minor repair & alignment, $35; HP 410B VTVM, fair cond, $35. T Steele, Frankford/Wayne Mastering Labs, 1697 Broadway, NY NY 10019. 212-265-5563.

Rane spectrum analyser pink noise gen & cal mike, $350. W Preist, Classic Sound & Recd, 1249 Bayshore Blvd, Dunedin FL 33528. 813-726-4474.

GR-1607 transfer, function & emittance bridge, new, w/optional standards, in orig mahogany case, $4000. R Meyers, Sound Masters, 4700 SW 75 Ave, Miami FL 33155. 305-376-2128.

Gold Line ASA-10B audio spectrum analyzer & PN-2 pink noise gen, like new, $175/both. R Kerbaway, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

HP 7010B X-Y plotter w/UREI 2010 level & freq detect module; UREI 2000 freq & response module; RCA AM phase display; TFT 7630 20 chan telemetry expander. A Bendix, KGWY, POB 1179, Gillette WY 82716. 307-686-2242.

Tek 465 scope, $1095; Ithaco 4302 dual 24DB octave filter, $725; Non-Linear MS230 mini scope, $295; Waveforms sensitive AC volt meter – 60 to +50 dB or – 0.001-300 V, 4 MHz, $175; HP 10529A logic comparator, $475; HP volt meter 403B, $275. J Price, Price's Rcdg Srvs, 2651 Globe Ave, Dallas TX 75228. 214-321-6576.

Tek RM-529, need repair (2), $300 ea. T Smith, CCI Comm, 192 Lancaster Ave, Frazier PA 19185. 215-289-1725.

Hickok 288X signal gen; Eico 425 scope; Simpson 260 VOM, needs repair; BC221 freq meter, battery operated; Hallicrafters S76 receiver, 540 kHz to 34 MHz. L Wilson, 409 Hillaire Dr, Hopkinsville KY 42240. 502-886-1678.

Heathkit IO104 15 meg triggered sweep scope, needs a little work, $200/BO. R Wells, KREO, POB 1598, Santa Rosa CA 95402. 707-433-4895.

Tek RM529 waveform monitor, new tube, $450. H Donnell, Creative Video Prod, 211 Windsor St, Reading PA 19601. 215-378-0994.

Tek 7704A scope, incl: 7A26, 7A13, 7B85, 7B80, scope cart, excel cond, new CRT in 1985, $8400/BO. T McConville, Complete Post, 6087 Sunset Blvd, Hollywood CA 90028. 213-467-1244.

Want to Buy

TEF 10/ or 12 analyser. P Westendorf, Gabriel Eng, 333 W Main, Mesa AZ 85201. 602-969-8663.

TRANSMITTERS

Want to Sell

RCA BTE-15A tuned to 88.5 MHz w/stereo gen, 42 kHz SCA gen & 67 kHz SCA gen, vgc, fully operational, can be retuned, w/manual, $875. M Byrnes, WAMU, 4400 Mass Ave NW, Wash DC 20016. 202-885-1030.

GE plate transformer primary 208-242, sec 1090-1890 KVA 13.89. R Elm, WWJC, 1120 E McCuen St, Duluth MN 55808. 218-626-2738.

LPB crystals, 990 kHz & 880 kHz, BO. A Caswell, C&G Bdctg, POB 171, Linden MI 48451. 313-735-4545.

FM xmtr, 10 kW, not too old, also diplexer for FM. R Gold, Suwebe Bdctg, 19355 NE 36th Ct Ste 11J, Miami FL 33180.

FM & AM stereo exciter, from 2-10 W, pass all FCC regs, prod room prods, from $750. L James, Rock 108, 975 S Florida Ave, Tarpin Springs FL 33589. 813-937-3429.

FM exciter, 10 W, fully programmable, excel cond, $750. L James, The Prod Room, 975 S Floria Ave, Tarpon Springs FL 33589. 813-937-3429.

CCA FM20000-DS, 97.1 MHz, w/exciter, recond, no PCB's, $10,000. R Mullinax, WFOX, 2000 River Edge Pkwy, Atlanta GA 30328. 404-953-9369.

TEX-20, new PLL exciter, slight cosmetic damage from shipping, 15 watt FM, $1200. D Pieri, Bext Inc., 739 5th Ave #7A, San Diego CA 92101. 619-239-8462.

Amertran plate transformer, 3-phase, primary 208-230, sec 3610-4210 KVA 24. R Elm, WWJC, 1120 E McCuen St, Duluth MN 55808. 218-626-2738.

Gates FM5H w/TE3 exciter, needs work, $2000. C Schipper, KQKS, 9191 Sheridan #205, Westminster CO 80030. 303-427-7700.

Andrew 3-1/8" air heliax 100' on reel, never used, BO. C Schipper, KQKS, 919 Sheridan •205, Westminster CO 80030. 303-427-7700.

McMartin BA 2.5K 2500 W AM xmtr, 1080 kHz, in service, needs new tubes. D Dart, KPRX, POB 1076, Price UT 84501. 801-637-4666.

RCA BTA-5F, 5 kW AM, vgc w/spares, 1480, off air, you dismantle, BO. B Glasser, WHBC, POB 9917, Canton OH 44702. 216-456-7166.

Harris BC10H AM, 10 kW, 1580, 5 kW cutback, 1978 vintage, BO. J Saunders, WLIM, 45 Penna Ave, Patchoque NY 11772. 516-475-1580.

Versa Count V322 FM exciter, 10 W stereo, 87.9 MHz, fully programmable, $850. M Rakoff, WQVM, 114-41 Queens Blvd #148, Forest Hills NY 11375. 718-591-0002.

Want to Buy

Collins 20V2 (2) in gd cond for amateur radio collectors. R Smith, 2245 Falspar St, San Diego CA 92109. 619-483-9331.

AM xmt, 3-4 tower antenna, phaser & phase monitor. B Barry, WAMB, 1617 Lebanon Rd, Nashville TN 37210. 615-889-1960.

Audio driver xfmr T5 or T6 for Gates DC500K. L Weatherford, WSQR, Box 249, Sycamore IL 60178. 815-895-3636.

FM xmtr, 25 kW in gd cond. E Kazmark, KAZZ, Box 1369, Deerpark WA 99006. 509-276-8816.

FM xmtr, 1-5 kW. E Goetsch, WXPR, 303 W Prospect, Rhinelander WI 54501. 715-362-6000.

TUBES

Want to Sell

RCA 8976 new cond, BO. T Smith, CCI Comm, 192 Lancaster Ave, Frazier PA 19355. 215-289-1725.

Hundreds of new old stock receiving tubes & ballast tubes, call or SASE for list. N Carlson, Mobile Sound Group, 721 W Melrose, Chicago IL 60657. 312-871-7459.

Want to Buy

Image Orthicon 5820 tube, 7TP4 CRT (TK31 viewfinder). C Harper, WBGK, 520 W Capitol Dr, Mihwaukee WI 53212. 414-964-8300.

Brimar D10-240GH view data 940A oscilloscope. F Anderson, 3801 5th Ave S, Great Fall MT 59405. 406-452-2810.

TURNTABLES

Want to Sell

Haeco PB2TX stereo TT preamp, variable EQ & level, like new cond (2), $25 ea; Ramko TT preamp, stereo, fair cond, $25; disk cutting systems avail, complete turnkey disk mastering rooms, Scully Westrex systems, complete w/EQ, limiters, monitors, variable pitch & depth, call for info; Thorens TD-160C unit w/dust cover, $35/BO. T Steele, Frankford/Wayne Mastering Labs, 1697 Broadway, NY NY 10019. 212-265-5563.

Technics SL-1100A quartz lock dir drive TT, needs minor repair, vgc, $40; Dual 601 auto TT, gd cond, $35; Scully Lathe, complete w/Westrex 3DII cutterhead & driver amps, vgc, $7500; Sony PS-5550 belt drive TT, needs minor repairs, gd cond, $25. T Steele, Frankford/Wayne Mastering Labs, 1697 Broadway, NY NY 10019. 212-265-5563.

Gates direct drive TTs (4) plus 2 wooden tonearm sets included, all work but are ancient, desperate to move, $75 for all 4. D Sparano, WVCR, Rt9, Loudonville NY 12211. 518-783-2990, call & leave message.

Collins 200 TTs (2). A Bendix, KGWY, POB 1179, Gillette WY 82716. 307-686-2242.

Russco Cue Master w/Micro-Trak 303 arm, excel cond, $250 + ship. R Kerbaway, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

Sparta GT w/pedestal cabinet, $150 plus ship. J Emmel, Emke Media, POB 401, Olyphant PA 18447. 717-383-1118.

RCA 12" TTs, 33/45 (3), $75 ea. B Harlan, WFAH/WDJQ, 393 Smyth Ave NE, Alliance OH 44601. 216-821-1112.

AR turntable, circa 1972, hole cut for SME arm, orig arm reinstalled, $25 + ship. J Martin, Box 160326, Mobile AL 36616. 205-460-2395.

Harris CB1201 12" 3 speed TT, Micro-Trak tonearm & Shure cartridge, never used, $350. B Mountjoy, Custom A/V Srvs, Box G1240, Elizabetheon TN 37644. 615-543-5849.

Presto 16" transcription TT, EQ, tone arm, BO. R Nelson, Lutheran Gospel Hr, Box 1, Flaxton ND 58737. 701-596-3565.

QRK 3 sp, w/Micro-Trak 303 arms, gd cond, $135 ea. E Martin, Maxwell Prod, 220B Terrace View Rd, Louisville TN 3777. 615-970-2192.

Gates CB-500 16" transcription TT, excel cond, $175; console cabinet for CB-500, $50; dual console for CB-500, $100; also equip by Rek-O-Kut, Presto, Grey, WE, send for list. R Van Dyke, Van Dyke Inc, Squires Ave, E Quogue NY 11942. 516-728-1327.

Sparta D-12 12" 3-speed TTs (2), fair cond. $75 ea. D Davis, Davis Bdct, 1217 Valencia Dr NE, Albuquerque NM 87110. 505-255-2431.

RCA transcription player, 78/33 rpm, $500. R Bellarva, WSBC, 4949 W Belmont, Chicago IL 60641. 312-777-1700.

QRK 3 speed TTs w/QRK tonearms, no cartridge heads (4), $200 ea. W Brown, KVNI, Coeur d'Alene ID. 208-664-9271.

Metron 12" TTs (2), 2 speed, $50 ea. D Ibel, KICD, 2600 N Hwy Blvd, Spencer IA 51301. 712-262-1240.

Want to Buy

Gates M5202 tone arm for Gates 16" transcrip. TT, negotiable. R Nelson, Lutheran Gospel Hr, Box 1, Flaxton ND 58737.

TV FILM EQUIP.

Want to Sell

RCA film chain (2) TP66 16mm projectors, TP55 film island control motorized mirror box, TP7 slide projector, TK27 color cam unit, $9500/all, will separate. J Rubenstein, MD Pub Bdctg, 7913 Yarnwood Ct, Springfield VA 22153. 703-451-1994.

RCA TP66 projectors 16mm for RCA TV film islands, very clean, $6000 ea or $10,000/both. S Shumatt, WVIR-TV, 503 E Market St, Charlottesville VA 22902. 804-977-7082.

RCA FR35A, new stock. T Smith, CCI Comm, 192 Lancaster Ave, Frazier PA 19355. 215-289-1725.

TV modified Graflex 16mm projector, $800. M Mathis, WSSA, POB 831, Morrow GA 30260. 404-361-8843.

Want to Buy

Philco Cinescanner TV bdct projector. DMT A/V, Box 9064-RW, Newark NJ 07104. 201-484-5291.

VIDEO PRODUCTION EQUIP.

Want to Sell

Chyron 3 character gen, complete w/keyboard, all cards, disk drive, colorizer, manuals & 8 font discs w/many fonts, working gd when removed, quick sale, $4500 as is, will ship freight COD; second unit as above w/o disk drive, $4000, both $8000. B Briggs, KCAM, 827 Meridian St, Nashville TN 37207. 615-226-1122.

CMX I squares for VR1200, VPR2, Sony 2860, MM1200, Grass Valley 1600, etc, BO. N Macrae, Technichrome, 701 Desert Ln Ste 4, Las Vegas NV 89106. 702-386-2844.

KTV KCT-5003 4" color TV, $125. K Retzer, KGRZ, POB 4106, Missoula MT 59806. 406-728-1450.

Ampex Mark 10X video tape head newly refurbished, $500. B Richert, WPCB, Signal Hill Dr, Wall PA 15148. 412-824-3930.

JVC 2GX700U cams, (2) gen lockable, 2 BR62000 portable recorders, KM1200 special effects gen, (2) B9W monitors & various acces, $6200. M Mortimore, Mister Mike Prods, 535 Broadway, Thermopolis WY 82443. 307-864-9444.

Knox 128B/Mod 8 character gen, blink, roll, crawl, multiple fonts & sizes w/manual, perfect, recent factory recond, $1500. RPC, 827 Meridian St, Nashville TN 37207. 615-226-1122.

Sony PVM1211 cross pulse monitor, $450. H Donnell, Creative Video Prod, 211 Windsor St, Reading PA 19601. 215-378-0994.

DVS Phaser II frame synch, new cond. T Smith, CCI Comm, 192 Lancaster Ave, Frazier PA 19355. 215-289-1725.

CBS 516 TBC (2), $2600 ea. R Peterson, Pacific Comm, 1801 E 4th Ave, Olympia WA 98506. 206-754-7081.

Sony Trinitron DXC-1800 w/carrying case & cables; Sony VO-4800 3/4", w/AC power supply, cables, carrying case, $3000 for both or BO. M Fiedler, Mahoney/Fiedler Prod, 5346 Dupont Ave S, Minneapolis MN 55419. 612-822-0013.

WV341P (2), WV360P, WV241P cameras; WJ545P spec. effects generator; PR910MM monitor; AC116 Ampex effects generator; 300' cable; 50' 10H50 cable; (2) headsets. E Davenport, United Methodist Church, 571 E. Office, Haindsburg KY 40330. 606-734-4725.

RCA TD11B studio tripod, dolly 160679, & head ML26204, $950 & frt. R Falhenstein, Tri God Ministry, 3447 Arbor St, Phila PA 19314. 215-739-6589.

CBS 5043 TBC, $1400. H Donnell, Creative Video Prod, 211 Windsor St, Reading PA 19601. 215-378-0994.

RCA TD11B camera tripod, RCA dolly 160679 & RCA head ML26204, $1000. B Falkenstein, Try God Ministries, 3447 Arbor St, Phila PA 19134. 215-739-6599.

CVS 504 TBC, $1400. H Donnell, Creative Video Prod, 211 Windsor St, Reading PA 19601. 215-378-0994.

Want to Buy

Editing sys. with ¾ to 1" capabil, prefer computerized but not nec. J Harsh, On Spot Prod, I70 Hwy 83, Oakly KS 67748. 913-672-3428.

Panasonic Recam B-100 system, any & all equip, cameras, recorders, edit controllers, cables, access, manuals, etc. B Briggs, KCAM, 827 Meridian St, Nashville TN 37207. 615-226-1122.

Sony VA-1 composite adapter for BVU1A Beta recorder, or trade for VA1V adaptor. M Glaser, MRG Assoc, 679 Nassau Rd MS 25A, Uniondale NY 11553. 516-489-1071.

VIDEO TAPE RECORDERS

Want to Sell

JVC CR4400L-J 3/4" portable VCR, AC power adapter, gd working cond, $1000. J Snavely, Alternative Cable TV, RD 3 Box 255, Boyertown PA 19512. 215-689-9447.

Tascam Series 30 reel motor, new, trade for Sony 850 Series headblock. E O'Brien, Outhouse Recdgs, 3041 Crawford St, Terre Haute IN 47803. 812-238-9312.

Sony VO1600 3/4" VCR gd for viewing, $350. A Wentt, Faith Prod, 1441 Guthrie Dr, Cleveland TN 37311. 800-251-4024.

JVC 6060U 3/4" deck, recent overhauled, new heads & belts, serv. manual, $800/trade for good VHS deck. R Robinson, TNA, Box 57, Wallingford CT 06492. 203-269-4465.

Sony BVU110 VTR, excel cond, BO over $4000. M Glaser, MRG Assoc, 679 Nassau Rd MS 25A, Uniondale NY 11553. 516-489-1071.

Zenith (Sony) 2500 port. tuner/timer & recorder, w/2 NiCad packs, great cond, $500/BO. J Martin, Box 160326, Mobile AL 36616. 205-460-2395.

Sony EVO 210 indus. 8mm player/recorder, less than 10 hrs use, $750. R Peterson, Pacific Comm, 1801 E 4th Ave, Olympia WA 98506. 206-754-7081.

Want to Buy

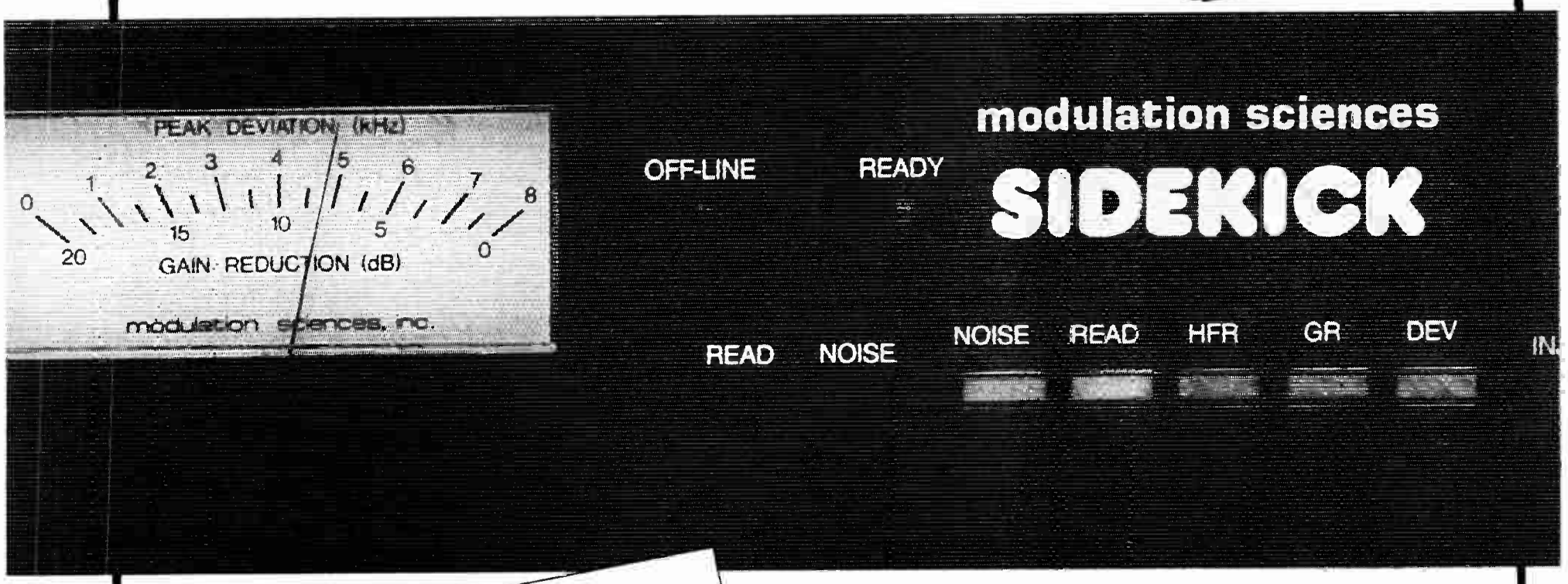
Panasonic Recam B-100 system recorders; AU-220, AU-300, AU-100, access, cables, etc. B Briggs, KCAM, 827 Meridian St, Nashville TN 37207. 615-226-1122.

VCR rec/play, 1" C format, prefer external edit capabilities. J Harsh, On Spot Prod, I70 Hwy 83, Oakly KS 67748. 913-672-3428.

Sony BVU100 for repair or parts. C Lunde, Cycle Sound & Video, 167 Madison St, Waterbury CT 06706. 203-756-7751.

VTR adaptor, component video to RGB for Sony Beta BVU1A VTR. M Glaser, MRG Assoc., 679 Nassau Rd, Uniondale NY 11553. 516-489-1071.

THE ONE BOX SOLUTION THAT MADE SCA WORK

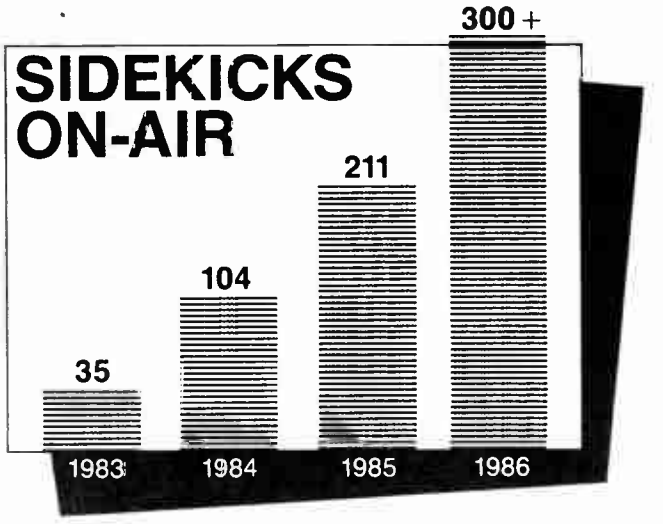


RF IDEAS

E.J. PRYOR, JR. *Broadcast Technologies, Inc.*

"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
© Waters Information Services, Inc.

modulation sciences, inc.
115 Myrtle Ave. Brooklyn, NY 11201 In N.Y.S. (718) 625-7333

Call **Toll-Free (800) 826-2603**
And Get Sidekick Working For You.

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A SUCCESS STORY

THE OBJECTIVE was no small task: design a radio console that would become the new standard.

THE METHOD involved listening to veteran broadcast engineers and installers. After all, they're the people who have seen and experienced all the ideas that came before. From this research we learned of the problems that had to be solved and the features that broadcasters required. We then added ten years of console building experience and innovation, and created the A-500α console.

THE RESULT: An unsurpassed console that exceeds prior broadcast standards. Its module/mainframe interface borrows from the computer industry, utilizing all-gold contact insulation displacement technology. The logic system is based on programming the module slot, allowing full module interchangeability. It also provides for separate programming of the module's "B" input selection, thus avoiding embarrassing false starts and mutes. Full console-to-machine control is supported without extensive use of interface boxes and cables. Three audio busses are provided to enhance talkshows and remote functions. There are separate processing loops for the speech and music paths, as well as individual channel insert points. A complete line of microphone and line inputs, remote selectors, and machine control modules is offered in virtually any combination, configuration or mainframe size you desire. The A-500α also features a full family of studio turret and turret components to ease facility design.

THE PERFORMANCE: Needless to say, it's a new age for audio, and the A-500α is a step ahead. While specifications don't say it all, ruler flat frequency response, .003% distortion, crisp square wave response and a noise spec that's unheard of deserve merit. Couple such performance, reliability and innovation together, and a new broadcast standard is set.

THE SUCCESS: WHEATSTONE broadcast consoles are installed in major markets all over the country, from frontline independents to national networks. They are in use right now at some of the world's largest institutions.

THE POSSIBILITIES: The possibilities are up to you.

Wheatstone Corporation

6720 VIP Parkway, Syracuse, NY 13211 (315) 455-7740

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