

DAB Hits Big at NAB Debut

by Judith Gross

LAS VEGAS Exactly one year after the concept of digital radio broadcasting became known to the U.S. radio industry, DAB made a stunning debut at the 1991 NAB show here.

The debut was two-fold. A year ago Eureka 147 developers played tapes of their extensively researched DAB system and presented papers on its technical merits.

This year, attendees heard the first U.S. over-the-air demonstration of Eureka DAB in special bus tours through downtown Las Vegas.

In addition, the first U.S.-developed in-band system for DAB showed up in prototype form at the USA Digital Radio booth. The five-month-old system drew crowds in a booth coordinated by project developers Gannett and Stanford Research Inc. (SRI).

Mobile reception

Eureka 147 DAB was broadcast from transmitters and an antenna on top of the Las Vegas Hilton. A simultaneous feed went out over FM, also from the Hilton tower, in one of eight music formats.

The DAB signal was broadcast at 479.9 MHz with a bandwidth of 3.5 MHz and 30 W ERP per program channel. The FM



Magical Mystery Tour:
NAB's demonstration of the Eureka system gave listeners a chance to compare DAB and FM reception in a moving vehicle.

was at 94.9 MHz with 30 W ERP. A 1 W "gap filler" transmitter on top of the Golden Nugget was used to show how Eureka makes beneficial use of interference and signal delays.

The half-hour bus tour focused primarily on giving listeners a chance to hear the DAB signal, with A-B comparisons of the FM signal.

Since Las Vegas is relatively multipath-

free, the only part of the bus ride where Eureka's chief benefit could be demonstrated was near the Golden Nugget gap filler. The blending characteristic of the FM receiver provided a subtle yet definite contrast to the wideband full-stereo of the DAB receiver.

Toward the end of the tour, listeners heard local station KLUC live in AM, FM and DAB, with stark contrast between the AM and FM signal but with little noticeable difference between the FM and DAB signal.

Back in the convention center, in a

brightly colored booth that drew constant crowds, Gannett and SRI set up the first prototype equipment of USA Digital Radio in-band DAB.

Gannett and supporters

CBS and Westinghouse provided technical support and Corporate Computer Systems provided the MUSICAM source coding or compression part of the system, the same algorithm used in Eureka.

A DAT tape was fed to a MUSICAM encoder and then modulated via coded polyvector digital modulation. The signal has 21 carriers spread over 200 kHz to allow it to operate within an FM station's current occupied bandwidth.

The same signal was fed into a CRL analog stereo generator and BE FX50 exciter to provide the FM comparison.

The system is designed to have the digital signal fall directly under the analog FM. But in the Las Vegas demo, the FM was transmitted over 101.3 MHz and the DAB signal off center at 101.5.

Gannett Engineering VP Paul Donahue explained that since the DAB signal uses less power than the analog, it can be moved to fall further down in the station's RF mask and still fall within the legal occupied bandwidth of the FM licensee.

Donahue said SRI researchers are studying the receiver cost tradeoffs and complexities of a digital signal centered directly under the carrier and one that

(continued on page 8)

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NASA/VOA Host DAB

by John Gatski

WASHINGTON A non-CD quality DAB demonstration is scheduled for mid-October as part of a joint NASA/Voice of America (VOA) venture, according to agency officials.

The announcement came during a late March FCC advisory group meeting on the World Administrative Radio Conference (WARC-92).

The NASA/VOA demo certainty will hinge upon the success of a summer-scheduled laboratory experimentation with NASA equipment to see whether it can perform adequately to make the transmission successful, a VOA official said.

The technology will be based on NASA's Jet Propulsion Laboratory experimental "vocoder" equipment used for land-mobile communications, according to VOA Broadcast Satellite Program Manager Donald Messer.

Test plans call for an uplinked L-band audio signal from a COMSAT facility in

Connecticut to a mobile van equipped with a digital receiver in Washington. The plan is to deliver the 19.2 kilobit per second signal via an INMARSAT satellite—if such satellite time can be found, Messer said.

Unlike other DAB systems, the NASA/VOA demo will not be CD quality, Messer said. "This demo will not be that at all," he said. "This will be more like AM."

The main reason the project will not be CD quality is lack of satellites powerful enough to accommodate the bandwidth, he added.

Messer pointed out that the equipment used for the October test is not intended as any prototype for future commercial DAB development. He said that NASA and VOA are working on a separate receiver prototype design "that could be used for a commercial digital receiver."

The NASA/VOA test has no price tag, but will come from the three-year, \$2.5-3 million allotted to the two agencies.

NEWS BRIEFS

TV Marti Snags Channel 13

KEY WEST, Fla. The FCC has assigned channel 13 in Key West Florida to TV Marti, the controversial Voice of America information/entertainment service beamed to Cuba.

The service, which had been off the air from mid-January to late March because its

balloon-carried transmitter had broken from its tether, has been transmitting on the channel since March 1990. The VOA leased time from WETV-TV, which was licensed to operate channel 13.

The VOA has since acquired the license through a \$1.3 million buyout of WETV-TV, which agreed to turn the

license back to the FCC.

TV Marti has been criticized as ineffective, technologically unsound and a potential conduit for retaliatory interference to Radio Marti. The Bush administration has countered that the service is the only TV medium for Cuba to get uncensored news and information.

NAB DAB Report Available

WASHINGTON A report providing explanations of current issues and concerns involving

digital audio broadcasting's (DAB) development now is available from NAB.

"Digital Audio Broadcasting: 1991 Market and Policy Developments" focuses on developments in DAB, including a synopsis of the NAB DAB Task Force's plan for U.S. implementation of terrestrial DAB service; a summary of NAB's preliminary study of spectrum requirements for beginning a U.S. terrestrial service based on Eureka-147 technology; and overviews of recent DAB proposals from broadcasters and international

proposals from Afrispace and Radio Satellite International.

RKO Reaches End of the Road

SAN FRANCISCO RKO's withdrawal from broadcasting was made final by the FCC's recent approval to transfer the license of the company's last station, KFRC in San Francisco.

KFRC will transfer its license to South Jersey Radio, Inc., which will sell the station to Bedford Broadcasting Co., for \$8 million.

This is the final settlement in a case originally involving 14 RKO stations. The FCC called the settlement a remedy for the "most protracted and burdensome proceedings in FCC history."

Another "Pirate" Walks the Plank

REEDSBURG, Wisc. A Wisconsin pirate radio station was recently shutdown by FCC officials, based on monitoring operations by the Field Operations Bureau.

Domenic R. Bianco of Reedsburg, Wisc., was fined \$1,000 for illegal broadcasting of his "KUSA" station on 74 MHz. That frequency is licensed to international fixed public radio communications service only.

Unauthorized broadcasting can carry as much as a \$100,000 monetary fine and one year in prison.

Clarification

The April 10 RW article, "NRSC Examines RBDS Systems," omitted information that Cue Network Corp. serves more than 90 percent of the U.S. population in 250 metropolitan areas, along with coverage in several Canadian cities.

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A DAB Here, a DAB There...

by Judith Gross

LAS VEGAS Remember when ... Eureka was a vacuum cleaner, DAB was that greasy kid stuff you put in your hair and the latest radio gear had pots instead of touchscreens?

You didn't have to be at NAB 1991 more than a few minutes to get the message that everything has changed. We aren't in Atlanta any more,



Toto. Back to Vegas, but wait a minute.

The convention center's spaceship-like rotunda is in pieces in the parking lot, the pot of gold in front of the Hilton is gone and how the heck do I find the press room?

More than the scenery has changed, though. They ought to rename this show the D-A-B convention. You couldn't escape it. Eureka in a booth, Eureka bus tours, USA Digital booth, sessions, sessions and more sessions.

As I tap this out I'm on my way to DAB: Friend or Foe, (which I still think they ought to call "Fiend or Foe") and I'm whirling from digital delights on the exhibit floor. I think I'll leave the product stuff 'til next time and tell you about the demos.

First, Eureka. Way up on the Hilton tower, above the 31st floor, it looked like Frankenstein's lab, but was actually a nifty set-up of Eureka transmitters, receivers, FM gear and two antennas peeking their heads above the "H" in Hilton.

I crawled up the cavernous steps to get a glimpse for myself, thanks to the graciousness of the NAB's Stan Salek, who good-naturedly agreed to let me have a look-see.

Each time I've seen the Eureka equipment, I'm impressed by how little room it occupies, which in the case of that claustrophobic room at the top of the Hilton was actually a necessity.

Then down on safe ground and on to the Eureka bus tour, which gave us more than our share of time to hear DAB—thanks to the Vegas rush hour. It was a well-constructed (if too constricted) demo. A little too heavy on the scripting, a little too few A-B switching, but credible, all in all.

I would have liked to see some bright, splashy paint on the bus like they had up in Canada last summer, but hey, who's complaining?

I especially liked the part comparing KLUC AM, FM and DAB. Of course the FM blew the AM away. It was, after all, a standard receiver. But then we switched to KLUC DAB just in time to hear a McDonald's commercial. Oh well, I guess even the hype sounds better in digital.

Further into the convention hall, there was the Gannett-SRI joint project, USA Digital Radio, in a wild booth of purples, pinks and electric yellows. The only thing missing was the red, white and blue, but one of the selections was Whitney Houston singing the Star Spangled Banner, so that made up for it.



Oh, yes, and it's still not an official connection, but no one was really surprised to see CBS's Tony Masiello and Group W's Glynn Walden helping out Gannett's Paul Donahue and the folks from SRI and Corporate Computer Systems. Seems this system is drawing

some weighty support.

The comparison worked, the digital signal didn't interfere with the FM.



Yeah, they were actually on adjacencies, but the digital signal does fall within the FM station's occupied bandwidth, even if it isn't flush on center with the FM carrier. It'll take more design work to see if the most cost effective way is off-center or not.

Lots of talk about digital for AM at this booth. The AMers are excited about it.

See, what's happening here is there's growing concern about not being able to get new spectrum for a system like Eureka. There's dire talk about the Air Force wanting to keep a tight hold on L-band, and they did just win us a war and all. So in-band, especially if AM won't be excluded, is beginning to sound better and better.

The Eureka folks have even suggested they might be able to reduce the bandwidth of their system to fit within an FM station's bandwidth. Nothing definite there, just some casual talk.

But no matter how good it all sounded, there's lots of drudge work ahead. We need to test Eureka at L-band. USA Digital Radio needs over-the-air mobile demos to show it can successfully combat multipath. And more work needs to be done for AM.

And just when you thought it was safe to open your mouth and express an informed opinion, along come a few more DAB systems out of the woodwork. They surfaced at a rousing Committee for

Digital Radio Broadcast meeting at the Sahara.

LinCom gave a few details of a system being developed for FM and one for AM, although company rep Steven Kuh didn't win any points with AMers when he kept alluding to the fact that AM stations can keep on broadcasting inferior quality audio and save lots of bits. (They don't sound like that because they want to, Steve.)

A company called Synetcom offered its own system, although that four-antenna array on the car might not go over too well with Delco and Ford.

Shades of AM stereo wars surfaced at that meeting with a raging battle over who's got the best compression algorithm—MUSICAM or ASPEC.

Seems the ASPEC folks want a redo of the ISO tests to prove they can best MUSICAM at 64 kbps, even though nobody realistically wants 64 kbps (except the phone company, which developed ASPEC).

MUSICAM got the nod on the first ISO go 'round, but because of ease of implementation, not how good it sounds. The two were considered virtually indistinguishable to the ear at 128 kbps. Whatever we do, let's not ask the FCC to choose a compression algorithm.

And Emil Torick, representing Eureka, expressed mucho skepticism of in-band systems when he said, "In-band is a good idea ... and always will be."

But I think the guy at the USA Digital Radio booth had the best idea. He was taking the whole DAB brouhaha in stride. He calmly put on the headphones and, in perfect pitch, broke into a sing-along of the aria from Madame Butterfly.

It wasn't digital, but it sounded good.

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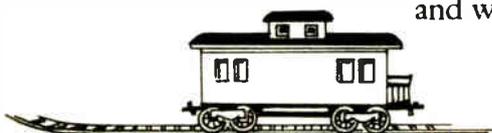


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World Radio History

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A pilot's view

Dear RW,

Thomas Carten's (WRKC-FM) recollections about duplicate licenses being issued to both Hams and aircraft in *Readers Forum*, March 13, 1991, were correct. Gary Hendrickson, a Ham and Commission employee, pointed out the potential problem to Johnny Johnston of Personal Radio before the docket that set up the new Ham calls was adopted. The Commission let this one stand.

Well, I'm one of those flyers that has such a call. My plane, a Mooney Mite with registration numbers N6GP, displays an Amateur's call on the tail. Not my call, unfortunately. However, the pilot never uses the "call sign" on the air. Scheduled airlines use their airline name and flight number (United 438). The rest of us replace the "N" with the make/model of the airplane. So my airplane is identified on the air as Mooney six Golf Papa. Not bad . . . at least I got my initials.

As for the FAA-FCC controversy, I have to look at both sides of the coin. Right now there are several "mandatory" avionics upgrades on the horizon. Each one calls for a sizeable outlay in cash for an individual aircraft owner. Present requirements tightening the frequency tolerance

will make many aircraft radios obsolete. Replacement can cost more than a recreational flyer normally spends on flying in a whole year! A second round of radio replacement is unthinkable.

We just finished going through adding "mode C" to our transponders so that we wouldn't be excluded from about 20 percent (the most populous) of U.S. airspace. Granted, the encoding altimeter was only about \$300 (exchange), but add the installation and certification and the bill triples. Another round of upgrades to "mode S" will soon waste this expense and obsolete \$1,000 worth of transponder.

While there is justification for future upgrade/changeout of all existing navigation/communications avionics to improve performance in hot RF environments and reduce the need for FAA radio station licensing intervention, it will certainly bring an avalanche of protest from the flying community unless such an upgrade can be accomplished with minimal impact on the flyers' pocketbook.

Considering the economic impact on thousands of flyers and possible grounding of aircraft due to lack of approved replacement radios, any short-term solution resting with the aviation industry seems very unlikely.

Gordon M. Pugh, PE
W1JTB
Manhasset, N.Y.

Radio for the underprivileged

Dear RW,

We agree with Glenn Gutmacher's letter (*Readers Forum*, April 10, 1991) that colleges, high schools, or any other non-profit broadcast training schools could use donations of discarded radio equipment by commercial radio stations undergoing studio upgrades.

Since May of 1990 we have appealed to our radio family for help with donations of any AM broadcast equipment, but we have not received a single donation of any sort since we began.

The purpose of our broadcast training school is to give those students from poor and low-income families the same opportunity as those that are able to attend regular broadcast schools.

We would truly like to thank Mr. Gutmacher and RW for a wonderful letter, and please keep up the good work.

Floyd Smith, President
The Broadcast Training
School for the Underprivileged
Chattanooga, Tenn.

Six-minute RF window

Dear RW,

There are two statements I wish to take issue with that appear in your article concerning RF safety (*Insight on Rules*, RW, March 13).

Your article correctly states that a one-minute exposure of six times the nominal standard must be part of a six-minute period that averages to the standard to be permissible. However, the example given of 2.5 minutes of zero field before and after the exposure is not acceptable. The correct example would be five

As digital audio broadcasting develops, it's beginning to look like the NAB has painted itself into a corner by endorsing Eureka 147 technology.

The NAB has been criticized for its speedy backing of the European system. Some suggest the quick action can be accounted for by the flak the group has taken over previous inaction during the introduction of other new technologies.

The NAB never backed an AM stereo standard; it now admits that may have been a mishandling of the situation. The association also has been criticized for its foot-dragging over the AM antiskywave antenna project.

So, when the NAB saw the opportunity to get behind an already largely developed DAB system—Eureka 147—it did just that. In defense of its decision, the NAB

Tread Carefully

pointed out that Eureka offered AM stations "parity" with FMs in DAB technology. In-band systems proposed at the time were compatible only with FM.

A lot can change in a year. At the recently concluded NAB convention, USA Digital Radio, formerly Gannett's Project Acorn, announced plans for an in-band AM system. Carried within the current RF mask, a prototype of the system is expected by one source to be ready by the NAB's fall radio show.

USA Digital Radio has undermined the NAB's parity argument with this in-band AM plan. More importantly, the development arguably puts USA Digital Radio in the lead in the DAB race. After all, the company will soon have a system both AM and FM stations can use. NAB, meanwhile, is backing a system that has not even been proven to operate in the bandwidth proposed for its use.

Also, the NAB is usually thought of as a mediator in these matters—as a forum for determining the most appropriate system for U.S. broadcasters. But in this case the group has essentially disqualified itself by its public decision to license Eureka through its NAB Technologies subsidiary.

It wasn't wrong for the NAB to back a system, but it might have been too early in the game for so complete a public embracing of Eureka 147. In trying to take control of DAB, the NAB chose to ignore the difficult position it would be in if its gamble didn't pay off. Now the NAB will have to tread carefully if it decides to work its way out of the corner.

—RW

minutes before and after.

The standard applies to every possible six minute window. This includes the six minutes beginning at the time the exposure begins as well as the six minutes beginning five minutes before the exposure begins.

In the case of the contact lens wearer who suffers eye discomfort at a broadcast station, I believe (from the facts presented) that it is likely that this discomfort is due to low humidity in the transmitter room. I do concur that the eye is at greater risk than other body parts due to its fragile nature, its lesser ability to cool itself, and perhaps the size of the eye cavity when exposed to microwave frequencies, not AM radio.

Michael V. Chiarulli, Mgr.
RF Engineering and Operations
ABC Broadcast Operations
& Engineering
New York, N.Y.

More unipole advice

Dear RW,

This letter is in reference to the letter that ran in the March 27 issue of RW, from Raymond E. Rohrer.

It has long been a tradition to state that an antenna tuning unit is necessary to attenuate transmitter harmonics. There is no doubt that the conventional tee network does attenuate harmonics. The question is, is it really necessary?

47 CFR 73.44 of the FCC rules and regulations sets forth the spurious emission requirements for all AM transmitters type accepted after Jan. 1, 1960. Two methods of measurement are given. One says to measure the output of the transmitter into a dummy load and the other says you can make a field measurement at ground level at approximately one kilometer from the antenna. However, the amount of attenuation required is exactly the same regardless

of the method of measurement.

Any transmitter made since the 1960s is supposed to have the harmonics attenuated before the RF leaves the antenna terminal. If you have harmonic problems with a transmitter that was type accepted during the last 31 years, it's either because the transmitter didn't meet its own type acceptance requirements or someone has tampered with it, causing harmonic generation.

Granted, there are quite a few older transmitters still in service that are "grandfathered in" that do need the additional attenuation provided by the antenna tuning unit, so they should have a tuning unit.

The folded unipole might be called an "All American" antenna because it gives you so much freedom of choice. With the conventional series antenna, you erect it, measure the impedance and do with what you get. The unipole, on the other hand, provides great freedom of choice. Geometry and dimensions may be manipulated and computer modeled to get optimum performance for any situation.

In a few instances, a series capacitor has been adequate to provide good performance. In other cases, it is necessary to utilize an antenna tuning unit. In all cases of retrofitting a series or slant-wire shunt-fed antenna to a folded unipole, the bandwidth and often the coverage have improved.

Mullaney Engineering, Inc. has developed a computer program specifically to design unipoles for any application. I have a copy of it and if you would like for me to run a computer model for your application, give me a call with the details. I'll be glad to do it for you. My phone number is 505-327-5646.

Ron Nott
Nott Ltd.
Farmington, N.M.

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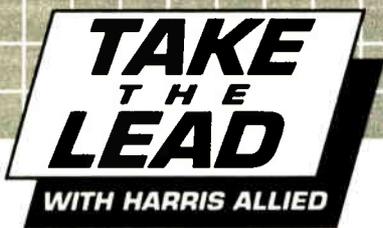
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FCC Determines Rule Compliance

by Alex Zavistovich

WASHINGTON A letter describing "a low level of compliance" with FCC rules by directional AM stations in the Philadelphia area is actually part of an FCC program to measure the effectiveness of its enforcement system.

FCC officials added, however, that other areas of the rules will come under Commission scrutiny throughout the year.

This past winter, AM stations under the Philadelphia field office's jurisdiction received a letter from John Rahtes, engineer in charge of the office. The letter alleged that phase monitor sampling parameters and field strengths were judged by a survey to be "substantially greater than allowed by the station authorization."

The letter added that compliance sampling would be conducted again, with violations and monetary forfeitures at stake for non-compliant stations.

Rahtes told RW that the letter came as a directive from the FCC's Field Operations Bureau. Each field office was to write a letter for its own region; the Philadelphia office sent letters to every directional station in Pennsylvania, southern New Jersey and Delaware, he said.

Enforcement baseline

According to Jeff Young, a staff engineer in the Enforcement Division of the FCC's Field Operations Bureau, the Commission is trying to "establish a 'baseline' of enforcement—some idea of a compliance level." He said the program was requested by Commission Chairman Al Sikes.

"The chairman likes the idea of seeing an effect," Young added.

Non-compliant AM directional sta-

tions could face fines of \$1,000 for the violations noted in the letter, Rahtes estimated. However, according to Young, the goal of the program is "not to set quotas or hit non-compliant stations." Rather, Young offered an example of "effecting a two percent improvement in compliance" in a particular area.

"We're trying to measure compliance without taking enforcement," he explained.

AM directional stations will not be the only target of this program. According to Rahtes, future inquiries into the FOB's "baseline" of effectiveness will examine areas such as the 800 MHz spectrum, amateur and business radio, microwave and satellite technology.

Like the survey of AM stations, those services likely will be targeted through a ZIP code sampling, Rahtes said. Letters would again be penned by the appropriate field office.

Still putting out fires

Young underscored that FOB still has projects "where we go after specific problems—we still have to put out some brush fires. But we're splitting our energy by looking at this baseline."

In assessing the results of the FOB campaign, Rahtes said the Philadelphia field office received "many responses" from AM stations in the tri-state area. That may indicate the program is headed in the right direction, he added.

"We're hoping to give more notoriety to problems we're interested in so that groups can take care of them beforehand," Rahtes said.

For more information, contact Jeff Young at the FCC's Field Operations Bureau: 202-632-7014.

Cuban Jams Rare

by John Gatski

WASHINGTON Although Cuba still interferes intermittently with U.S. stations by broadcasting on the same frequency, wholesale jamming by the

his agency does not know why Cuba has not tried larger scale jamming and interference. He acknowledged, however, that such jamming is costly, based on data gained from years of Soviet jamming of various U.S. communications signals.

The U.S. government believes Cuba has two AM transmitters capable of broadcasting an estimated 500 kW, which are likely used for any intentional (but sporadic) interference. The transmitters also are cranked up for important political messages by President Fidel Castro.

The limited interference to commercial stations generally has been felt along the southern U.S., in areas such as south Florida. But high power Cuban broadcasts directed to the U.S. at night can potentially interfere with AMs in other parts of the country because of skywave propagation.

The Eastern Montana College report may bolster the Bush Administration's continued support of TV Marti, which has continued to draw fire from the NAB and members of Congress. The video broadcast, Congress has said, increases the likelihood of retaliatory interference to U.S. radio broadcasters.

VOA was scheduled to put TV Marti back on the air in April following technical problems that have hampered the cable-anchored blimp transmitter since January.

Interference has remained at about the same level since 1985...

communist government remains rare, according to a recent college study.

Dr. M.L. Cornette, an assistant professor of Communications Arts at Eastern Montana College, said the interference has remained at about the same level since 1985 when Radio Marti went on the air.

Radio Marti, which is run by the United States Information Agency's Voice of America (VOA), beams western news and information to Cuba. TV Marti began broadcasting similar video programming in early 1990.

Cornette said that Cuba stepped up jamming of AM frequencies and TV Marti's channel 13 signal, but the radio jamming has been sporadic.

Cornette said the Cuban government does not have the economic resources to continuously jam U.S. stations on any large scale.

VOA spokesman Joe O'Connell said



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Royalties Opposed

by Charles Taylor

WASHINGTON The NAB has filed comments with House and Senate Judiciary Committees opposing possible legislation that would legitimize performance rights in sound recordings.

The bill, likely to be sponsored in part by the Recording Industry Association of America (RIAA), aims at recovering alleged lost income that will occur as a result of an increase in bootleg recordings once the improved quality of digital audio broadcasting (DAB) makes its bow.

"Without adequate and effective protection for the copyright owners of sound recordings, the livelihood of recording artists, musicians, record companies, recording engineers and the numerous other individuals involved in the creation of sound recordings are placed in jeopardy," the RIAA has said.

In a letter to the two committees, NAB President Eddie Fritts said the need for such a bill "is speculative at best and may have a significant and deleterious impact on local broadcasters throughout this country."

He pointed out that while DAB has the potential to provide a significant technical enhancement in the sound quality of radio broadcasts, it is highly speculative to assume that the advent of DAB will signal a significant decrease in the sale of prerecorded music.

"These same fears of technical advancement were raised when FM stereo and cassette recorders entered the consumer market," Fritts wrote. "Despite these fears, the recording industry is more successful today than at any other time."

NAB Wants Local Laws Eased

by Arthur Cole

WASHINGTON Believing that local laws regulating satellite home receiver dishes could be a springboard for regulation of broadcast transmission antennas, the NAB has asked the FCC to adopt regulations to supercede such local regulations.

The NAB has charged that many of the local ordinances are "overly restrictive" and "undermine the rights of radio and TV users."

The request came in comments filed March 15 calling on the FCC to declare a Deerfield, N.Y., ordinance invalid because, according to the filing, it does not define reasons for the denials and has inconsistent restrictions. For instance, the NAB claims, the ordinance bans all dishes on half-acre lots, but allows 100-pound antennas.

The comments were in response to a Petition for Declaratory Ruling filed by Joseph A. Carino, a Deerfield resident who was denied a permit to install a receiver dish at his home. While the case itself concerns a broadcast receiver, NAB officials said it could be used as a platform for action on transmission towers and dishes as well.

"This is really a consumer case, but we found we could address our own concerns about broadcasters in general and their ability to operate," NAB spokesman Doug Wills said. "Instead of making our members jump not only through federal (regulatory) hoops but state and local ones as well, it would be far more preferable if federal rules supercede local and state laws when addressing things like safety and height requirements."

"As constructed now, state and local regulations comprise a patchwork system," he added. "The time has come for the FCC to step in and assert itself."

Deerfield Town Supervisor Donald F. Youlen disagreed. He said local communities should have the right to determine

their own zoning.

"I have nothing against towers, but we had one guy put one in a residential area" he said. "If you have a nice neighborhood, the last thing you want is dishes and antennas everywhere."

"All we want to do is preserve the aesthetics of our town. The FCC won't be able to do that as well as we can."

As for the Carino case, Youlen said the disagreement has nothing to do with the ordinance, but with the fact that Carino did not follow proper procedures.

"If he had applied for a building permit, he probably would have gotten it," he said. "But he put the dish up first and then went to the zoning board."

Youlen said the case is now in the fed-

eral court system.

To expand its preemptive rules, the NAB has suggested that the FCC could base them on its Federal Preemption of Amateur Regulation. Those rules, according to the NAB filing, protect Ham radio and SMATV operators from local and state restrictions. The local rules, even if they are designed to protect health and safety, can be superceded if they "unreasonably operate to preclude" amateur radio operation.

"The amateur radio and SMATV decisions provide ample precedent for the Commission to declare that local regulations which operate to preclude . . . interstate communications by dish antenna . . . must be preempted," the NAB filing stated.

FCC Gives Nod to Pioneer Preference

by Judith Gross

WASHINGTON Innovators of new radio technology will be granted an allocation preference, but how much of an incentive it is for DAB proponents remains to be seen.

With FCC Commissioners Sherrie Marshall and Ervin Duggan withholding their votes, the Commission approved the so-called "pioneer's preference" at its April meeting.

The three other commissioners' "yes" votes guaranteed pioneers a license to operate in a new service, or in a technology that upgrades an existing service, in one area without the applicant being subjected to the burden of the competitive application process.

According to the Commission, those seeking a pioneer's preference must file a petition for rulemaking, asking for spectrum allocation for a new service or a rule amendment to permit use of a new technology in an existing service.

Applicants will need to demonstrate technical feasibility, which the Commission said "would provide valuable information," but will not have to give a financial showing.

No selling for profit

During the meeting, Commissioner James Quello asked Office of Engineering and Technology (OET) staff whether applicants granted a pioneer preference could transfer or sell it for a profit. The OET's Robert Unger replied that they could not sell or transfer controlling interest.

FCC Chairman Al Sikes said the pioneer preference "is not something to reward entrepreneurship; it's to reward invention."

Ron Strother, who has positioned himself as a DAB pioneer, said he was glad the FCC had decided to reward inventors in new technologies. But he questioned whether the granting of a single license was enough of a reward.

"I'm somewhat disappointed in the 'carrot' they have chosen," Strother said. "Does it foster innovation to award a single station? What is invention worth in this country?"

Rodney Small, an OET staffer, said

provisions of the pioneer preference remain unclear, and that is why Marshall and Duggan withheld their votes.

NAB opposed

The NAB, which opposes the idea of a pioneer's preference, said in a statement from President and CEO Eddie Fritts that the FCC plan will cause "a flood of unsubstantiated and premature requests for spectrum."

Fritts also said that the NAB would work to prevent pioneers from staking out broadcast spectrum "in their efforts to strike gold with new communications services."

DAB's NAB Introduction

(continued from page 1)

is adjacent to it before a final design decision is made.

No interference

The listening demo provided an A-B comparison between the FM and DAB to prove that the two signals did not interfere with each other. A "multipath simulator" duplicated a radio's blend characteristic for a more dramatic comparison.

Convention goers to both demos appeared impressed by the DAB sound, although some noted there was little discernible difference between DAB and FM.

AM broadcasters seemed especially interested in USA Digital Radio's research into a possible system for AM. In theory, it would be designed to fall within the RF mask of an AM station and provide 15 kHz of stereo digital audio. That portion of the system still is under development.

The next over-the-air tests of DAB are slated for the NAB's radio show in mid-September. USA Digital Radio hopes to have a mobile reception demo ready by then.

Since the convention will be held in multipath-rich San Francisco, tests of both systems should provide more dramatic results.

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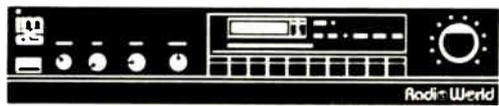
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Station Processing Is Beside the Point

by John Gatski

WASHINGTON In a recent RW article, you may have noticed a major indictment of broadcasters by some recording engineers. I sure noticed it.

The condemnation came from a story about the new stereo-enhancing processing known as QSound. In explaining why a number of early QSound-enhanced recordings were not mono compatible, some recording engineers acknowledged a "Who cares?" attitude about broadcasting when making their recordings.

They charged that overprocessing to make stations louder, especially on FM, has so adversely affected the original sound of their recordings that they don't lose much sleep over airplay compatibility.

They meant, I suppose, that some stations sound like garbage.

These recording engineers' radio indictment is a bit overstated, perhaps even arrogant. After all, there are a lot of good-sounding stations out there in a variety of formats that do use some processing. Some of the recording engineers even have blamed the QSound mono problem on heavy processing. Broadcasters, of course, have said "no way."

But even if this "radio be damned" mindset is confined to a minority of recording engineers, it still is disturbing.

Have broadcasters really alienated recording engineers with processing to the point that the technicians don't care about radio? Plus, if engineers say they don't listen to the radio anymore, what about the listeners?

This so-called "loudness war" has been around since the early-to-mid 1970s. The dense-sounding music was programmed for mostly pop audiences. As CHR radio competition picked up, programmers tried to woo the young listeners into tuning to the loudest station.

The advent of processing equipment allowed this misuse, but you can't blame the equipment. First, peak limiting and diode clippers were used to enhance loudness. Then came the multiband processors and more elaborate clippers, which allowed the music to become denser, creating even greater loudness.

In the process (pardon the pun), the sound quality suffered. The result was music that was all one level, overly loud with little dynamic range. Often times, the engineer knew better, but was forced to turn it up by programmers who saw it as a way to pull in listeners.

A couple of years ago, I visited a Washington-area, Urban format station that did very little processing. In an

informal comparison, the station's engineer showed me a modulation monitor reading of his station, a minimally processed classical station and a heavily processed CHR station.

The needle moved with the music peaks quite nicely on the host station and the classical station, indicating decent dynamic range. They both sounded pretty good, too. The other station was a different story. The needle barely budged from its maximum modulation level. It sounded horrible—grungy, and no detail. But it *was* loud.

Thankfully, there are some signs that the processed loudness war is waning. Engineers with "clean" stations have expressed concern about overprocessed stations and some of the offenders are turning it down. The NAB even commissioned a test to ascertain whether high levels of processing adversely affect receiver performance.

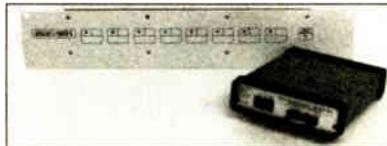
Most classical and jazz stations do not process much to maintain the integrity of the original recording for their discriminating listeners. In pop music, where the processing is much more prevalent, there finally may be a realization that overprocessing does not hold listeners.

People are becoming accustomed to CD-sound quality and are noticing that

(continued on page 10)

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College FMs Oppose Censoring

by Frank Beacham

LOS ANGELES A dozen California college radio stations recently joined together to broadcast a state-wide 18-hour special on the perils of censorship by the FCC and other government agencies.

Titled "Day of Decency," the programming, which aired in March, was designed to raise awareness about past and present censorship and to encourage a public response. At the core of the free-speech marathon was a protest of the FCC's 24-hour ban of "obscenity, profanity and indecency" on radio and television stations.

Each station programmed its own special with some common material networked among the stations. Among the voices heard were artists and activists such as Allen Ginsberg, Jello Biafra, Lydia Lunch, Alan Watts, Jack Kerouac, Laurie Anderson and Lenny Kravitz. Censorship in the arts, literature, radio and television, jazz, world beat, rap, alternative music and news broadcasts were addressed throughout the programming day.

"College radio used to be considered a haven for free thinking and alternative voices," Todd Sievers, music director of KUCI-FM, Irvine, told the Los Angeles Times. "There was a time when we weren't afraid to push the

rules to the limit. Most people think college radio is still the free-form experimental medium it used to be. But that's not the case anymore. We are being censored."

KUCI Promotions Director Danielle Michaelis said the FCC ban is adversely affecting all college and public radio stations by causing self-censorship to avoid fines. That self-censorship includes reviewing recordings before they are aired and sometimes deleting potentially offensive material. She said her station would have to go off the air if an FCC fine were imposed.

"With the current (FCC) ban, most employees and artists within this massive industry know what is happening and have an educated opinion regarding the issue of censorship," Sievers told his listeners. "However, at the moment, the general listening public is for the most part ignorant on this issue. In the public eye, censorship equals 2 Live Crew or Madonna—they know only what they see on television.

"Rather than just talking about this topic, we plan to do something to help stop its progress and create a greater public awareness," Sievers said.

Before the "indecency" ban, the FCC allowed so-called adult themes to be aired between midnight and 6 a.m. Under the new 24-hour ban, stations

can be fined as much as \$10,000 per violation. "A fine would put us off the air really quickly," Michaelis commented. "The groups that would challenge us have money and we don't. That's what it boils down to."

In addition to the radio marathon, a series of "Day of Decency" fairs with music, art exhibitions and informational booths were held at campuses in San

Diego, Davis, Irvine and Berkeley. These fairs were sponsored by the University of California Radio Network.

Stations participating in "Day of Decency" were KUCI and KALX, Berkeley; KCSB, Santa Barbara; KCPR, San Luis Obispo; KDVS, Riverside; KZSC, Santa Cruz; KFJC, Los Altos Hills; KCSC, Chico and KLA and KXLU in Los Angeles.

NAB Eyes L-Band

by Judith Gross

WASHINGTON Concern over the availability of L-band spectrum was the focus of the NAB's April DAB Task Force meeting.

The task force had no specific proposals to vote on; instead, the group discussed a variety of topics that continued the debate over DAB's implementation at 1500 MHz.

A Eureka 147 DAB test plan on L-band is due before the task force in early May. In the meantime, word from two separate quarters has raised concern over whether enough spectrum for DAB would be available at L-band.

In a supplement to its second Notice of Inquiry on WARC, the FCC noted that the executive branch has opposed the reallocation of L-band to broadcast services.

Task force member Randy Odeneal from Sconnix Broadcasting said that a report due to be released from the Air Force also opposes giving up that band for other uses.

"It isn't going to happen at L-band," Odeneal said. "In addition, the rest of the world is not interested in that band."

Task force Chairman Alan Box of

E-Z Communications said the group still supports seeking co-primary status between terrestrial and satellite DAB at WARC and that L-band is the target.

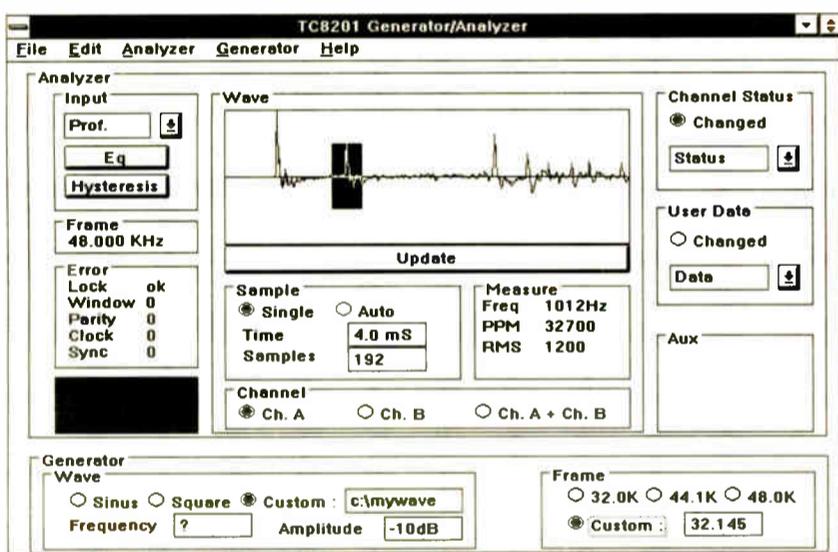
In discussing the opposition to reallocating L-band spectrum for DAB, Box said his understanding is that "it's not firm. We knew all along that we'd have to fight hard for it and we'll continue to do just that."

The DAB Task Force also reviewed the Technical Advisory Group's favorable report of its trip to Rennes, France, to evaluate Eureka 147, as well as a minority report from Paul Donahue of Gannett.

The Donahue letter said that while Eureka appears to work well, it still needs to be tested at L-band frequencies. Odeneal concurred with that view.

"The Rennes test didn't demonstrate anything to me that I didn't already know from reading the literature from Eureka. Nobody is saying it doesn't work," Odeneal said.

He said he feels the same way about the Eureka 147 demonstration at the NAB show in Las Vegas. "It doesn't prove anything and it isn't right to mislead people."



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Points of Processing

(continued from page 9)

overly loud radio stations do not sound the same as the digital disc.

One engineering VP told me that stations that continue to heavily process are only penalizing themselves. If programmers insist on processed loudness, they will offend their listeners, he explained. Monitoring loud music for an extended period is very fatiguing and a listener may think twice about tuning into such a station when scanning the band, the engineer said.

Let me make just one more point about recording engineers' attitudes toward radio. Granted, the radio people are dependent on the recording industry for program material. But judging by some of the recording engineers' reactions to the QSound concern, it sounds as if they believe broadcasters are of secondary importance.

These people need to remember that their prized recordings would not be as popular (and they would not make as much money) if it weren't for the broadcasters. The relationship works both ways.

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RCI Shortwave Service Cut

Latest Victim of Cutbacks in Public Broadcasting Loses 90 Employees and Millions from Its Budget

by James Careless

OTTAWA Canada's shortwave service, Radio Canada International (RCI), is the latest victim in cutbacks hitting Canadian public broadcasting. The service's budget was slashed from 19 million Canadian dollars (CA\$19 million) to CA\$13.5 million.

As of April 1, RCI's staff was cut nearly

in half—from 208 to 118. The international radio service also eliminated seven of its 14 foreign services, including Japanese, German, and a host of Eastern European languages.

Because of the budget slashing, RCI's English and French transmissions will be nothing more than rebroadcasts of domestic Canadian Broadcasting Corp. (CBC) programming, although a handful of staff

was retained to provide some newscasts.

If the cuts seem more drastic than the figure implies, that is because virtually all of them have come from programming. This accounts for the high layoff figures.

In contrast, there has been no reduction in hours scheduled nor in the engineering budget. The budget actually includes extra money for improving RCI's transmitters, RCI Communications Manager Jane Organ said.

Reactions mixed

Because some areas suffered bigger cuts than others, reactions to the RCI budget were mixed.

At RCI, the decision is seen as an unprecedented disaster, since the cuts will inevitably alienate many of its 16 million weekly listeners. Those who tuned in for languages that are now gone obviously will tune elsewhere.

Other programs eliminated include the "Shortwave Listener's Digest," one of the most popular shows on world band radio. And with it goes host Ian McFarland, who consistently won "Most Popular Broadcaster" honors from various listener organizations for years.

McFarland unintentionally anticipated the demise of his program. A week before the cuts were announced, he told listeners that he was joining Radio Japan for a two-year stint in the English international service.

RCI transmitter

The reaction of international broadcasters such as the BBC, Radio Japan and Radio Korea is somewhat different. That is because they and a few other broadcasters rely on RCI's Sackville, New Brunswick, transmitter site to relay programs cheaply to North America.

In fact, the use of RCI's equipment is technically cost-free because the Canadian service gives them time on its trans-

mitters in return for an equal amount of time on theirs.

That's a deal few North American broadcasters could have matched. Had RCI closed down, a few of the international broadcasters would have been cut out of the North American market altogether.

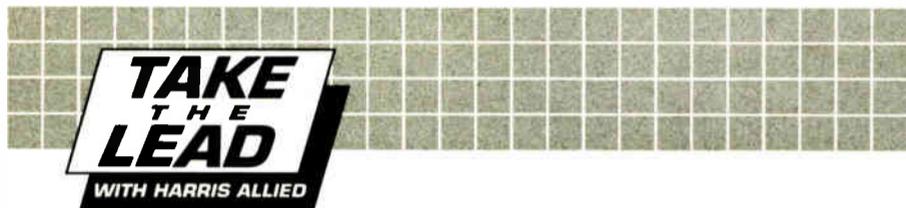
There has been no reduction in hours scheduled nor in the engineering budget.

Even with budget cuts, RCI is much more secure than it was last year. The CBC, which ran RCI since its inception in the 1940s, announced last December that it could no longer afford to keep the service. The corporation was faced with a CA\$108 million budget shortfall that led it to eliminate RCI and 11 domestic television stations.

RCI was saved, however, by the Department of External Affairs (DEA), which took over fiscal support. DEA is a branch of government that promotes Canada abroad.

The deal with DEA gives RCI a stable five-year funding base—something the CBC has never been able to achieve even for itself.

Funds are so tight, even with last year's CA\$108 million cut, that the CBC is facing another shortfall of at least CA\$50 million in the near future. If the government does not help out—and it most likely will not—the CBC's very future could be in jeopardy, while RCI's is secure.



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Circle 92 On Reader Service Card

World Radio History

EC Rules Affect Stateside

by David Burnett

LONDON New European Community (EC) equipment rules that formalize a system recognizing quality products also will affect equipment manufacturers in the U.S. and Japan.

European broadcasting manufacturers are already

learning the implications of the EC directive that sets electromagnetic compatibility (EMC) requirements, effective Jan. 1, 1992.

Approximately 100 delegates, representing most of the U.K.'s important audio and video manufacturers and distributors, attended an Audio Engineering Society (AES) con-

ference here in March that outlined the new regulations. Under the rules, companies will be criminally liable for non-compliance.

No legal standing

EC directives have no legal standing, but Community Law requires member states to introduce legislation to enforce them.

Detailed specifications have not been established, but July 1, 1991 is the date for adoption and publication of the legislation to implement the directive.

In general terms, the EMC rules apply to nearly all electrical and electronic apparatus, and require them to neither cause nor be susceptible to electrical interference. Suggested detailed parameters include immunity from supply line dips, transients and interruptions, and RF field and

electrostatic discharges. There will be similar requirements for equipment to not generate these artifacts.

The directives set up essential requirements that products must meet before they can be sold in the EC. Standards then set the detailed specifications by which manufacturers can measure conformity. Procedures for how manufacturers meet the requirements and identify products with a "CE" mark also are included.

To allow continued marketing of existing products, there may be a transition period where only compliance with existing national standards is required.

Options available

Manufacturers have several options to demonstrate that their products meet the necessary standards, but they must always certify the apparatus with a declaration of conformity. This document has to be kept available to the enforcement authorities for 10 years.

Conformity with specified European standards will require a simplified declaration, but this requires the manufacturer to have a certification of their total operations.

Alternatively, manufacturers must produce and maintain a technical construction file for the product. The file must describe the equipment and the procedures used to ensure that it conforms with the requirements. There also must be technical reports or certificates from an approved body.

A comprehensive technical file will make the approval easier, and reduce the possible need for type testing. The manufacturer, however, can submit the product for type approval and gain a certificate. Telecommunications terminal equipment and radio transmitters always require a type-examination certificate.

Cause for concern

The introduction of new regulations are always a cause for concern, but for any manufacturer it must be better to only satisfy one set of requirements. For new products, the requirements can be incorporated in the design, which will be easier than modifying existing equipment.

The EC-based manufacturers, or the distributors in the case of imported equipment, are responsible for satisfying the requirements, and non-compliance will result in the product being removed from the marketplace.

David G. Burnett is owner of the business management and broadcasting consultancy DGB Associates in Cambridge, England. He covers radio from the U.K. for Radio World International.

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Broadcast Electronics has the largest and most skilled engineering staff dedicated to the radio broadcast equipment industry. Significant FM transmitter design patents awarded to B.E.:

- Folded Half-wave Output Cavity, patented 1982.
- Internal Second Harmonic Suppressor, patented 1982.
- Broadband Input Impedance Matching Circuit, patented 1985.

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World Radio History

Radio Buffs Collect Memories

by Dee McVicker

TEMPE, Ariz. As early as 1946, Joseph R. Pavek would travel the countryside and, as the story is told, stop by the local barber shops for a haircut and whatever information he could glean on radio memorabilia.

Pavek, a sales representative for the

broadcasting from the first mineral-based radio receivers through the development of television.

"Joe was getting older and looking for someone to take care of his collection," said Stephen Raymer of the Pavek Museum of Broadcasting. "And, of course, it's a big undertaking. You need a building and you need a staff. He

Corp.'s KSL Radio/TV in Salt Lake City.

Said Don Gale, Bonneville's VP of news and public affairs, "When Mr. McIntire began getting older, he decided he wanted to somehow preserve and protect his collection. And he quite naturally thought of KSL. We've always had an interest in radio history and been involved in it. So he called KSL and said he had this little radio collection."

Flabbergasted

Expecting a small collection of less than several hundred sets, the group was surprised to find more than a thousand radios and other wireless memorabilia.

"Some of our people went to look at (the collection) and they were flabbergasted. We had collected some radios on our own over the years because we have an interest in that sort of thing, but nothing anywhere near what he had," related Gale.

Included in the collection is a large variety of radio sets from early radio up through the 1960s, with some dating in the 1970s. "As far as we know, this is the largest collection in the country," noted Gale, who said that McIntire went to great lengths to refurbish and repair the radio sets, sometimes even making his own parts if need be.

OFFBEAT RADIO

Honored that McIntire turned to Bonneville to preserve the future of his treasured collection, the group accepted the antiques in 1985 and quickly made plans to display them in KSL's new broadcast facility. Those plans, however, fell short of expectations when the group realized it was out of room.

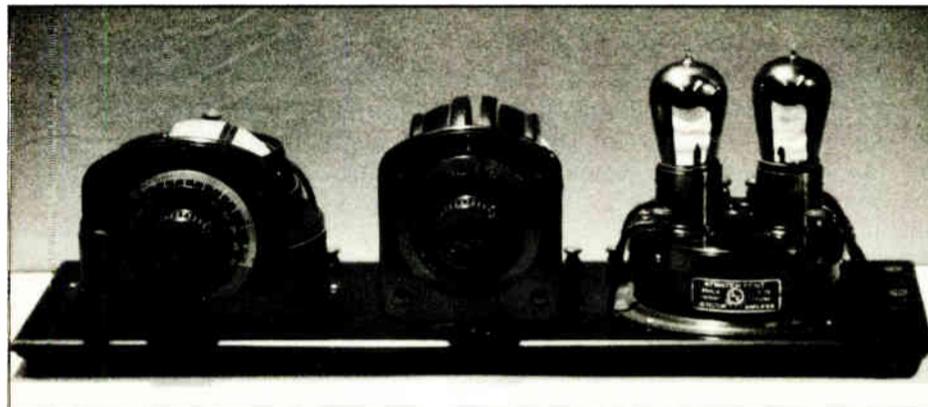
"We found there just wasn't any place in our building to display them, so we began looking for other things we could do with them that met our obligation to

Mr. McIntire," said Gale. In January 1991, Bonneville found a new home for the collection at Brigham Young University, where curators will be able to more adequately catalog and maintain the collection.

Dusted and nursed

Michael Ohman, a professor at the university who claims to have "dusted and nursed" all 1,000 or so pieces, said the collection will be on display soon. "Our plan is to have a continuing rotating display of radios to show a cross section," he said. "We also worked it out with Bonneville Corp. to house several of these radios in the foyer of KSL, so they will have an on-going collection there, too."

A self-described radio antique buff, Ohman said the collection ranges from
(continued on page 23)



Atwater Kent's first receiver, the Model 3925, built in 1922.

Midwest region and an amateur radio buff known by the call letters WOEP, thus began to amass one of the most fascinating antique radio collections in the United States.

Meanwhile, another collection of early radio memorabilia was in the making by P.R. McIntire of Salt Lake City, Utah. Bringing home a Majestic radio and phonograph set for his new bride, this purchase would spark in McIntire a lifetime fascination with radio memorabilia and inspired a collection that came to number over a thousand pieces.

Endured uncertainty

Years later both the McIntire and Pavek collections would endure uncertain times. Joseph Pavek, advancing in age and unable to find a suitable home for his antiques, was faced with auctioning off his beloved collection—a lifetime accumulation that chronicled

couldn't find anybody that would guarantee to do that. He was ready to put the collection up for sale at an auction."

Fortunately, Pavek first placed a small advertisement in a publication put out by the Antique Wireless Association, of which he was a charter member. The ad caught the eye of a radio memorabilia buff and philanthropist, who provided the funds to house, catalog and preserve the priceless collection. Today, the collection is still preserved at the Pavek Museum of Broadcasting in St. Louis Park, Minn., where visitors can stroll down memory lane and relive the evolution of radio.

The same type of journey awaits visitors to Provo, Utah, where the McIntire collection is expected to be on public display soon. It, too, had faced an uncertain future some six years ago, before McIntire called Bonneville International

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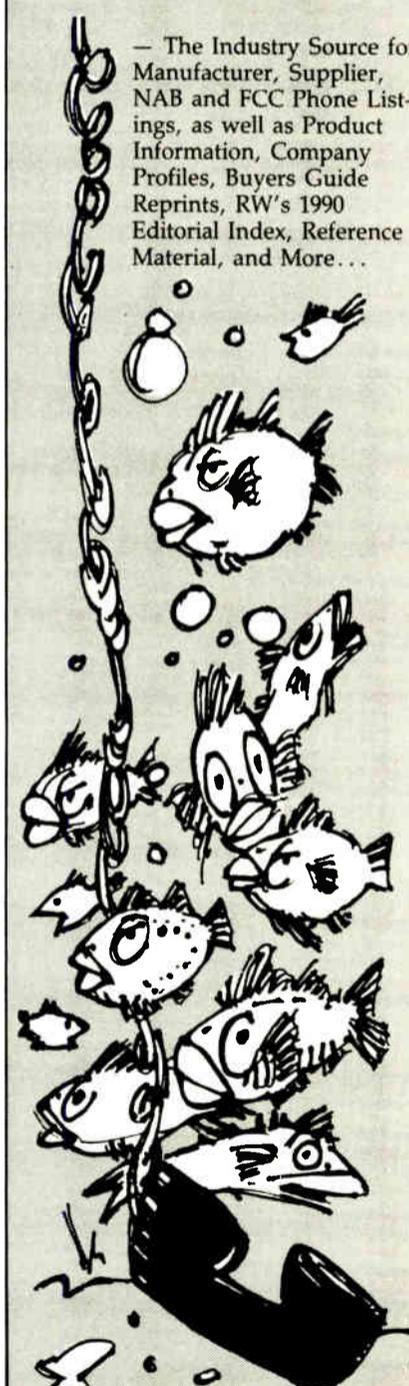
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Tuning In Remote Broadcasts

by Bruce Bartlett
with Jenny Bartlett

ELKHART, Ind. Right here in my home town lives an aficionado of remote broadcasts. He's Jim Lies (pronounced "lease"), CE of WTRC-AM and WYEZ-FM in Elkhart/South Bend. The AM station does remote broadcasts from a van it calls the Rainbow Express.

WTRC purchased the van from United Limo. It already had a generator and cabinets, which easily converted to racks. Jim and Richard Carris supervised the conversion to a remote broadcast van.

Here's a typical procedure for a broadcast remote. Station personnel park the van outside the remote site—say, a mall or restaurant. Then the talent carries a portable Marti 2.5 W transmitter into the

restaurant, as well as a "handy talkie" to hear communications from the studio. The small Marti transmitter sends the program to the van, where it is repeated and sent to the studio in full fidelity via a 25 W Marti UHF transmitter.

Cleaner setup

Why not use a mic cable from the restaurant to the van? It's a cleaner setup—there's no cable for cars to run over or people to trip on.

In a typical remote, all the music is played at the station, while the remote announcer just does four or six cut-ins, talking to restaurant customers or management. For more elaborate shows, the talent might back-announce records, or introduce upcoming events. Few stations have music played at the remote site.

RW Directory Update

The following company listings update Radio World's 1991 Directory. Please clip out and insert this section into your directory for future reference.

Ampere Electronics Corp.
100 Providence Pike
Slatersville, RI 02876
Contact: Greg J. Murphy
401-762-3800

Audiotekniques Inc.
1600 Broadway
New York, NY 10019
Contact: Doug Cook
212-586-5989 FAX: 212-489-4936

A/V Technology International
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West Newton, MA 02165
Contact: Gerald Abeles,
President
617-965-3866 FAX: 617-965-1865

Communication Resource Network
8 Bond St, Suite 203
Great Neck, NY 11201
Contact: Alec Shapiro, President

Communications Data Services
6105-E Arlington Blvd
Falls Church, VA 22044
Contact: Rich Biby, President
703-534-0034 FAX: 703-534-7884

Communications Technologies
P.O. Box 1130
Marlton, NJ 08053
Contact: Clarence Beverage,
President
609-985-0077 FAX: 609-985-8124

Competition Specialists
4535 S Blosser Rd
Santa Maria, CA 93455
Contact: Jim Mussell

Comprompter Inc
141 South 6th St
La Crosse, WI 54601
Contact: Ralph King, Pres
608-785-7766 FAX: 608-782-4674

Compucan
PO Box 831360
Richardson, TX 75083
Contact: Michele Geopferick

Computer Concepts Corp
8375 Melrose Dr
Lenexa, KS 66214
913-541-0900 FAX: 913-541-0169

Comrex Corp
65 Nonsset Path
Acton, MA 01720
Contact: Lynn Distler, VP Sales
508-263-1800 FAX: 508-635-0401

Comsearch Inc
11720 Sunrise Valley Dr
Reston, VA 22091
Contact: Jerry Schulman,
Mktg Mgr
703-620-6300

ComStream Corp
10180 Barnes Canyon Road
San Diego, CA 92121
Contact: Jesse Hindemith,
Sales Manager
619-458-1800 FAX: 619-453-8953

Comtech Antenna Systems
3100 Communications Rd
St Cloud, FL 34769
Contact: Thomas C. Christy,
VP of Marketing
407-892-6111 FAX: 407-957-3402

Comtech Data
350 N Hayden Rd
Scottsdale, AZ 85257
Contact: Ray Kelsey, Dir Mky

Concept Productions
1224 Coloma Way
Roseville, CA 95661
Contact: Dick Good, Sales Mgr
916-782-7754 FAX: 916-786-8304

Concept Unlimited
9311 San Padre, Suite 1060
San Antonio, TX 78216
Contact: Dave Rettinger

Conex Electro-Systems Inc
PO Box 1342
Bellingham, WA 98227
Contact: Bill Hamelin,
Engineering Manager
206-734-4323 FAX: 206-676-4822

Connect Systems Inc
23731 Madison St
Torrance, CA 90505
Contact: Kirk Mckloren
213-373-6803

Connectronics Corp
652 Glenbrook Rd
Stamford, CT 06906
Contact: Richard Chilvers,
President
203-324-2889 FAX: 203-326-7027

Continental Electronics
PO Box 270879
Dallas, TX 75227-0879
Contact: Walt Rice, Manager,
Domestic Sales
214-381-7161 FAX: 214-381-4949

Control Concepts Corp
PO Box 1380
Birmingham, NY 13902-1380
607-724-2484

Control Technology Inc
2950 SW 2nd Ave
Ft Lauderdale, FL 33315
Contact: James C. Woodworth,
President
305-761-1106 FAX: 305-764-3298

Cool-Amp Conducto-Lube Co
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Lake Oswego, OR 97035
Contact: Jeanne McKinney,
Secretary
503-624-6426 FAX: 503-624-6436

Corbin Enterprise
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Miami, FL 33255
Contact: Chris Corbin, President

Corporate Computer Systems
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Holmdel, NJ 07733
Contact: David Lin,
Product Manager
908-946-3800

Cortana Corp
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Contact: Evelyn Nott, President
505-325-5336 FAX: 505-326-2337

Cortland Cable Co
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Cortland, NY 13045-0330
Contact: John J. Dower, Pres
607-753-8276 FAX: 607-753-3183

Consultronics
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Milpitas, CA 95035
Contact: Ron Evans

Countryman Associates Inc
417 Stanford Ave
Redwood City, CA 94063
415-364-9988

Creative Support Services
1950 Riverside Dr
Los Angeles, CA 90039
Contact: Mike Fuller, Owner
800-468-6874 FAX: 213-660-2070

Cremlo Inc
1600 Fourth Avenue NW
Rochester, MN 55901
Contact: Dan Estes

Crouse-Kimzey
PO Box 155999
Fort Worth, TX 76154-0999
Contact: Mark Bradford
817-283-7700 FAX: 817-283-8133

Crouse-Kimzey of Annapolis
PO Box 6300
Annapolis, MD 21401-0300
Contact: George Fisher
301-757-6100

Crown International Inc
1718 W Mishawaka Rd
Elkhart, IN 46517
219-294-8000

C.S.I. Telecommunications
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San Francisco, CA 94129
Contact: Mike Newman
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Current Technology
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Richardson, TX 75083
Contact: P Diamond
214-238-5300 FAX: 214-238-0911

Custom Business Systems
PO Box 67
Reedsport, OR 97467
Contact: Steve Kenagy, VP Mktg

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Contact: Joseph Foti,
Vice President
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Contact: Carl Peterson,
Dir Bdct Sales/Mktg
206-733-4567 FAX: 206-734-7939

Jules Cohen & Assoc.
1725 DeSales Street, NW
Washington DC 20036
Contact: Bernard R. Segal,
President
202-659-3707 FAX: 202-659-0360

Modulation Sciences
12A Worlds Fair Drive
Somerset, NJ 08873
Contact: Eric Small,
VP/Engineering
908-302-3090 FAX: 908-302-0206

S.W.R. Inc.
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Ebensburg, PA 15931
Contact: Ed Edmiston
800-762-7743

Teletech Inc.
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Dearborn, MI 48121
Contact: Kenneth Hoehn, VP/GM
313-562-6873

White Instruments Inc.
1514 Ed Bluestein Blvd
Austin, TX 78721
Contact: Emory Straus
612-388-3800 FAX: 512-388-1515

LINE OUT

On top of the van is an omni UHF antenna. It works fine in town, transmitting up to a 15-mile radius. For longer reaches, a directional antenna is aimed at the studio with the aid of a map and compass.

One time the station did a remote call-in talk show from Disney World. Disney personnel set up the talent with a mic, P.A., and telephone. The talent (Allen Strike) used a telco landline to tell the station he was there and ready to go on.

Mix-minus station

The station fed him a mix-minus signal, in which Allen heard the station's program but not his own voice. If Allen received his voice from the station, it would have doubled his live voice on the P.A. and headphones, causing comb filtering or a confusing echo.

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On some call-in shows, the calls are on a 3.5-second delay. In this case, the station feeds a pre-delay program to the talent.

The Disney remote was sent over a normal 300 Hz to 3 kHz phone line, but it sounded great. How? A Comrex encode/decode system was used. At the sending end is an encoder, which frequency-shifts the signal 250 Hz upward (by heterodyning). In this way, a 50 Hz signal becomes 300 Hz, which the phone line can handle. That is, a program with a 50 Hz to 2750 Hz audio spectrum is made to fit into a 300 to 3K bandpass. Clever, eh?

At the receiving end back at the station, a decoder frequency-shifts the signal down by 250 Hz. The full program spectrum is restored. And you hear it: Those three extra octaves at the bottom add a lot of fidelity.

This system can be extended to two or more phone lines, one with a shift up and one with a shift down. Then you can pass a 50-6K spectrum on a 300-3K phone line. The two phone lines are decoded and summed at the receiving end. According to Jim Lies, the resulting sound is "quite startling. It's amazing that audio of that quality can be passed through the phone line."

Apparently, summing the two phone lines causes no objectionable phase cancellations.

Swoosh

While we're on the subject of remotes, how do you pick up a basketball game effectively? Larry Stevens, program manager of WHME-TV, South Bend, Ind., advises that many stations have the announcers wear headset mics and stick a microphone on a stand near the broadcast mixer to pick up crowd noise.

But if you want to capture the ball dribbling and players' foot squeaks, have a technician sit in the center of the bleachers with a shotgun mic, following the action on court.

Here's another court-pickup method that works less well but requires no operator. Place two or three directional boundary microphones on the floor, each surrounded by a few mic stands to protect the mics from being stepped on.

To pick up the baskets, tape a boundary microphone just under each hoop. Also, you can hang a cardioid mic from the catwalk over the court to pick up the court action and the audience. You might even fasten a C-Ducer piezo-electric tape to the floor in order to pick up ball thumps.

Readers: If you have any successful tips on miking a basketball game—mono or stereo—please give me a call. I'll mention your ideas in *Line Out*.

■ ■ ■

Bruce Bartlett is a microphone design engineer and technical writer for Crown International. He also is author of the just-published "Stereo Microphone Techniques" from Focal Press. Jenny Bartlett is a technical writer. Bruce can be reached at 219-294-8388.



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Treading the Path To Job Satisfaction

by John "Q" Shepler

Part II of II

ROCKFORD, Ill. You've finally hit that sweet spot. Everything is going right. The routine work gets done in the morning and the afternoons are free to work on advanced projects.

Q-TIPS

What's even better is that it's all suddenly paying off. Everybody in town knows and respects you. They ask your advice as often as they can get away with it. You've even written a couple of magazine articles on your latest developments. Why, at the next NAB, people will even know who you are.

This is the secret dream of everyone with ambition. You want more than just to plug through the day. You want achievement, with the rewards and recognition it brings.

You already know how to get to this stage. Stick with the job through the learning period and the tough times, and keep focused on getting the routine under control.

Day-to-day chores

Organize day-to-day chores and work them as quickly as you can. Most people won't do this because they think they are working for the clock. They don't get to leave before the clock says so. So, why try harder?

You are working against the clock, not for it. There are only so many hours in the day and many, many things to do with those hours. Get the must-do jobs out of the way so you still have time to achieve some dreams.

Now, focus on those dream jobs. They can be anything above and beyond the call of duty. Inventing a new piece of equipment, running a new survey, simplifying present operations, writing software, even teaching a class—whatever your preference. None of these things are in your job description, but they are critical to becoming an above-average performer.

Among the tips I can offer to make sure these achievements happen: First, stay at it. Most of what you try won't work the first time or the second. When it does start to work, it will need lots of refinement. Keep plugging at it until you are satisfied. Only then set this project aside and move on to the next.

Second, chase away time wasters. The clock won't let them leave, so they have time to waste. They would just as soon have somebody to waste it with. Point them toward someone else who has the same attitude.

Background project

Next, the dream project has to be a background project. If it takes time needed for normal operations, people are going to get upset and you may get ordered to stop "playing around."

Fourth, pick projects that other people

want too. It helps to have support. If you're the only one interested, keep a low profile or somebody may decide that they have better uses for your time.

Finally, milk it for all it's worth. If you come up with something new and exciting, spread the word. Get others to use it. Let your friends around the country know what you're up to. Write to the trade magazines. Present a technical paper. Don't rule out a patent or a copyright. Many new products have sprung from the back rooms of radio stations.

Unfortunately, there is a dark lining on our silver cloud. There is one final stage that comes sooner or later. This is the stage you want to take action to avoid, but will probably go through at least a couple of times yourself.

This final stage is when the magic fades and the job begins to become a

You want achievement, with the rewards and recognition it brings.

drag. Sometimes this is just a result of running out of steam. Other times it is the result of an outside influence.

You may be flying along high and mighty when, out of the blue, the operation is sold and your flagship becomes a cash cow for somebody else's dreams. Overnight, the budgets go and the enthusiasm goes with them. Perhaps you just got a new boss who doesn't like your ideas or doesn't think they're worth

(continued on page 28)

"Doing things for successful FM translators"



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*Radio Technology Component Grand Prix '88, CD Division, Stereo Sound Component of the Year (1988) & Best Buy (1988)

Circle 103 On Reader Service Card

DAT vs. DCC: Is It Any Contest?

by Mel Lambert

STUDIO CITY, Calif. The technology spotlight has been playing recently on a new consumer recording/replay format that, at the very least, is muddying the DAT water. DCC, or Digital Compact Cassette, is Philips' remarkable innovation designed to replace the familiar analog cassette.

In a nutshell, DCC uses 1/8-inch chromium-dioxide tape to record up to 120 minutes of digital audio in an enclosed housing the same size as a conventional cassette. Unlike analog cassettes, however, the shell is single-sided with the top surface being reserved for graphics and other information. The tape also is protected by a metal shutter that is automatically moved to one side by the DCC transport (much like the metal shield used by some CD "caddy" manufacturers).

Eight data tracks

The DCC format is bi-directional, offering up to 60 minutes of record time in either tape direction. The record/replay heads feature eight data tracks per two channels, and have been positioned specifically to offer compatibility with all of our existing cassettes. In other words, a DCC player might be engineered to use the same head block, with additional repro amplifiers, to play back analog recording as well as new DCC recordings.

Voila—instant compatibility with the

millions of pre-recorded analog cassettes lining our shelves, and a gentle segue for most consumers from boring ol' analog to pristine new digital.

And on paper at least, DCC does have a respectable technical performance. Running at a tape speed of just 1 7/8 ips (the same as analog cassette), the eight data tracks allow a companded, digitized stereo signal to be recorded and replayed utilizing a familiar eight-to-10 modulation system and Reed-Solomon error-protection codes.

DIGITAL DOMAIN

The end result is a quoted frequency response of 5 Hz to 22 kHz at a sampling frequency of 44.1 kHz (32 kHz and 48 kHz also are provided in the format); dynamic range in excess of 105 dB; and THD plus noise of greater than 92 dB. DCC consumer decks are scheduled to hit the stores some time during the middle of next year—and word from Philips is that they will also feature SCMS copyright protection circuitry to prevent unauthorized digital-to-digital copying by the consumer.

Where does that leave DAT, the much-heralded digital replacement for consumer analog recording hardware? Within the strictly consumer marketplace, I

would say, pretty much dead in the water.

It has to be conceded that, with hindsight, compact discs became something of an embarrassment for the record industry, and the producers, songwriters, performers, publishers and others that owned copyright to those recordings.

By placing a digital-quality master in the hands of the public, and making available CD players with direct digital outputs, consumers soon realized that they could make virtually mirror-image copies of a CD using the player's optical or S/P DIF coax ports.

Prototype DAT

And it was about this time that the first prototype DAT recorders appeared upon the scene. The RIAA (Recording Industry Association of America) and others began to realize that sales of albums and singles were on the decline, and chose to point the accusing finger at the home taping fraternity.

In essence, the industry watchdogs insisted that anti-copy protection circuitry be included in consumer recorders: first, the sonically degrading CopyCode notch filters (which the National Bureau of Standards tested and found lacking), and now the SCMS (Serial Copy Management System) format.

Personally, I feel that home taping was never a significant issue in this anti-copy debate. However, it cannot be denied that the music software industry was running

scared at the prospect of placing too good of a recording medium—DAT—in the hands of the consumer. So, to cut to the chase, DAT came in for a great deal of negative publicity, while the various consumer electronics giants looked for a more "attractive" format.

Meanwhile, DAT had taken off in the professional audio industry, with second-generation machines now being introduced, some with IEC-format timecode capabilities for use in broadcast, music recording and post-production facilities.

It would appear that the market for Pro-DAT now has reached critical mass, and is sufficiently well established that the format will prove a viable alternative to more expensive video-based digital processors and reel-to-reel transports.

On the consumer front, a format was required that could be used to eclipse DAT and meet the anti-copying criteria of software owners. This is, of course, where DCC comes into the picture. Formally unveiled at January's Winter Consumer Electronics Show in Las Vegas, DCC is a very elegant technical achievement, and goes a long way in satisfying the anti-home taping lobby's objections to DAT recorders.

Squeeze bits

In essence, the Philips DCC format utilizes a proprietary data-compression technique (based, interestingly, on the firm's involvement with the MUSICAM system) to squeeze the appropriate number of bits onto multiplexed linear tape tracks. The coding technique, referred to as PASC, or Precision Adaptive Sub-band Coding, provides, with additional

(continued on page 26)

EXPERIENCE COUNTS . . .

Continental Electronics Installations At Master Antenna Facilities.

LOXLEY TOWER SITE

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WBLX 27.5 kW
WGCX 27.5 kW
WJLQ 27.5 kW

TELETOWER PROJECT

Houston, Texas
2 OF 2 STATIONS

KLTR 27.5 kW / 21.5 kW (Aux)
KMJQ 50 kW

BRODIE LANE TOWER SITE

Austin, Texas
2 OF 2 STATIONS

KHFI 35 kW
KPEZ 21.5 kW

SUMMIT TOWER PROJECT

Atlanta, Georgia
2 OF 3 STATIONS /
4 OF 5 TRANSMITTERS

WSTR 35 kW (2)
WVEE 40 kW

LOADSTAR TOWER PROJECT

Ft. Lauderdale, Florida
2 OF 2 STATIONS

WJQY 40 kW
WKQS 50 kW

LOADSTAR TOWER PROJECT

New Orleans, Louisiana
4 OF 4 STATIONS

WEZB 35 kW
WLNG 35 kW
WMXZ 35 kW
WQUE 35 kW

GANNETT TOWER PROJECT

Miami, Florida
8 OF 10 STATIONS

WEDR 50 kW
WHQT 25 kW
WLVE 25 kW (2)
WPOW 25 kW
WQBA 21.5 kW
WSHE 25 kW
WTMI 25 kW (2)
WZTA 25 kW (2)

MILLER TOWER SITE

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6 OF 6 STATIONS

KKDA 40 kW
KLTY 40 kW
KLUV 40 kW
KOAI 45 kW
KZPS 40 kW
WRR 40 kW

LOADSTAR TOWER PROJECT

Orlando, Florida
3 OF 3 STATIONS

WJHM 25 kW
WJYO 55 kW
WOCL 55 kW

LOADSTAR TOWER PROJECT

Jacksonville, Florida
3 OF 4 STATIONS

WAIV 40 kW
WYV 27.5 kW
WQIK 35 kW

OLDSMAR TOWER PROJECT

Tampa, Florida
2 OF 2 STATIONS

WKRL 40 kW
WUSA 40 kW

SHOREVIEW TOWER PROJECT

Minneapolis, Minnesota
6 OF 8 STATIONS

KDWB 25 kW
KEEY 25 kW
KLXK 25 kW
KQRS 25 kW
WLQL 25 kW
WLTE 25 kW (2)

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The Name's Tedford; Call Me Ted

1930's "Master Machinist" Made Radio Come to Life With Contraptions to Produce Live Sound Effects

by George Riggins

LONG BEACH, Calif. One side of radio that has not always been in the forefront is the role of sound effects, or what we now call "sweetening."

In the days of yore, the sound effects were done live because the programs were live. No going back and adding "presence" as is done today. One of the pioneers in the creation of sounds for radio programs was Rollo L. Tedford. According to his youngest daughter Jan Jennings, Tedford practiced the art of sound effects and was the transcription engineer at WLW between 1932 and 1941.



Rollo Tedford was, among other things, a master machinist. For this reason he was able to fabricate many of the contraptions needed to produce the sounds that were used to set the mood and background for the programs. He also was an amateur radio operator with the call W8AKW.

Don't say Rollo

It is said that when Tedford met someone he would say, "The name's Tedford; call me Ted." He never used his first name and did his best not to let anyone find out what the name was.

According to Jan, many of the early stars of radio did their programs from WLW because of the sophisticated facilities and signal strength. Jan also reports that her dad had a side business in which he recorded some of the stars on disk at his home.

Unfortunately, most of these masters were melted down during WW II for the aluminum. Jan remembers such stars as Red Skelton coming to the house to record special programs. Jan reports that she heard almost the entire repertoire of jokes and stories Red Skelton used at the time, and learned why Red always had a live audience in such a good mood when the program started—a good story with the punch line delivered just as the signal was given to go on the air.

In 1941, Tedford left WLW to form the Tedford Crystal Labs to produce transmitter crystals. One of his better crystal customers was the Crosley Radio Manufacturing Co. in Cincinnati. Crosley was producing radios for the Army Signal Corps at the time and was in need of a reliable supply of crystals.

One episode in the life of R.L. Tedford was his part in special programming that was produced to celebrate the opening of the new coast-to-coast radio hookup. Ted told the story of a man's life in sound effects starting with the day of birth until the day of death. For this he was offered a job

in New York City. The offer was not accepted. Ted preferred to stay in Cincinnati.

Books on old stations

There are at least two books in progress on early radio calls. First, Jim Hilliker of Monterey is doing research on the early days of radio in Southern California.

One of the early calls there was KJS,

which went on the air in 1922 on a frequency of 833 kilocycles (kc). The station moved to 1190 kc in 1924 and to 1020 kc in 1925. The next move was to 1040 kc in 1927 and then to 1090 kc in 1928.

Later that year, KJS shared time with KGEF on 1300 kc. The station changed call signs to KFAC in 1931 and then went full time in 1932. The station again changed its frequency in 1941 moving to 1330 kc. The final change came in 1989 when KWKW moved to the 1330 Hz frequency and what was left of KFAC changed call to KAZN and

moved to the 1300 Hz frequency that had been occupied by KWKW.

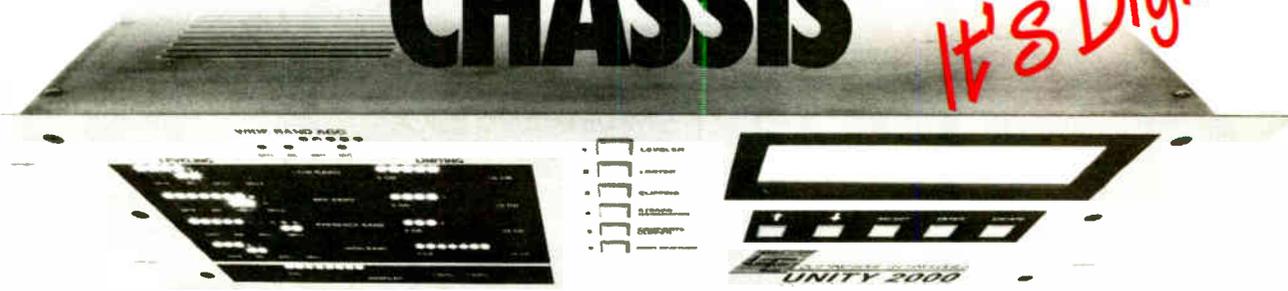
(Yes, I have used both the old kc designation and the newer Hz notation for frequency. Remember that it has not been that long ago that Hertz was only known for the antenna. At the time the frequencies were noted in kc—we were still using kilocycles to denote the wavelength when stated in terms other than meters).

Another book on early call signs is being written by Howard McDonald. McDonald is doing his work in Montana

(continued on page 26)

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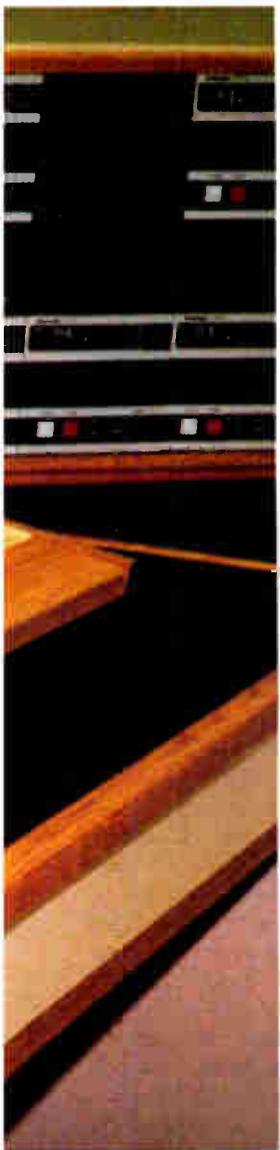
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World Radio History

Know Dial-up Remote Risks

by Bill Sepmeier, Pres.
National Supervisory Network

AVON, Colo. As economic conditions grow leaner and leaner, more broadcasters are considering the use of some form of dial-up remote control as part of a plan to enable them to run their operations without the presence of local operations personnel.

This may cause serious problems for the station licensee since this type of equipment was not primarily designed for this purpose but was, in fact, developed to augment the service of a dedicated operator.

Since the FCC now is stepping up its field operations enforcement, it would be wise to consider the risks that may be involved with this type of dial-up, ATS method of station technical control.

The FCC issued in September 1988, a "Clarification of Rules Pertaining to Broadcast Station Transmitter Remote Control Operation." This public notice (number 88-194) is very specific regarding the procedures that must be followed when operating a dial-up system.

Thousands of dollars

Failure to comply may result in the issuance of citations and Notices of Appar-

ent Liability that may run into the thousands of dollars.

Quoting from the Public Notice: "Section 318 of the Communications Act of 1934 states that a licensed person must be on duty and in charge of the broadcast transmitter apparatus during periods of operation."

The notice further states that "the duty operator must be in control of the transmitter at all times."

This designated duty operator must have the ability to control the transmitter in such a manner that will insure the licensee is operating "within the terms of the station authorization

and all applicable rules."

This section of text is critical, since the F.O.B. may interpret the phrases "in control of the transmitter" and operation "within the terms of station authorization and all applicable rules" to mean that this duty operator must be fully trained and familiar with station operation procedures, requirements and FCC broadcast rules qualifications that often become problematic with hotel clerks, security system employees or other local choices for off-premise operators.

Fixed location

Furthermore, the Commission states that this duty operator should be "located at a fixed location and that "remote control systems that rely, either wholly or in part, on portable paging receivers or mobile telephones to contact the duty operator do not excuse the duty operator from the requirement to be continually present at the fixed remote control location, to have a positive means to interrogate the transmitter, to turn the transmitter off, and to monitor EBS Alerts and to carry out EBS functions."

Regardless of the remote control point in use, each station must comply with EBS requirements, which include the requirement that a staff member monitor the EBS receiver and have the capability to activate the EBS encoder promptly to broadcast EBS tests and emergency action announcements.

These requirements apply to transmitter operators located away from the actual studio, or off premises. Stations must maintain the capability to transmit the attention signal and make appropriate announcements and programming changes and, additionally, participating stations must have the capability to broadcast national emergency and presidential messages live as they are originated.

In addition, the FCC says that when a dial-up circuit is used for transmitter remote control, the station licensee must either ensure that the dial-up circuit remains available at all times for the exclusive use of the duty operator; or provide a means for the operator to interrupt or preempt any other telephone access to the remote control equipment of the transmitter.

Authorized personnel (including the designated chief operator) may obtain technical data and adjust the transmission system from any location. However, this does not negate the requirement that stations have a designated operator on duty at a fixed location at all times. This operator may be placed at any fixed location, however, "EBS responsibilities may limit operator locations."

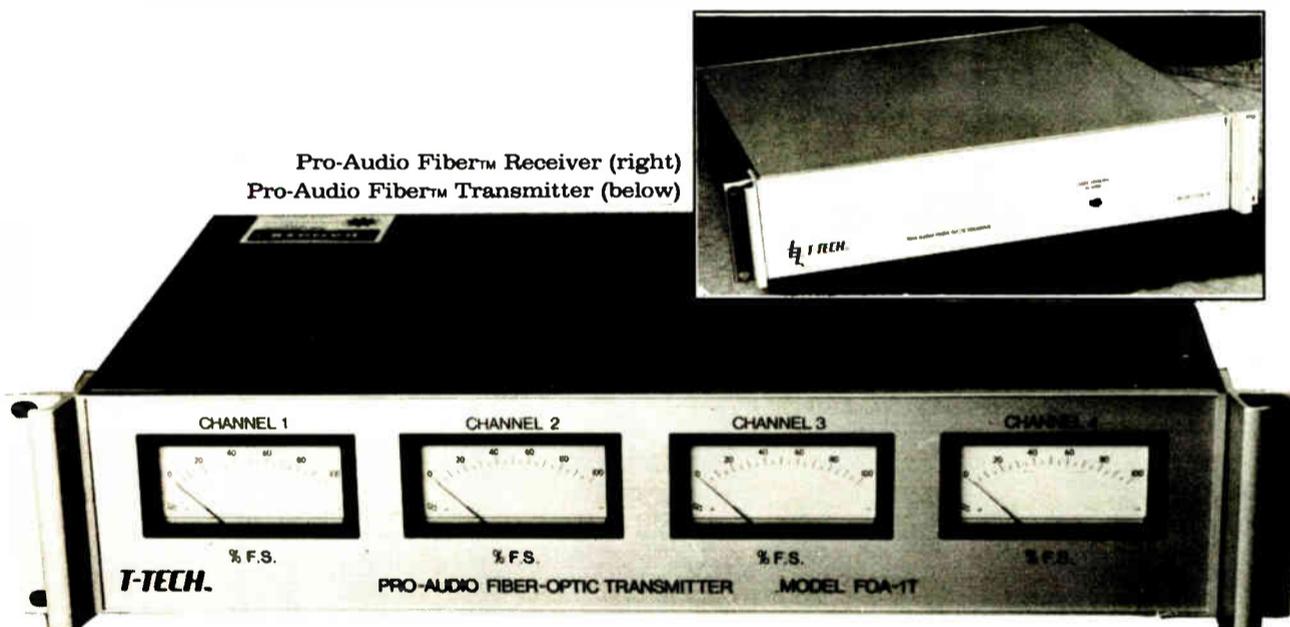
Automatic warnings of out-of-tolerance conditions that may result in interference must be directed to the fixed point duty operator first. If a corrective response is not received by the remote control master equipment within five minutes, the remote control system must turn off the transmitter automatically. See Section 73.1410(e).

A summary of rules

To partially summarize the Commission's rulings: First, regardless of the type of remote control used, a station must employ a designated duty operator that is present at a fixed location during all periods of station operation. This operator must be licensed, trained in station operational procedures and familiar with FCC rules.

(continued on page 26)

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Mind Your P's & Q's With EBS

by Lex Felker

WASHINGTON A couple of months ago, reports surfaced of a morning man on a Midwest radio station airing false announcements of a nuclear attack.

Apparently, many listeners believed the broadcast was real (remember Orson Wells' "War of the Worlds"), and the station received several complaints. Needless to say, the FCC was not pleased by the incident.

FELKER'S FORUM

This is an extreme example of how to get in trouble with the FCC. But it doesn't always take a conscious effort to raise the ire of the Commission. For example, the FCC maintains great interest in licensee adherence to the rules governing the Emergency Broadcast System. Stations that fail to abide by these rules may end up receiving an expensive "pink ticket" from Uncle Charlie.

The requirements to avoid trouble are pretty straightforward: EBS tests must be aired on a weekly basis (between 8:30 a.m. and local sunset), and appropriate entries must be made in the station log. You might also want to make sure the audio frequencies and levels are within tolerance.

Monitor station

Broadcast licensees also must monitor the station specified in their State EBS Operational Plan. The rules require that the monitoring equipment be installed at a station's control point and that entries be made in the log of all EBS tests received from this station.

If a scan of your logs indicates that no EBS tests have been received recently, you might want to make sure that your EBS receiver is operating. If it is, be a friend and tip off the GM of the station you're supposed to be monitoring. (By the way, stations with wire services also must log receipt of the periodic test transmissions conducted by these networks.)

Beyond these basic requirements, stations need not participate in the Emer-

gency Broadcast System. In the event of an actual emergency, non-participating stations must leave the air pursuant to instructions contained in the EBS Checklist, which should be maintained at a station's control point.

Number of procedures

Participating EBS stations have a number of procedures they must follow during an actual emergency. These all are described in the EBS Checklist published by the Commission.

A word to the wise: In these days of heightened FCC enforcement, and

much bigger fines, an ounce of prevention can sometimes be worth a pound of cure. Take the time to familiarize yourself with the FCC's EBS Checklist and the EBS Rules (Sections 73.901-73.962), and give your operators a crash course on the subject. That way you won't be unpleasantly surprised the next time an FCC inspector visits your station.

Lex Felker is a technology/engineering consultant with the Washington law firm of Wiley, Rein & Fielding and a former chief of the FCC's Mass Media Bureau.

Remembering Radio

(continued from page 15)

early tape and disc players to Victorolas. "We have a very early Victrola that plays on Edison disc (cylinders). We have crystal sets and a myriad of microphones," said Ohman.

The microphone used by President Franklin D. Roosevelt during his fireside chats to the nation, for example, is part of



Larry Cindrich adjusts the dial of an antique crystal set, part of the P.R. McIntyre Antique Broadcast Collection.

the collection, as is a primitive radio made in 1898.

The exhibition of McIntyre's lifelong collection, Ohman said, should evoke nostalgic memories for those who grew up with radio. The famous "Green Eye" located at the top of some Zenith models, for example, is one that many visitors will recall seeing in their parents' or grandparents' parlors.

"If the reception for a channel was good, the eye was a bright green, but as the signal faded, so would the eye," recalled Ohman.

For most, these early radio memories are of a time when listeners were asked to

participate—to use their imaginations.

"Radio gave listeners the opportunity to use their imagination, to create images," said Bonneville's Gale. Thanks to Joseph Pavak and P.R. McIntire, the memory of radio will be preserved for some time to come.

For information on the Pavak Museum of Broadcasting, call 612-926-8198; for information on the McIntire collection, call 801-378-4377.

Dee McVicker is a free-lance writer and regular contributor to RW. To inquire about her writing service, call 602-899-8916.

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Reduce Costs, Not Engineers

by Barry Mishkind

TUCSON, Ariz. Regular readers know that this column often has spoken out on the theme that engineers are professionals worthy of respect. And as such, they also deserve an income exceeding that of fast food workers.

In return, station owners and managers deserve to receive competent service from an engineer who is committed to continuing education and self-improvement.

That the dynamics of the manager-engineer relationship have changed under deregulation, no one seriously debates. But, a recent conversation I had with an engineer surprised me. We were discussing the problems he faced at several of his client stations where the pinch of the recent recession was forcing some managers to make special efforts to trim operating expenses.

Sadly, many of them look at engineering as a place to make a quick cut.

A day in the life

Perhaps this scenario has a sad ring of familiarity to it: At one particular station, the GM was really in a cost-cutting mood. So, he called the engineer in for a chat.

Already, the GM had converted to using a contract engineer; he even got the engineer to agree to a flat rate for

monthly services, rather than charge for each trip made to the station.

Like many stations that have gone this route, the GM was reacting to an increasing number of hours being billed for simple repairs and fixes. These usually were necessary because of employee incompetence, which basically comes from lack of training.

ECLECTIC ENGINEER

Over time, the number of calls to the engineer had increased. He had to care for many rather mundane matters that ought to have been handled by the air staff without problem. The engineer noticed his income per hour work was dropping below that of a gas station attendant.

Unfortunately, the GM's attitude was: "I run this station and I'm doing you a favor by employing you." Thus, it was natural when he came up with the idea of asking the engineer to reduce his contract fees.

After the engineer explained that he actually needed more money to adequately service the station, the manager replied, "Well, how much do you think you're worth?" The engineer responded with his needs.

"That's too much," the GM said.

"Whaddaya think, I'm made of money? These are hard times."

The engineer first tried the high road: "Well, sir, when you call me, you expect a highly specialized, competent technician to respond and yet you pay more to the janitor than to me. It might seem clean desks are more important than being on the air."

Well, of course the GM was looking at his technical budget as an expense, rather than a necessary cost of doing business or even a money saver. The engineer was just another easily replaceable employee. The GM couldn't see why an increase was necessary. This conversation was not going to go anywhere.

So, perhaps you can imagine the shock on the man's face when the engineer finally stood up and said, "I'm sorry, but I'm afraid I'm going to have to let you go."

"Huh? What do you mean, let me go?" replied the GM, with a jolt, not used to being on that side of the table.

After regaining his composure, the GM suggested that "maybe we can work something out here." But the engineer stood firm.

Reality therapy

For those managers who haven't gotten the message, there is a real shortage of good engineers coming into broadcasting. Money is much better elsewhere, such as in two-way radio or computers (and no 24-hour on-call). The industry has changed. Many techs have moved on.

In reality, the engineer was doing the station a favor by working there. He knew several other local stations needing technical attention, and some of them were willing to pay a living wage to stay on the air with a competitive signal.

So he could easily turn down the GM's "final offer." The result was that the station now had to find someone else.

More and more stations today are learning this lesson the hard way: with lost air time, longer repair times, poorer

service. Good engineers are proving to be a vanishing resource.

If you're a manager, remember that your engineer likes to eat, just like you. And he does have the rather specialized knowledge you need to stay on the air and make money.

Providing a living wage will bring you many benefits. A good engineer not only repairs breakdowns, but analyzes your station and offers suggestions where operating expenses can be safely trimmed. By working together, you and your engineer will be able to make the station more efficient and ultimately more profitable.

Finding the elusive circuit

In virtually every station, there's some custom project that requires a small circuit to accomplish a task. Either someone has asked "Can we possibly . . . ?" or your imagination has identified some thingamajig that will make life easier.

For example, perhaps you need a quick and cheap way to read the transmitter building temperature. Or, how about a filter and/or compressor for that remote amplifier, a NiCad battery tester or audio function generator?

Indeed, the list of little projects and the circuits needed to accomplish them are endless.

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Actually, as the Volume 3 indicates, there are two preceding volumes, filled with well over 3,000 different circuits and ideas. One or more of these books belongs in your shop library.

♦ ♦ ♦

Barry Mishkind is a consultant and contract engineer in Tucson. He can be reached at 602-296-3797; FidoNet 1:300/11; or on MCI Mail at 325-9883.

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Understanding RF Exposure Hazards

by Harold Hallikainen

SAN LUIS OBISPO, Calif. We've recently been discussing what a station chief operator should do to ensure compliance with the FCC and ANSI specifications for human exposure to RF fields.

Last month I suggested a report be prepared based on predicted and measured fields. This report would show what areas are safe for human exposure for unlimited periods of time, those areas safe for limited exposure times and those areas where a transmitter power reduction is required.

INSIGHT ON RULES

The report would contain sufficient measurement and calculation details to fully justify its conclusions (such as, how much the transmitter power must be reduced when a climber is a certain height on the tower).

I received a call from Richard Tell of Richard Tell Associates, (702-645-3338). His company specializes in RF radiation consulting. Prior to that, he spent 18 years with the Environmental Protection Agency studying the potentially hazardous effects of electromagnetic fields.

In the call, we discussed "RF hot spots" and RF contact currents. He also sent me a copy of a paper on this subject from the 1990 NAB Engineering Conference Proceedings.

The study of human exposure to RF fields appears to be a very interesting and controversial subject. The ANSI guideline the FCC currently is using is being revised to include various new ideas. The FCC may or may not adopt the new specifications (it would appear that to adopt the new specifications, the FCC would have to go through a notice of proposed rulemaking, comment and report and order process, which can be slow).

Hot spots

Hot spots are small areas of high RF fields in areas of much lower RF fields. They generally are caused by reradiation. For the NAB paper, Tell measured hot spots generated by reradiation from a mail box on a metal post, a metal window frame and a guy wire.

In each case, the field close to the metal object was substantially more than the "ambient" field. "Surface fields" were measured about 5 cm from the surface. The "E squared" and "H squared" fields were increased to 5.9 to 15.8 times ambient. If these fields are above the ANSI limit, is exposure to these fields allowed?

Ideally, a transducer or measurement instrument does not affect or "load" the parameter being measured. For example, an ideal voltmeter draws no current, an ideal ammeter has no voltage drop, an ideal pressure gauge introduces no volume displacement, etc.

An ideal EM field meter does not change the field at the point of measurement (which it might do, due to load-

ing). However, when a person enters this area, the radiator is substantially loaded, possibly decreasing the radiated field to within the ANSI limits.

When the person actually touches the radiator, the radiated field drops substantially, but a contact current flows. A limitation on contact current is being considered for hot spot exposure, instead of specifying the undisturbed field be measured some arbitrary distance from the reradiator.

Window frames

Since mailboxes and window frames generally are touched by hands, and the hand is connected to the remainder of the body by a relatively small diameter wrist, it would appear that the highest heat dissipation due to RF contact would be in the wrist. Using the specific conductance of the various tissues in the wrist and the density of those tissues, a total wrist current can be determined to give a Specific Absorption Rate in watts per kilogram of tissue.

The SAR then can be tied back to how much temperature rise would be expected in the tissue due to the RF current. The current ANSI standard limits SAR to 0.4 W per kilogram for the whole body, but allows 8 W per kilogram in any one gram of tissue, allowing for varying fields, such as those generated by a hand-held radio transmitter.

Tell's paper shows a contact current of 75.1 mA in the AM band and 87.3 mA in the FM band for an SAR of 8 W per kilogram in the wrist. Further, since wrists seem to be able to survive elevated temperatures (if not, I won't wash dishes anymore), an SAR of 20 W per kilogram has been suggested. This would limit AM contact current to 119 mA and FM to 138 mA.

Tell's paper lists 19 references from a wide variety of organizations and publications. A lot of research is being conducted in this field. The current ANSI limits are based on the heating effects of RF exposure.

There also is a study being conducted into other effects. It might be interesting to see how computed peak SARs (possibly at the tip of a finger) compare with those expected by contact current as the finger approaches a reradiating object. The tip of the finger is very close to the object, resulting in a potentially high field and high SAR, but the reradiator is also "loaded" by the presence of the finger, decreasing the generated field.

It would be interesting to see a graph of peak SAR, SAR in the wrist and whole body SAR as a function of the distance between the tip of the finger and the reradiator. The actual field at various places on the finger and wrist would have to be measured to take into account the loading as well as the attenuation due to distance from the radiator. Does the peak SAR approach a limit as the finger approaches the reradiator? How does this peak SAR compare with that expected by contact current (I squared R)?

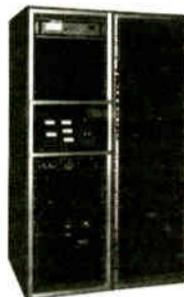
This is a very interesting field deserving additional study. There may be a

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and has kindly sent a few pages from the manuscript for review. Howard has taken each current call in Montana and traced the call back to the original assignment.

In looking over the call signs, more have been issued and changed on the FM side of the dial in Montana than on the AM side.

Only a Great Falls AM station with a total of five different calls since going on the air in 1947 suggests anything other than stability. The first call is listed as KSTR, with a notation that the call

was never used on the air. Successive calls are listed as KXLK, KARR, KYOT and the current call of KXGF.

McDonald has written a short history on the origin of each call listed.

A call that was originally assigned to Ennis, Montana's KKHJ was switched from Montana to Los Angeles in April 1990. A quote from Howard's manuscript tells the story very well:

"The FM station at Ennis was originally assigned the call sign of KKHJ-FM in honor of the two major owners, Howard and June McDonald.

A station in Los Angeles (KRTH) pur-

chased the call sign for its own use from the MacBroadcasting Radio System, the owner of the FM station. KRTH had at one time been known as KHJ. The KKHJ at Ennis became KKMT-FM."

The Ennis stations were scheduled to be on the air in the spring or early summer of 1990. Howard did not mention in his letter when the AM and FM stations went on the air.

Study guides

Received a note from Jim Wulliman regarding the study guides for the SBE certification exams. Prices for the study guides are \$19.95 for "Broadcast Technologist" and \$39.95 for all other higher levels. The prices don't include shipping. "All registered purchasers will receive future upgrades at a reduced cost," Jim said.

A couple of paragraphs from Jim's letter will better explain the position of the officers and the majority of the membership on the study guides: "We still don't want to be in the Q & A business, so we stress that the questions are similar in type and scope to those in the exams, but are provided to enable the applicant to review his or her knowledge, not to give them an example of each question they will find on an exam.

"In reviewing certification applications, I also have noticed that many people got started in this business as announcers with a little technical training and developed into good solid technical people as they grew in the profession," he said.

By the time this is in print, I will know whether the disks are available in only the IBM compatible format or if the study guides are also available in formats that will work on the Apple products. More next time.

George Riggins has experience in radio and electronics dating back to the 1930s. He also is a licensed ham radio operator and has had his own broadcast sales and service company, Riggins Electronic Sales, for more than 20 years. He can be reached at 213-598-7007.

A Digital Challenge

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gain stepping, the quoted dynamic range and THD+N performance.

What isn't so well advertised, however, is the fact that, by their very nature, most compression algorithms will prevent analog copying, with SCMS taking care of digital-to-digital copying. Because the data-reduction coding technique is doing so much processing to reduce the number of bits required to produce a recordable signal, including elegant masking analysis and other high-tech number crunching techniques, to perform the process a second time would produce an audible effect on the copy.

So, from Philip's point of view, we have the possibly "ideal" digital consumer recording format. DCC will handle pre-recorded tapes—and contact-print techniques for high-speed duplication of DCC titles are just around the hardware corner—and the home taper is provided with a format that will do an excellent job of making one-time copies of whatever it is they wish to record.

But the same factors that make DCC viable for the consumer market also means that it will have little application for professionals. My instincts tell me that DAT will continue to impact the broadcast, post and music industries for several years, to be eclipsed during that period by affordable hard-disk and removable optical recording formats.

So, DAT versus DCC? An unfair contest for many reasons, and one in which DAT for broadcast applications will be a clear winner.

Mel Lambert has been intimately involved with the production and broadcast industries on both sides of the Atlantic for more than a dozen years. Now principal of Media&Marketing, a consulting service for the professional audio industry, he can be reached at 818-753-9510.

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Dial-Up Remote Risks

(continued from page 22)

Control schemes that rely solely upon a system that calls a pager or some sequence of pagers, mobile phones or different station personnel homes in the event of a problem do not comply with FCC rules.

Second, the fixed location duty operator must have the means and knowledge to control all transmitter parameters necessary to insure legal operation of the station and must have primary access to the transmitter.

Third, the duty operator must be able to monitor EBS alerts and carry out EBS activities without delay. In short, EBS monitoring and control capability at any off-premise remote control point should equal that available at the studio as specified under the rules.

It appears that dial-up systems may be used as a means for station personnel to access the transmitter plant from, say, a home or mobile telephone, as long as the station employs a fixed location, primary

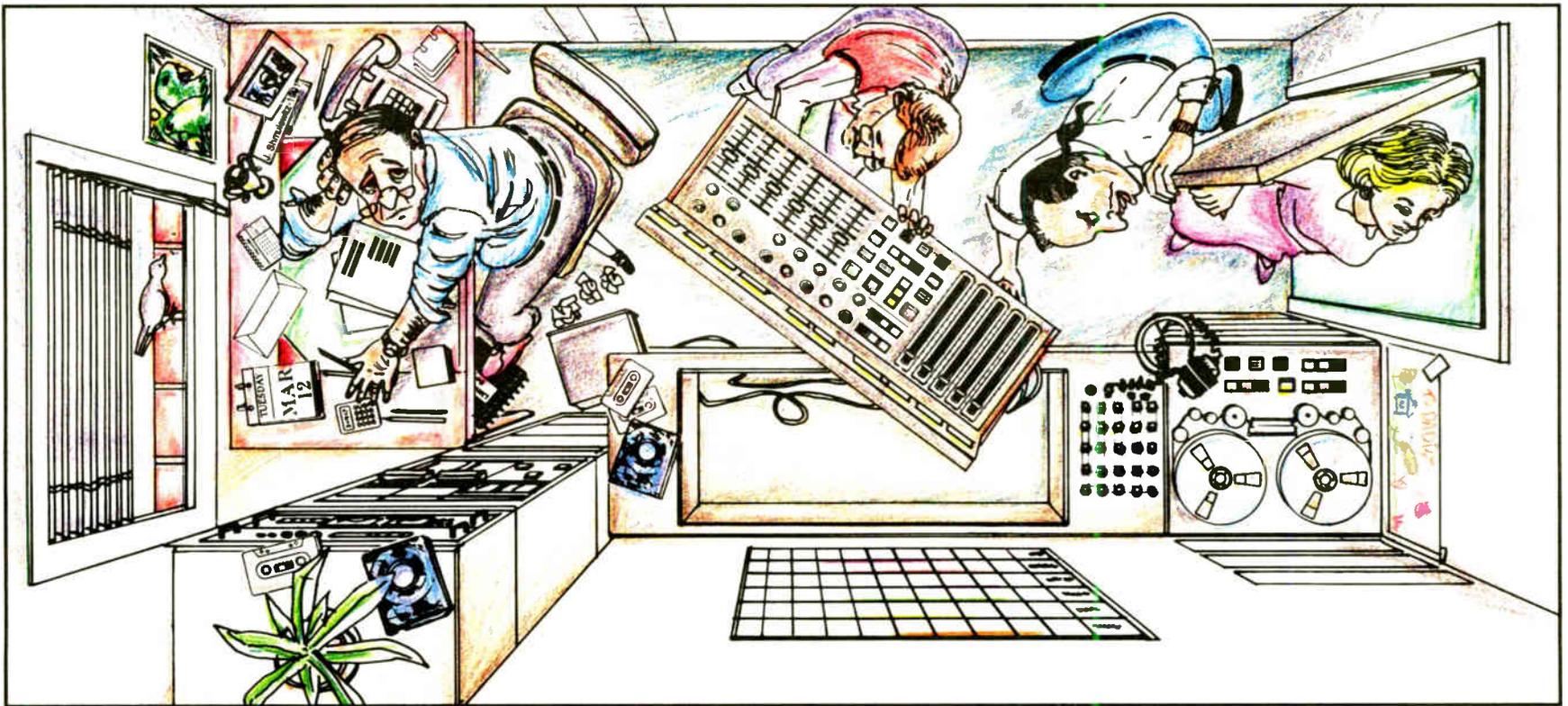
duty operator.

Dial-up also seems acceptable as a means of remote control for use by studio disk jockeys at stations where more conventional dedicated line systems may be impossible or impractical to implement.

However, any dial-up application that drifts from these scenarios and does not comply with the comprehensive fixed duty operations personnel and associated EBS requirements may place the station licensee in jeopardy of having a time-consuming and expensive run-in with the local FCC Inspector.

The remote control of a broadcast plant still is viewed as one of the most serious aspects of its operations. It is especially advisable to consider all of the liabilities involved before deciding upon a means of "off-premise" operations.

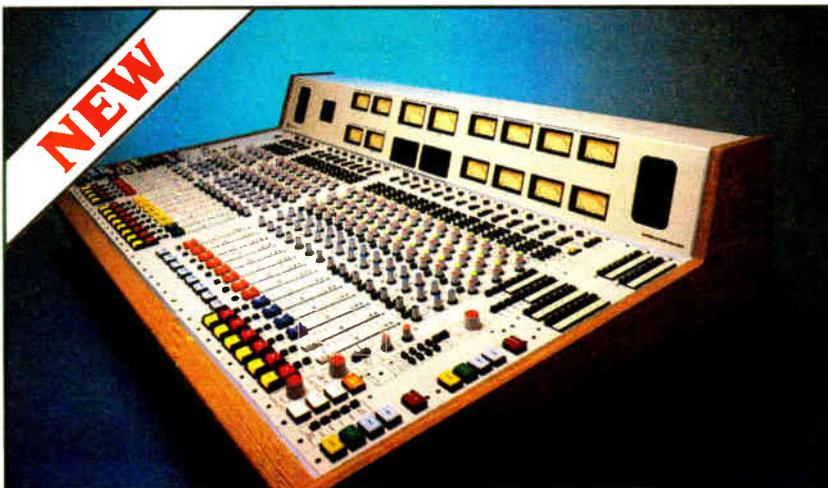
Bill Sepmeier is president of National Supervisory Network. He can be reached at 800-345-8728.



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The Path to Job Satisfaction

(continued from page 17)

much. This is guaranteed to drain your batteries.

Many times, though, the operation remains the same. You change.

Some of this comes with finally seeing the limited potential in any position. While working your way up, you are so focused on achieving the goals that you don't imagine the rewards as being less limited than the dreams.

Limits of a dollar

For instance, most of us are surprised to find that every job has a salary limit. A truly excellent person is certainly worth more than a plodder, but not double or triple... at least not to the ownership. Once you hit the salary ceiling, you need to accept this or find a higher paying position.

Here's where excellence can pay off. If you really are top rate, you might be able to convince your employer to create a new position. One idea is to establish a group chief engineer job for the best engineer in the chain. Something similar can be done for sales and management people.

If new positions are a problem, and most companies have problems with increasing head counts these days, perhaps you can work out some other arrangement. Air talents get extras for remotes and personal appearances all the time. Why not something similar for engineers? Maybe you can increase your income by helping other stations part time, or building a mobile DJ operation,

or something different, like offering training courses or teaching at a community college.

I'm assuming you are basically happy where you are. You feel held back by salary limitations or a small operation that can't fund your grand ideas. To keep from sliding into the depths of frustration, you need to find ways around the roadblocks. Keep your main job, but get something going on the side to expand your horizons.

Don't let yourself go into decline. So many high achievers "burn out" by naively going up against impossible roadblocks and then giving up completely in frustration. If you are losing the spark, sit down and think through how you got there. Then decide whether you can work with the present situation or need to move on.

When the going gets tough

Moving on is tough. One, because it's hard to find really good jobs even if you're hot. Two, because there are always those stages to go through again at the new place. What are your options?

You can get a similar job in a bigger market to help your income, although higher expenses will certainly eat up some of the gain. Alternatively, you can change careers.

As one who has been through a career change, I'll tell you it's rough. One day you're an expert in your field, the next day you're in a new environment with lots of experts you never heard of. What's worse, you are no longer an ex-

pert. You're back to being the beginner. That's a major ego blow and it can last several years or more until you regain an expert's status.

These, then, are your three choices. First, stay where you are and work around the limitations.

Second, find a similar job at a better paying station, probably in a larger market. If you like the idea of moving to a bigger city, this can be a bonus to help ease the upset of having to repeat the stages.

Third, do something completely different. This offers the greatest potential, but also inflicts the most pain. Career changing is best approached as a long-range solution. You will probably need additional schooling or study before embarking on a completely different path.

Whatever you decide, remember the stages that are common to all jobs. Keep your focus on getting to the stage you find most desirable as soon as possible. Time spent in this stage will be the happiest and most rewarding of your career.

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

RF Exposure Hazards

(continued from page 25)

safety advantage to the proposed DAB and digital HDTV systems, since they generally use lower power.

Unlicensed college radio

I got another call from a college FM station operating without the benefit of a license. Various intentional and unintentional unlicensed radiators are discussed in part 15 of the Rules. 15.211 and 15.221 are quite interesting. 15.211 allows any frequency or power to be used in a tunnel, provided any emissions escaping the tunnel meet the various specifications of part 15.

These systems are allowed when the radiator and all connecting wires are contained within the "tunnel, mine or other structure that provides attenuation to the radiated signal due to the presence of naturally surrounding earth and/or water."

Part 15.221 similarly allows educational institutions to use AM frequencies on a non-interference basis with any power or radiated field, as long as the field meets the general limitations of part 15 at the campus boundary. Note that 15.221 permits such operation on AM only. It appears that operation on FM would only be permitted at an "under-

ground university."

We've always assumed that radio required federal regulation because coverage does not "stop at property lines." These two sections, however, seem to define the word "stop" and, with some extension, could allow radio use on any frequency and power as long as the field at all points on the property line (and perhaps a certain distance above the property) met certain field limitations.

Instead of setting a limitation on the field 30 meters from some box that radiates, the field would be set 30 meters from the property line (the property itself becomes a large "box"). I've heard of this reasoning being used to transmit an FM signal in a concrete sports complex. Radiation outside the complex was well below the part 15 limits.

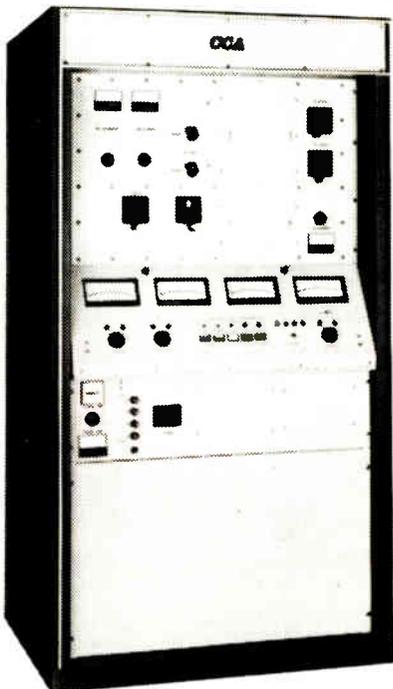
But, as I read the rules, unlicensed operation in the FM band is limited to 250 microvolts per meter measured at 3 meters (15.239(b)).

Harold Hallikainen is president of Hallikainen and Friends, a manufacturer of transmitter control and telemetry systems. He also teaches electronics at Cuesta College, San Luis Obispo. He can be reached at 805-541-0200, or on Internet at hhallika@pan.calpoly.edu or ap621@cleveland.freenet.edu.

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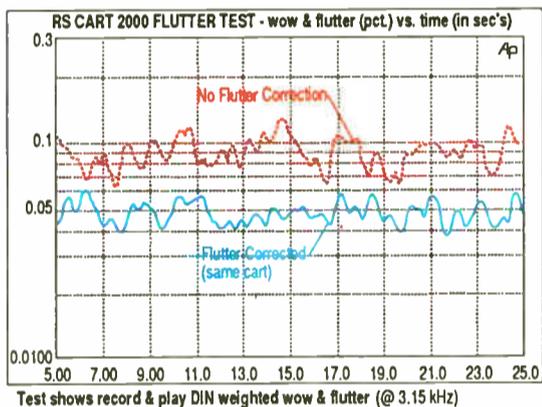
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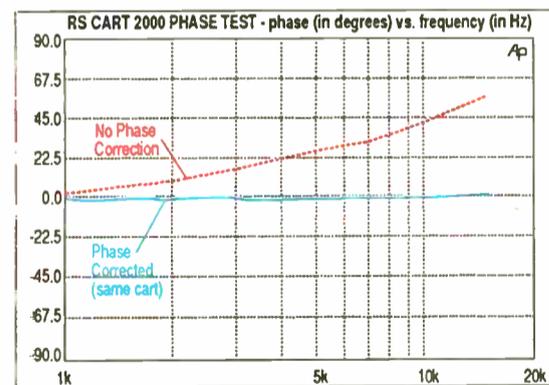
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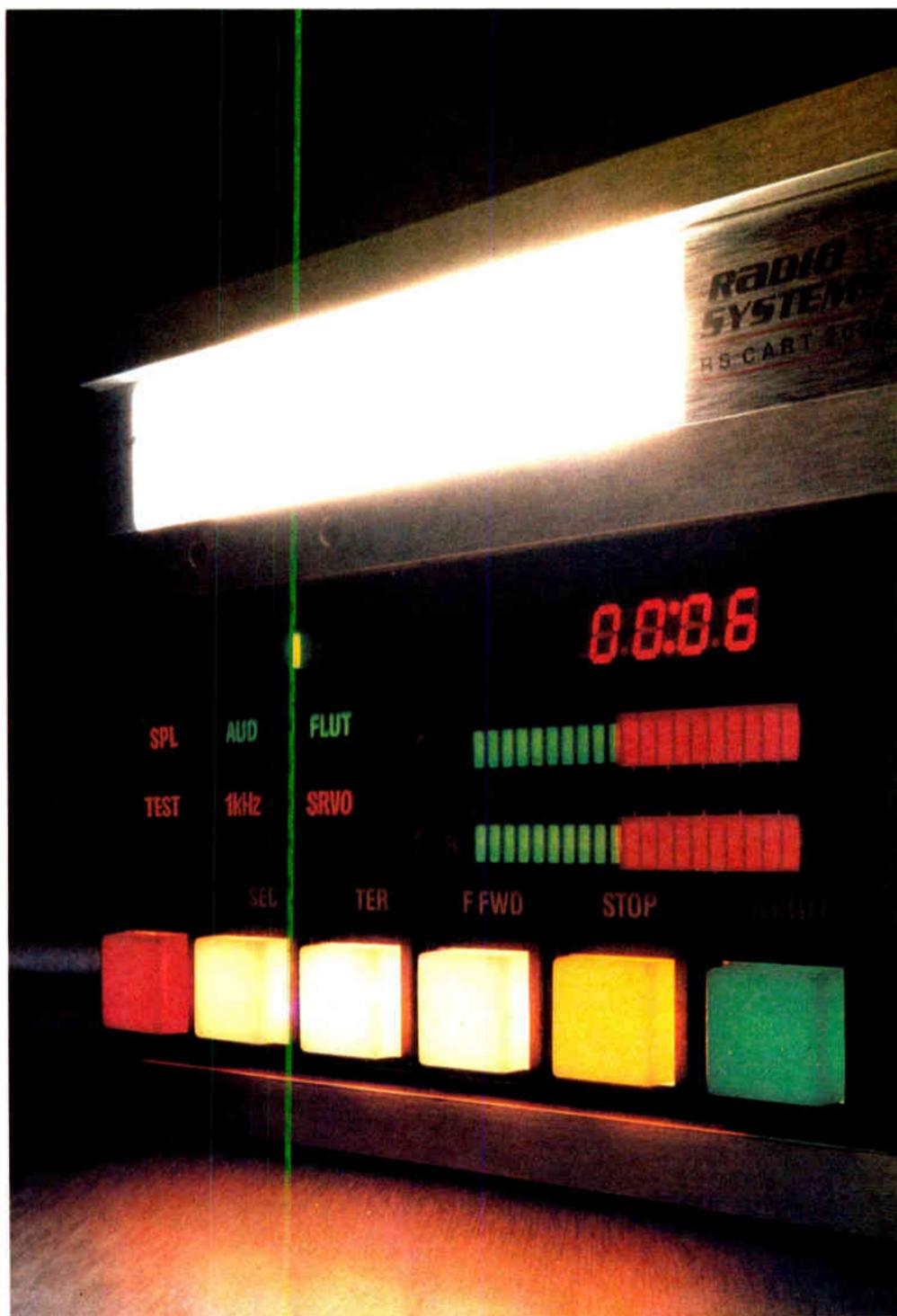
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Magnecord CM6K 10 W tube mon amp, rack mount, rebuilt, sounds gd, \$50; Precision S60 tube amps (3), 60 W, 2 low imp mic inputs, clean & working, \$50 ea; McGohan M1003 100 W tube amp, 2 low imp mic inputs, clean & working, \$75; mic/spkr in suitcase, 8 W, phone line input, \$35. E Davison, 135 N IL, Springfield IL 62702. 217-787-0800.

DuKane audio dist amp w/4 mic preamp cards, mixer card #2A155, (7) 2A160 line amp cards, all in 110-1437 card frame, outputs unbalanced, all rack mount, \$100; dual 24 V pwr supply for above, \$50; Shure Voice Gates (4), pwr supply, rack panel, mic level I/O balanced, \$50/lot. E Davison, 135 N IL, Springfield IL 62702. 217-787-0800.

Ramko Primus P-8S/16M distribution amps (8), w/meter and headphone option, never used, \$400 ea. M Sadacca, KCKC-KBON, 740 W 4th St, San Bernardino CA 92410. 714-882-2575.

McCurdy DA-504 1x12 amps and PS (6), vgc, rack mount, \$550; RCA BA 44 utility amps, vgc w/connector tray, \$70. B Kuhar, 1543 Easton Ave, Bethlehem PA 18018. 717-645-8814.

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Scully '100' recorders, record/play amplifiers, 8, 16, 24 track heads. Sequoia Electronics, 1131 Virginia Ave, Campbell CA 95008. 408-866-8434.

ANTENNAS & TOWERS

Want to Sell

RCA FBC-8C 8-bay high pwr wide-icers, tuned to 102.3 MHz, excel cond, BO; RCA BFA-4A, 4-bay hor pol high pwr on 102.3 MHz. BO. T Edmisson, WDKN, 106 E College, Dickson TN 37055. 615-446-0752.

RCA BFC6B 6-bay FM antenna wideicers, tuned to 88.5 MHz, w(5) spare bays, located at US Twr Frederick MD, \$2800/BO. M Byrnes, WAMU, American Univ, Washington DC 20016. 202-885-1069.

CSP/Vector Tech 4-tower AM phasing unit wall phasing controls & Potomac Inst antenna monitor, currently on 1360 kHz, mint cond, BO. R Wright, 1208 N Locust Ave, Lawrencburg TN 38464. 615-762-6200.

EG&G 4-level, 3 flash boxes/level w/top AOL & controller, gd cond, TOP AOL in new cond, \$22500. M Pollock, WFXG-TV, POB 204540, Augusta GA 30917. 404-650-0054.

Atlas 160' self-supporting twr, 18' at base, all drawings, excel cond, you disassemble & transport, \$995. M DeClue, KOKI-TV, Tulsa OK 74145. 918-622-2300.

Rohn 90' tower, land & building in Springdale AR, gd tower site. J Richardson, KXIO, POB 37, Clarksville AR 72830. 501-754-2076.

LDF 5-50A heliack, 450', new; Jampro 3-bay antenna H/V, 100.5 MHz. S Delay, 217-498-7339.

Phelps-Dodge CFM-2P CP 2-bay at 107.1 MHz, \$475. P Wells, KJQY, San Diego. 619-238-1037.

ERI unshielded sample loops (3) & isocouplers for AM directional monitoring, BO; transformers, chokes, etc from Collins 1 kW AM xmt, 10 V filament xfms, etc. BO. C Gennaro, WJMS, 222 S Lawrence, Ironwood MI 49938. 906-932-2411.

Rohn 65, (2) sections, 18" face solid rod, 20' sections, \$300 ea; Rohn 60 (10) 20' sections, 42" face, \$400; 6" coax, one 130' section, one 120' section, BO. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

Phelps Dodge CFM LP8 8 bay FM tuned to 94.3, excel cond, \$5000/BO. B Anderson, WTGY, POB 9, Charleston MS 38921. 601-647-5600.

Beiden cable, various lengths, 8449, 8447, 8790, 8422, 9750, 8448, 8663, 8627, below wholesale, you ship; Andrew 78ARF (4) 3-1/8" EIA flange connectors, brand new, \$300 ea or \$1100 for all plus shipping. R Kerbawy, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

Shively 6810, 6-bays wideicers, 103.3 MHz, \$750. D Hainer, WCRF, 9756 Barr Rd, Cleveland OH 44141. 216-526-1111.

Rigid feedline, (20) 20' sections w/end terminations, (4) 90° elbows & (6) assorted short pieces, alal 1-5/8" rigid feedline, just taken out of service, BO. J Bisset, Multiphase Consulting, 703-379-1665.

Gates FMC-7A 7-bay FM antenna, working when removed, extra heaters, 103.1 MHz. J Goeman, KJAM, Box D, Madison SD 57042. 605-256-4514.

Utility tower G480, 445' high, all but 2 sections in gd cond, w/new guy wires & insulators, base insulator, side lights & beacon, on ground in 20' sections, 30" face. D Loughry, WFRB, POB 430, Frostburg MD 21532. 301-689-8871.

Dielectric coax switch, 1-5/8", 4-port motorized w/interlocks, new wiper & contact stock, recently rebuilt in vgc, \$1500; MCI coax switch, 1-5/8" 4-port motorized w/interlocks, recently rebuilt in vgc, \$850; MCI coax switch 3" 4-port w/interlocks, gd cond, \$1700. B Webster, WLIT, 150 N Michigan, Chicago IL 60515. 312-329-9002.

Windcharger, 120' on ground w/guys, \$500 FOB Duluth MN. J Stromquist, WNCB, 2828 Piedmont, Duluth MN 55811. 218-722-3017.

Beiden cable, various lengths, 8449, 8447, 8790, 8422, 9750, 8448, 8663, 8627, below wholesale, you ship; Andrew 78ARF (4) 3-1/8" EIA flange connectors, brand new, \$300 ea or \$1100 for all plus shipping. R Kerbawy, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

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Phelps Dodge CFM LP8 8 bay FM tuned to 94.3, excel cond, \$5000/BO. B Anderson, WTGY, POB 9, Charleston MS 38921. 601-647-5600.

Cablewave HCC158-50J 310' of 1-5/8" Heliack air dielectric, EIA connector both ends, one gas pass on gas barrier, \$2500 plus shpg. F Anderson, WSCQ, 1440 Knox Abbott, W Columbia SC 29169. 803-791-1653.

RCA FBC-8C 8-bay high pwr wide-icers, tuned to 102.3 MHz, excel cond, BO; RCA BFA-4A, 4-bay hor pol high pwr on 102.3 MHz, BO. T Edmisson, WDKN, 106 E College, Dickson TN 37055. 615-446-0752.

World Tower 8809-2, 429', 2 yrs old, 30"-24" face, w/lighting, solid rod, high wind/ice specs, like new, \$16500. B Carr, WRED, 1201 Fremont Pike, Woodville OH 43469. 419-837-9570.

RCA BFC6B 6-bay FM antenna wideicers, tuned to 88.5 MHz, w(5) spare bays, located at US Twr Frederick MD, \$2800/BO. M Byrnes, WAMU, American Univ, Washington DC 20016. 202-885-1069.

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CSP/Vector Tech 4-tower AM phasing unit wall phasing controls & Potomac Inst antenna monitor, currently on 1360 kHz, mint cond, BO. R Wright, 1208 N Locust Ave, Lawrencburg TN 38464. 615-762-6200.

Dielectric IM-2400 dehydrator, \$1500; Cablewave 920167-004 angle member adaptor kits (25 of 10 ea), \$30/kit. G Liebisch, WPTF/WQDR, Box 29521, Raleigh NC 27626. 919-790-6315.

Andrew MDS antenna, horz polarized, freq 2150-2163 MHz, w/200' 5" W/G, connectors & hardware, \$3500/BO. D Hill, KXAL, POB 1393, Mt Pleasant TX 75455. 903-572-6536.

EIA Flanges 3 1/8" rigid coax line, (55) 20' pieces, 50 ohm, stored indoors, \$200 ea. L Bruce, WROR, 3 Fenway Plaza, Boston MA 02215. 617-236-6841.

Dielectric coax switch, 1-5/8", 4-port motorized w/interlocks, new wiper & contact stock, recently rebuilt in vgc, \$1500; MCI coax switch, 1-5/8" 4-port motorized w/interlocks, recently rebuilt in vgc, \$850; MCI coax switch 3" 4-port w/interlocks, gd cond, \$1700. B Webster, WLIT, 150 N Michigan, Chicago IL 60515. 312-329-9002.

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Cablewave HCC158-50J 310' of 1-5/8" Heliack air dielectric, EIA connector both ends, one gas pass on gas barrier, \$2500 plus shpg. F Anderson, WSCQ, 1440 Knox Abbott, W Columbia SC 29169. 803-791-1653.

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Rigid feedline, (20) 20' sections w/end terminations, (4) 90° elbows & (6) assorted short pieces, alal 1-5/8" rigid feedline, just taken out of service, BO. J Bisset, Multiphase Consulting, 703-379-1665.

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Kintronics 25 W isocoupler tuned to 92.0, \$1500. N Hunter, KTGL, 3201 Pioners Blvd, Lincoln NE 68502. 402-483-6814.

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Phelps Dodge CFMHP-5 5-bay FM, 3 1/8" line, 96.1 MHz, all hardware, like new, \$7000; Rohn 55 100' galvanized twr w/guy wires, top and bottom plates, turnbuckles, hardware, anti-twist arms, vgc, \$3000; 60' 1 5/8" air dielectric coax xmission line w/flanges on each end, \$750. Lonnie, KCMB, 1009-C Adams Ave, LaGrande OR 97850. 503-963-3405.

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4 BAY	4,000

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Harris/ERI Sky-Gain FMWH-1AE 1-bay FM antenna, gd cond, used 2 yrs, tuned to 92.7 MHz, \$500, buyer pick up. M Gollub, WMJS, Box 547, Prince Frederick MD 20678. 301-535-2201.

Rohn 25 base insulator, never used, \$300/BO+shipping; LAPP 14855 base insulator, never used, \$300/BO+shipping. B Crusier, WJRZ, 20-6 Jamestowne, Toms River NJ 08753. 908-286-0411.

RCA isocoupler, tuned to 97.7, can retune, 1 5/8" EIA flange. G Fuller, WKKR, Box 2329, Opelika AL 36801. 205-745-4656.

Collins 37CP 6-bay antenna tuned to 97.1, 1 bay needs repairs, \$150. B Gagne, KTCZ-FM, 100 N 6th, Minneapolis MN 55110. 612-339-0000.

Phelps Dodge CFM-HP-8 8-bay antenna on 93.3. BO. C Springer, KLMR, POB 890, Lamar CO 81052. 719-336-2206.

Bird dummy load, oil filled, several to choose from, 5 kW, 2.5 kW, 1200W, 500W, FM or AM; Also 75 kW AM load, air cooled. Goodrich Ent, 11435 Manderson St, Omaha NE 68164. 402-493-1886.

Want to Buy

Air dielectric 1-5/8" coax, need 300'; Rohn tower flasher & photo light switch for 300mm beacon. J Richardson, KXIO, POB 37, Clarksville AR 72830. 501-754-2076.

Air Heliack, 340' of 1 to 1-5/8" for non-profit FM, cash or tax deductible receipt. D Van Zandt, WJLU, 2596 SR 44, New Smyrna FL 32168. 904-427-9000.

Want Cablewave LP 12 bay circular polarized FM antenna, need immediately. K Kichel, KTJC, 1207 Louisa St, Rayville LA 71269. 318-728-5652.

Transmission line dehydrator unit, all types. P Salois, KPCR, Box 1, Bowling Green MO 63334. 314-324-2283.

Christian station needs 12 bay L pwr FM circ polarized antenna between 91.5 and 93.5 MHz, also need 1 5/8" air coax 160-180' w/rot without connectors. K Diebel, KTJC, 1207 1/2 Louisa St, Rayville LA 71269.

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Circle 107 on Reader Service Card

Circle 78 on Reader Service Card

AUDIO PRODUCTION

Want to Sell

Howe Audio 2100 Phase Chaser, excel cond, \$1200/BO. G Fullhart, WVKs, 4665 W Bancroft, Toledo OH 43615. 419-531-1681.

Orban 536A de-esser, \$275 plus \$10 shipping. M Gollub, WMJS, POB 547, Prince Frederick MD 20678. 301-535-2201.

Dolby 361 A Type NR (2) ready for SR cards, \$1175/BO. R McMillen, 3235 SE 39th Ave, Portland OR 97202. 503-239-6070.

Audio Digital TC2 2.25 sec, 18 kHz digital delay & effects unit, direct millisecond readout, \$575. R McMillen, 3235 SE 39th Ave, Portland OR 97202. 503-239-6070.

AKG R-25 new remote control for AKG BX-25 reverb unit, long cable, BO/trade. J Roper, Imperial Studios, 383 N Studio, Terra Haute IN 47803. 812-877-2663.

Burwen TNE 7000A transient noise eliminator (2), like new cond, \$175 ea plus \$10 shipping. M Gollub, WMJS, POB 547, Prince Frederick MD 20678. 301-535-2201.

Fairchild 659A Reverberator (2), \$100 ea/BO; **Dolby A301 Type A NR**, 2 chnl (2), \$300 ea/BO. R Rhodes, POB 1550, NY NY 10101. 212-245-5045.

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Altec 15678A tube mixers (3), \$100 ea; **Altec 1607A mixer amp (4)**, \$100 ea/all. J Parsons Sr. 10375 Cannas, N Huntingdon PA 15642. 412-863-9590.

Eventide H910 Harmonizer, BO; **Realistic parametric EQ (4)**, BO; **Realistic 4 chnl mic mixer**, 35-1105 (3), BO. C Larko Prod, 916 Fairfield Ave, Ft Wayne IN 46802. 219-424-2405.

Shure SR-107 graphic EQ, excel cond, \$150 plus shpg. B Leslie, Pro Recdg Srvc, 13709 Maple Leaf, Cleveland OH 44125. 216-662-1435.

Audio Digital TC-4 digital delay 6.4 seconds, mono, excel cond, \$600. G Faltus, WZMX, 905 Wethersfield, Hartford CT 06114. 203-296-1175.

dbx 21 Type II decoder unit for tapes & records w/manual, new cond, BO/trade. E O'Brien, Imperial Sound, 383 N Studio, Terra Haute IN 47803. 812-877-2663.

UREI 529 cut only 27 band EQ terminal connection in & outs, \$350 ea or \$600/pr; **Techni S1200 MK 3 TT**, \$200; **dbx 3BX expander**, \$200. B Wilson, 212 Southside, Campbellsville KY 42718. 502-789-1505.

Shure M68 (3), & level lock, all mounted in custom wood cabinet w/sliding doors, excel cond, \$300+shipping. C Easlick, MES Co, 2233 Cumberland, Lansing MI 48906. FAX 517-321-1900.

dbx 900 series rack w/(2) 942 Type II 2-chnl decoder & (2) 411 Type II encoder/decoder, BO; **Eventide H910 Harmonizer**, not working, BO. K Stokes, WKJN, 3029 Sherwood Forest #200, Baton Rouge LA 70816. 504-292-9556.

Travel trailer 14' mod for remote studio use, 8 chnl SS console w/mon amp & spkr, 5' rack, gd cabinet, \$4000. J Sellmeyer, Rt 1 Box 270, McKinney TX 75069. 214-542-2056.

Gentner pre-wired patch panels, 6' cables to punch blocks, panels are 1/4", 26 across (13 stereo) w/monitor row at bottom, sell/trade. B Harris, KXLT, 5350 S Roslyn St #210, Englewood CO 80111. 303-741-5654.

Rolling Radio remote van, '87 Toyota, 68,000 miles, w/console, 100 W speaker amp, cellphone. S Griffin, WYAY/WYAI-FM, 200 Galleria Pkwy #900, Atlanta GA 30339. 404-955-0106.

dbx 157 2-chnl rack mount, \$150. Tiki Recording Studios, 195 S 26th St, San Jose CA 95116. 408-286-4091.

dbx 150 type 1 NR (2), rack mount, balanced in/out, excel cond, \$100 ea; **Aphex Aural Exciter broadcast model**, rack mount, balanced in/out, excel cond, \$500/BO. M Byrnes, WAMU, American Univ, Washington DC 20016. 202-885-1069.

Delta Lab DL-4 space rack mount effects processor w/variable delay, flange, double and echo effects and more, \$200/BO; **Aphex Type C aural exciter**, single rack space, variable controls add brightness and audio intelligibility, unbalanced 1/4" and RCA connectors, excel cond, \$175/BO. B Fisher, KPOK, POB 477, Bowman ND 58623. 701-523-3883.

Lyrec TIM 4 tape timer, 15 ips, \$50. P Cibley, Cibley Music, 138 E 38 St, NY NY 10016. 212-986-2219.

Ramko Primus RS-1616 audio/data routing switchers (2), never used, remote cntrl avail, \$1000 ea. M Sadacca, KCKC-KBON, 740 W 4th St, San Bernardino CA 92410. 714-882-2575.

Wells Cargo Super Roving Radio w/leap rack and cabinets, \$18,000. D Denton, KFRC-FM, San Francisco CA. 415-362-8800.

European Christian Youth organization seeks FM transmitting equipment. All the basic broadcast studio equip such as mixers, turntables, mics, headphones, CD players, cassette players, speakers, etc. They would like to obtain easy-to-assemble or DO-IT-YOURSELF type of equip in kit form, either in completely-knocked-down KID basis or semi-knocked-down SKD basis, to encourage the youngsters to actively participate in the assembling & setting up of the radio stations. If you can supply such items, or can suggest other sources of supply, or if you need more details, please fax us at (852)-542-1876 or telefax us at 76232 HWAL HX or write to us: A.D. Mahabubani, Hanaro World Agencies Ltd, GPO Box 1942, Hong Kong.

Cables, professional, excel cond: list, send SASE to POB 20007, NY NY 10028.

Want to Buy

Symetrix 528A mic processors, gd to excel cond only, buy/trade. B Harris, KXLT, 5350 S Roslyn St #210, Englewood CO 80111. 303-741-5654.

Tube limiters, compressors and EQs: Fairchild 680/670; Teletronix/UREI LA2A, LA3A; Pultec; MAVE; Lang; API; etc.; also, other tube signal processing equip. J Kreines, DeMott/Kreines Films, 5330 Kennedy Ave, Millbrook AL 36054. 205-285-6179.

Air personality seeks FT pos in E, 1 yr exper in AC, will work T-40/AC/SC. C Partridge, WNSI, 2629 1/2 S French Ave, Sanford FL 32773. 407-323-5279.

CE, 15 yrs exper, excel in RF, digital and FCC applications, KY, IN, TN and MO only. C King, KMML/KATP, 13310 Cisco Dr, Amarillo TX 79111. 806-335-1954.

Announcer w/country, B/EZ, CHR, multi-trk and show producer exper seeks pos w/upward potential in markets 50-70. Tony, 14216 Shaner NE, Cedar Springs MI 49319. 616-696-1631.

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Chief Engineer needed for AM/FM combo. Also qualifications with experience in SMR & paging, especially with 800 trunked phone systems, both interconnect & dispatch. Above \$30,000 for right person. Jerrell Shepherd, Box 430, Moberly MO. 816-263-5800.

Teac AN60, AN80, AN100 Dolby noise reduction unit. R McDonald, Mission Rcrdng, 5231 Horton, Mission KS 68207. 913-722-2677.

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Hara radio operators looking for surplus audio processors, mixers & mics, as well as other inexpensive gear that could help broadcast play radio at home among enthusiasts for vintage AM. Please write wofferings. WA3VJB, Box 73, West Friendship MD 21794-0073.

Lyrec 15 ips tape timer, \$50; **Orban 526A single chnl de-esser**, \$175. P Cibley, Cibley Music, 138 E 38 St, NY NY 10016. 212-986-2219.

AUTOMATION EQUIP

Want to Sell

MEI Satmaster satellite programmer plus (2) SMC 452 stereo bi-directional Carousels, 5 yrs old, \$8000 plus shipping. R Kerbawy, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

SMC 250RS mono Carousels (2), vgc, \$600 ea. M Persons, WJYJ, Box 706, Brainerd MN 56401. 218-829-1326.

Schafer older relay style automation controller in one rack, \$300; **Cetec 7000 various source cards**, \$450 ea; **Schafer Audiofile A2 (2)**, \$2500 ea. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

MM Persons automation programmer, like new, \$700; **Otari ARS-1000 (5)**, new heads, gd cond, \$750 ea/\$3500 for all. P Wolf, WZCR, 2000 San Carlos Blvd, Ft Myers Bch FL 33931. 813-574-5548.

Rexox PR-99 play only (2), gd cond, 2 trk stereo. \$1000 ea. C Stalaker, KEZQ, POB 100, Little Rock AR 72203. 501-372-7740.

IGM Basic A control system, 3000 event memory, video monitor, log printer, remote control, 13 source cards, EN FSK logging system w/TV terminal, 12 yrs old, will sell as unit or separately, BO; **IGM Go-Carts**, 42 tray, stereo elect w/mono heads, 12 yrs old, gd cond (2), \$900 ea. D Gander, KDJZ, Box 10, Hutchinson MN 55350. 612-587-2140.

Automation system w/(6) 350 RS Carousels, (3) 250 RSC Carousels, (6) equip rack, Rexox A77, DP-1 programmer, AS 20 switcher & remote control unit, TS 25 tone decoder, plus many more items, \$3000. E Dulaney, KYKK, 619 N Turner, Hobbs MN 58240. 505-397-4969.

IGM time announcer 382 A's (2) w/manual; **Ampex 802 R-R w/manual**; (2) **SMC 252 Carousels**, stripped but few gd parts; **SMC 20ARS Carousel**, stripped, trays left; (2) **Gates RDC 10 remote controls**; **Gates audio amp**. R Pastorik, WCMY, 216 W Lafayette St, Ottawa IL 61350. 815-434-6050.

SMC DP-20 w/(6) SMC 350 mono Carousels, (2) **Otari ARS-1000 reels**, (2) **ITC 750 reels**, (2) **SMC TS-25 dual tone sensors**, (2) **SMC drawer type dual mono cart machines**, single play cart machine, (5) racks, desk type brain, system capable of 20 stereo inputs, has backfill & network cards; also have (2) **SMC R/P cart machines**, mono & stereo, many spare cards & all books, BO. G Smith, KORQ, 915-673-2545.

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SMC 350RSB, Carousel, rack, pwr supply, DS-20 switcher, RP1000 brain & assorted parts, BO. D Dunsmore, KRRZ/KZPR, 216 S Bdwy, Minot ND 58702. 701-852-4646.

Conex CS-25 dual 25 Hz tone sensor w/manual, excel cond, \$300. B Watson, KSAK, 1551 E Amhr, W Covina CA 91792. 814-946-6249.

IGM Go Cart 24 (2), Carousels in excel cond, 5 yrs old, \$2000 ea/\$3800 both. R Graiff, WPUT, Box 1055, Patterson NY 12563. 914-878-3307.

MEI MP-1000, 8-source sequencer, 3 yrs old, excel cond, alone or w/custom wall cabinet w/(4) Ampex 445 decks w/pre-amp & tone detectors, \$4500 complete, you ship. H Kneller, WKIL, 3151 Cooper St, Punta Gorda FL 33950. 813-639-1112.

IGM EC System, complete, BAI, 3 Carousels, 3 carts, 2 new racks, Otari ARS-1000, new '88, BO. J Phillips, WZOM, 409 Clinton, Defiance OH 43512. 419-782-8591.

SMC Carousel 350-RSB, perf cond, ready to go on air, \$1200/BO/trade; **SMC Carousel 250-RS (2)**, recently rebuilt, plus (1) for parts, \$500/BO/trade. S Callahan, WFTI-FM, 1120 Pinellas Bayway #103, Tiem Verde FL 33715. 813-856-3544.

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Engineer seeking position, just back from Middle East assignment, high-power AM/FM/shortwave exper, resume avail, will go anywhere. Send responses to: Radio World, POB 1214, Falls Church VA 22041. Attn: Box 91-03-01.

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Ex-Armed Forces DJ, 3 yrs exper seeks on-air or prod position w/Florida station, energetic, witty, aggressive team player. L Erickson, 813-985-4875.

Announcer w/2 yrs non-comm exper seeks FT or PT comm position within driving distance of Philadelphia PA. Milt, 215-533-3773.

Traffic Reporter w/dynamic voice & personality seeks FT/PT announcer or entertainment editor position in a major market, ready to relocate. 214-644-2152.

Production whiz avail w/ons of network writing & engineering exper. Bruce Ranes, 718-526-6501.

Annc/Jock w/4 yrs exper in radio & clubs, will relocate, wants to keep learning. Brian, Rt 2 Box 370, McAlester OK 74501. 918-423-8041.

Engineer seeks position as Chief or Assistant Chief in Wisconsin, SBE & NARTE certified, FCC licensed. Reply to, Engineer, POB 11319, Eugene OR 97440.

Engineer w/20+ yrs in all phases of radio seeking employment, excel references, call Cecil at 817-325-2253.

Announcer/News Director/Engineer w/over 25 yrs exper in all phases of radio seeking position in South Georgia or Florida. Bill Sutton, 803-245-4902 (PM's), 803-245-2411 (days).

News/talk stations: radio's best producer avail to upgrade your programming, can write news, anchor & production too. P Dro, POB 76098, St Pete FL 33734. 813-822-5303.

CE w/big production voice & over 15 yrs hands-on eng exper seeks eng position w/production in competitive top 100 market. G Morgan, 704-563-8676.

Burning desire to be #1, 30-ish male seeks air shift, humorously ironic, irreverent, silent majority opinionated, 2 yrs exper volunteer newscasters, money unimportant, opportunity is, NY-NJ-PA area. J Benson, 17 W Main St #5, Mdn NY 10940. 914-343-9184.

CE, 14-year pro, wants radio or AM/FM/TV in med to lrg market, prefer Midwest, family man, stable, inquire now to: Radio World, POB 1214, Falls Church VA 22041. ATTN: Box 91-04-01.

Volunteer, no salary req'd, willing to learn all phases of broadcast, production studio, news & sales, avail PT in Rockland NY-Westchester CT-N Bergen County NJ area. Mark, 914-357-2424 (days).

Entry lvl w/small broadcast, prefer N Eng area, On-Air exper, DJ, exper musician, bandleader, vast personal library. P Nash, 13 Custer St, Brockton MA 02401. 508-584-6056.

Veteran eng avail, temp or permanent, very exper in studio, satellite, automation, RF facilities from translators through 50 KW AM-DA, construction, budgeting, mngmt, On-Air news, computers & TV. Radio World, POB 1214, Falls Church VA 22041. ATTN: 91-04-02 RV.

Chicago metro area DJ w/2 yrs exp seeking major market slot, nights, FM, AOR, AC will relocate anywhere, will express mail resumetape. B Dohm, 534 E 37th Ave #31, Hobart IN 46342. 219-962-3392.

Radio newsmen/anncr seeks FT position in IN Ind ana, 16 yrs exp, done it all; references, tape & resume avail. T Murray, RR 3 Box 385, Rochester IN 46975. 219-223-4496.

20 yrs exper in all phases incl engineering, programming, business & talk radio, seek position which includes talk. Jim, 717-373-1484.

CE w/30 yrs exper in AM-FM willing to relocate anywhere. F Shields, POB 194, Hunt TX 78024. 512-238-4334.

AM-FM radio eng, 30 yrs exp, 50,000 W AM directional, AM stereo, 100,000 W FM, CO/DOE of groups, lets talk. J Bowers, 309-688-4953.

EMPLOYMENT SECTION

HELP WANTED: Any company or station can run "Help Wanted" ads for \$1.50/word or buy a display box for \$55/column inch. Payment must accompany insert, use your MasterCard or VISA; there will be no invoicing. Blind box numbers will be provided at an extra charge of \$10. Responses will be forwarded to listee, unopened, upon receipt. Call 800-336-3045 for details.

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 \$5 fee which must be paid with the listing (there will be no invoicing). Responses will be forwarded to the listee, unopened.

Mail To: **BROADCAST EQUIPMENT EXCHANGE**
PO Box 1214, Falls Church, VA 22041

PHONE: 703-998-7600 FAX: 703-998-2966



Call Simone Mullins, Classified Ad Manager, to reserve space in the next issue. Use your credit card to pay, we now accept VISA and MASTERCARD.

Radio World
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Ad deadlines are the first Friday of each month for the following month's issue

Select from these categories for best ad positioning:

- | | | |
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| Help Wanted | Consoles | Stations |
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| Amplifiers | Disco-Pro Sound Equip. | Switchers (Video) |
| Antennas & Towers & Cables | Financial Services | Tapes, Cartr. & Reels |
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| Automation Equip. | Microphones | Transmitters |
| Brokers | Miscellaneous | Tubes |
| Cameras (Video) | Monitors | Turntables |
| Cart Machines | Movie Production Equip. | TV Film Equip. |
| Cassette & R-R Recorders | Receivers & Transceivers | Video Production Equip. |
| CATV-MATV Equip. | Remote & Microwave Equip. | Video Tape Recorders |

Classified Advertising Display Rates Effective January 1, 1991

	1x	3x	6x	12x
1-9 col inch (per inch)	\$55	53	50	45
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Distributor Directory	90	85	80	75
Professional Card	60	55	50	45
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To compute ad costs: Multiply the number of ad inches (columns x inches) by the desired rate schedule for your per unit cost. Example: a 3" ad at the 1x rate is \$165, at the 3x rate \$159, at the 6x rate \$150, at the 12x rate \$147, etc.

AUTOMATION . . . WTS

Complete automation system for satellite network, (2) 48 tray Instacarts, format Sentry FS12B, working when removed from service. B Umberger, WMTZ/WHBO, 18167 US 19 N #500, Clearwater FL 34624. 813-536-9600.

Schafer 903E, gd cond, all but R-Rs, w/spare parts inventory, \$5500/BO, we pay half shipping. K Browth, KTRZ, Box 808, Riverton WY 82501.

BE Control 16X audio source cards (4), \$40 ea; BE live-assist remote control panel, new, never used, \$175. G Jones, SW Mediacast, 110 Sierra Rd, Kerrville TX 78028. 512-367-4587.

Harris System 9000 w/event controller for 12 sources, source cards, all system computer cards, pwr supply, cables for (4) Otari ARS-1000 stereo reel decks, (4) Carousels, data entry CRT workstation, (2) standard system equip racks; controller fully operational when removed, BO, buyer ships. K Eiert, KWED, 609 E Court St, Seguin TX 78155. 512-379-2234.

SMC System, (6) 350 RS Carousels, (3) 250 RSC Carousels, (6) racks, DP-1, AS 20, currently on air, \$3500. E Dulaney, KYKK, 619 N Turner, Hobbs NM 88240. 505-397-4969.

Autogram double Carousel random control, built into drawer w/pins, basic but cheap & complete, \$50; SMC 581-A double play cart, breaks or time announcer, missing one card, like new, \$200. D Jack, Mountain Media, POB 1826, Boise ID 83701. 208-286-7676.

Sono-Mag DP-1, complete system, on air, (5) Carousels, (4) reels, delay news rcrdr, (5) racks, logger, printer, CRT mon, remote control, Audicord stereo cart rcrdr w/tones, \$10,000. M Rhoades, KTKK, POB 1232, Lebanon MO 65536. 417-588-1435.

Gates SP-10 auto system w/dialer; (2) Gates SC48 seq auto controllers; (2) switches/mon panels; Carousel 252; (2) Gates 55 stack cart players, one for parts; all BO. M McDaniel, WBTO, Linton IN 47441. 812-847-9830.

SMC ESP2, (6) Otari reels, (2) Carousels, (4) racks, control system, dual play cart and printer, excel cond, 2 yrs old, BO. L James, KYQQ-FM, POB 650, Wichita KS 67201. 316-265-1065.

Harris System 90, 7-day clock, (2) 46 tray mono Instacarts, (2) 750 ITC clear text log, on air, BO/all or part. G Fuller, WKKR, Box 2329, Opelika AL 36801. 205-745-4656.

Harris 9000 controller, (5) Otari ARS-1000 R-R, (5) SMC 350 Carousels, \$5500. S King, KATP, 7701 I-40 W Ste 660, Amarillo TX 79160. 806-359-5999.

Schafer 901 Brain, (3) Audiofiles, (5) Carousels, (5) racks. R Hull, KCOL-KIMN, 1612 W Laporte Ave, Ft Collins CO 80521. 303-482-5991.

SMC system, (6) 350 RS Carousels, (3) 250 RSC Carousels, (6) racks, DP-1, AS 20, on air and wrkg, \$3500. E Dulaney, KYKK, 619 N Turner, Hobbs NM 88240. 805-297-4969.

Scully 255 FT (3), new heads, gd cond, \$700; Criterion R/P; FAT wire phone system, BO. R Remington, KMTX, 516 Fuller Ave, Helena MT 59624. 406-442-0400.

Cetec/Schafer 90Z I/O cards and cables (5), for Revox A77 reel PBs, \$75 ea/\$300 all. B Spitzer, KKLS/KKMK, Box 460, Rapid City SD 57701. 605-343-6161.

CAMERAS (VIDEO)

Want to Sell

JVC KA-3U component back for JVC KY Series camera, outputs Betacam & M format, \$295. D Brennan, Brennan Custom Video, 3596 Lorna Ridge, Birmingham AL 35216.

Panasonic WV CD20 (2) B&W security cameras w/lens, new CCD, 8mm lens, 25mm lens, wall mounts, \$2000. D Hurd, Harding Univ, Box 853 Station A, Searcy AR 72143. 501-279-4658.

Panasonic WV-RC30 remote control unit for Panasonic 777 color camera w/50' multi-pin cable, \$500. D Hurd, Harding Univ, Box 853 Station A, Searcy AR 72143. 501-279-4658.

Sony HVC-2400 2/3 color tricon w/zoom lens, w/SL-2000 deck & NP-1 batteries, \$150. P Russell, Bowdoin College, Sills Hall, Brunswick ME 04011.

RCA TK-76B 3-plumbicon bdc camera, pwr, case, etc, 20:1 zoom, just overhauled, excel cond, \$1200; JVC KY-2000 3-satcon bdc camera, pwr, gd cond, \$1000. U George, Satellite TV, 314 West 52nd, NY NY 10019. 212-969-0240.

Panasonic AK-30 w/bdct grade 3 plumbicon tubes, batteries, case, cable, gd cond, \$4595. D Brennan, Brennan Custom Video, 3596 Lorna Ridge, Birmingham AL 35216.

JVC KY2000B 3-tube color camera w/AC adaptor, shoulder pad, case, mic holder, VTR cable, Anton-Bauer battery bracket, Tamron 10-100 zoom, \$1000; JVC KY1900 3-tube color w/AC adaptor, case, Tamron 10-100 zoom, \$900; Panasonic WV3160 single tube color, \$400. D Hurd, Harding Univ, Box 853 Station A, Searcy AR 72143. 501-279-4658.

Panasonic AG-450 (2), S-VHS pro camcorders w/all access, like new, \$1200 ea/firm. R Larson, Larson Prod, 3 Braden St, Pl. ME 04769. 207-764-3770.

Sony AVC 3400 B&W portable (2), \$50 ea; Panasonic WV 360P B&W, \$100; Panasonic WV 340P B&W, \$100. D Hurd, Harding Univ, Box 853 Station A, Searcy AR 72143. 501-279-4658.

Sony BVP-30 camera w/CA3 adaptor, Fujinon 14x9 lens w/2X extender, beta back avail, excel cond, \$8500. Roman, World Video, 10625 Scripps, San Diego CA 92131. 619-695-1045.

RCA TK760 studio color camera (2), w/CCUs, 15/1 Angenieux, paint boxes, cables & cases, \$4500/both. C Polorti, 10005 Lacy Ave, Morrisville PA 19067. 215-945-3990.

CART MACHINES

Want to Sell

ITC ELS-IV bulk eraser/splice finder, \$500/BO. G Fulhart, WVKKS, 4665 W Bancroft, Toledo OH 43615. 419-531-1681.

BE 500 DR, mono R/P Spotmaster, \$200. G Sive, Your Video Conn, 31844 Rancho Amigos Rd, Bonsall CA 92003. 619-749-7662.

RCA RT-7B decks (6); (4) BA-7 record amps, gd-poor cond, BO. R Meyers, Benchmark Comm, 4700 SW 75 Ave, Miami FL 33155. 305-264-5963.

Audicord Series 100 R/P, gd cond, \$650. G Smith, KTLK, 915-673-5252.

ITC Omega mono (3), PB, R/P, like new, \$750 ea play only, \$950 R/P. P Wolf, WZCR, 2010 San Carlos Blvd, Ft Myers Bch FL 33931. 813-574-5548.

Sparta Century Series stereo, 1 kHz tone decade only, gd cond, \$275. F Anderson, WSCO, 1440 Knox Abbott, W Columbia SC 29169. 803-791-1653.

Spotmaster 300B R/P deck, \$350. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

Gates mono, (5), one for spare parts w/modules, (3) Gates mono, CPD, CDP, cart record amps. Richard Lynn, 615-458-6616.

ATC mono rack mounts (5), like Criterion 80 Series, works fine, spare modules, \$125 ea; SMC R/P mono in gd cond, \$500. P Wolf, WCRM, 241 NE 10th Ave, Cape Coral FL 33909. 813-574-5548.

Tapemaster 700-P PB in great working cond, \$350; Spotmaster TP1-A cart winder w/timer, \$150; UMC 40 H-85 cart motor, \$100. S Dynes, Dynes Comm, 307 S Penn, Wheeling WV 26003. 304-233-8856.

BE 2100 PS stereo PB (3), like new, \$850 ea/\$2400 all, plus UPS. G Jones, Southwest Mediacast, 110 Sierra, Kerrville TX 78028. 512-367-4587.

BE 5304 stereo triple decker used as demo, less than 20 hrs use, excel cond, \$2400. B Robinson, Musicworks Inc, 128 Holiday Ct, Franklin TN 37064. 1-800-251-9000.

Tapemaster 700 R/P, gd cond, \$200; Audicord A-21 R/P, \$300; (2) Tapemaster 700-P, gd cond, \$150 ea; (350) Audiopak & Fidelipac carts, various lengths, spare parts, foreclosure sale, \$1 ea. G Milstien, WTYN-AM, 1241 E Lakeshore Dr, Landrum SC 29356. 803-457-3568.

BE 1070, 2-stereo play, 1 stereo RP, numerous modules for ATC Criterion 1, \$350; cue amps, pgrm amps, pwr supplies, etc, \$25 ea. H Kneller, WKH, 3151 Cooper St, Punta Gorda FL 33950. 813-639-1112.

Audicord E Series, 3 PB, 1 R/P, BO. J Phillips, WZOM, 409 Clinton, Defiance OH 43512. 419-782-8591.

ITC RP R/P cart machine, 3 tone stereo, excel cond, \$1100+shipping; Harris Criterion 80 PBK, 3 tone, mono, gd cond, \$350/ea+shipping; ITC SP, 3 tone, mono, like new, \$800. J Sellmeyer, Rt 1 Box 270, McKinney TX 75069. 214-542-2056.

Harris Criterion 80 & 90 Series (10), play or record, mono or stereo, \$300-350/ea; Harris 90-3 triple deck mono, \$750. G Liebisch, WPTFM/QDR, Box 29521, Raleigh NC 27626. 919-790-6315.

Sparta, (4) decks w/(3) tones PB, spare deck, \$860. L Beigel, On-Cue Rcrdng, POB 85042, Los Angeles CA 90072. 800-726-9813.

ITC SP stereo PB w/inly audio card installed (2), \$700 ea; ITC R/P w/SWA play/rec card, \$850. D Irwin, KJAZ, 1131 Harbor Bay Pkwy, Alameda CA 94501. 415-769-4800.

Harris 994-7995-001, mono, \$250/BO. L Fuss, WDTL, POB 159, Fayetteville GA 30214. 404-460-6159.

Tapemaster 700-P PB, \$100/BO; Harris 90-1 R/P, \$600/BO; Criterion PB, \$150/BO. M McDaniel, WBTO, Linton IN 47441. 812-847-9830.

ITC SP stereo cart reproducers (3), w/Straight Wire Audio elec, \$1000 ea/\$1950 all; Audicord DL series cart rcrdr/reproducer stereo, 1 yr old, w/manual, \$1000. B Shannon, WKZA, 5158 Countryside Dr, McKean PA 16426. 814-476-7426.

Want to Buy

Stereo cart machine, only needs to play not record, buy or trade. C Hubbeling, KTEQ, 501 E St Joseph, Rapid City SD 57701. 605-394-2231.

Stereo record head for Gates Criterion or IGM 92 record center. R Fess, WLRB/WKAS, 119 W Carroll St, Macomb IL 61455. 309-833-5561.

Complete rack mount adaptor for ITC 3D cart machine. F Kelly, WRZQ, POB 690, Columbus OH 47201. 812-378-1073.

Tapemaster RP & P in poor cond or need repairs. A Ishkianian, 9723 Riggs Rd, Adelphi MD 20783. 301-439-7222.

CASSETTE & REEL-TO-REEL RECORDERS

Want to Sell

Fostex MY250R00-31214-D capstan motor, BO. M O'Brien, Imperial Snd, 383 N Studio, Terre Haute IN 47803. 812-877-2663.

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Tascam R/P around mount for 32 series decks, BO; Tascam 38 8 trk in excel cond, BO; Pioneer 2022 2 trk in excel cond (4), some spare parts. C Larko Prod, 916 Fairfield Ave, Ft Wayne IN 46802. 219-424-2405.

Sony/MCI JH 110-C-8 1" 8 trk, excel cond, w/manual, \$4600. R Leonardi, Voices, 16 E 48th, NY NY 10017. 212-935-9820.

Tascam 34 4-trk, 7.5-15 ips, 10" reel capability, like new cond, low hrs, w/manuals & original packing box, \$695. B Osborne, Audio-Visual Assoc, 4760 E 65th, Indianapolis IN 46220. 317-253-8562.

Tapsonic TRS70, \$300; Teac A7030 & A3300SX2T, \$350 ea; Tascam 34 4 chnl, \$800; Teac A3340SX chnl, \$800; Teac A505 tube type, \$300; Akai 4000D, \$100; Sony TC650D, \$130; Teac A4010, \$100. J Parsons Sr, 10375 Cannas, N Huntingdon PA 15642. 412-863-9590.

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Revox A-77 2 reel w/built in 25 Hz detectors, gd cond, \$550. F Anderson, WSCO, 1440 Knox Abbott, W Columbia SC 29169. 803-791-1653.

Sony CCP-100, cassette duplicator, 30 ips, ferrite heads, excel cond, w/manuals, \$300. B Burnham, WCAR, 32500 Park Ln, Garden City MI 48135. 313-525-1111.

Telex 300, like new cond, w/manuals, BO. D Bisbee, 685 S Roys, Columbus OH 43204. 419-782-8591.

Auditronics AV123-4TS 1/4 trk; Infonics RR-1 FT; Infonics RR-2 2 trk, all in gd cond, \$200; Soundscribe audio logging recorder, fair cond, BO. R Meyers, Benchmark Comm, 4700 SW 75 Ave, Miami FL 33155. 305-264-5963.

Pioneer RT-901, stereo 1/4 trk, rack mounted, 10" reels, heads gd to fair, overall cond gd, w/manual & NAB hub adaptors, \$150/BO, you ship or pick up. T Adams, New Wisconsin Radio Reading Service, POB 5541, Madison WI 53705.

Edison Envoy 515 voice writer; Roberts 4 trk photo sync 1057; Advent stereo cassette w/Dolby; Uher CG-320 stereo cassette; Sony TC-353 stereo. Pinetucket Recording, 747 Wire, Auburn AL 36830. 205-826-0390.

MCI/Sony JH110-C-8 8 trk, 1", in factory console w/Auto-locator III, gd cond, \$3250. M Leach, Waves, 1956 N Cahuenga, Los Angeles CA 90068. 213-466-6141.

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Otari ARS 1000 reels w/none sensor (2), gd cond, \$650 ea; ITC 750 PB only reels (2), gd cond, \$450 ea; SMC TS-25 dual tone sensor, one card needs repair, \$175. G Smith, KTLK, 915-673-5252.

Ampex 351 1/2 trk transport w/Inovonics RP amps, refurbished. S Delay, 217-498-7339.

Tascam 32-2 R/P, small or large reels, 2-speed, like new, never installed, \$1200. P Brown, KSPI, 905 Preston, Still Water OK 74075. 405-372-7800.

Telex RP-85 slow speed logger deck, gd cond, \$800/BO. G Fulhart, WVKKS, 4665 W Bancroft, Toledo OH 43615. 419-531-1681.

Otari ARS 1000 w/none sensor, motor needs bearings but works, gd cond otherwise, \$550. G Smith, KKHR, 915-676-9898.

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Ampex 601 in custom woodgrain case; (2) Ampex R-R's; (3) Gates mono cart record amps; (5) Gates mono cart machines; Gates mono cart machines. R Lynn, 615-458-6616.

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917 Post Rd., Ste 318, Fairfield, CT 06430

3M 400 2 trk 1/4", will take 10.5" reel, 15 & 7.5 ips, \$800. Katherine, Linden Inc, 229 N Henry, Alexandria VA 22314. 703-549-4424.

ITC SP stereo cart reproducers (3), w/Straight Wire Audio elec, \$1000 ea/\$1950 all; Audicord DL series cart rcrdr/reproducer stereo, 1 yr old, w/manual, \$1000. B Shannon, WKZA, 5158 Countryside Dr, McKean PA 16426. 814-476-7426.

Otari ARS-1000 stereo reproducers (8), new heads, excel cond, \$900 ea/(2) or more \$800 ea. R Graiff, WPUT, Box 1055, Patterson NY 12563. 914-878-3307.

Technics 2-trk 1500 w/remote & rack mount, \$850. D Gold, Gold Star Rec, 11434 Ventura Blvd, #102, Studio City CA 91604. 818-986-2911.

Ampex 351, (2), 30667-01-C, Simpson VU meters, excel cond, \$40 ea. J Newman, Box 1211, Newport RI 02840.

Tascam wired remote control for 80-8 & similar Tascam/Teac reel decks, \$50+shipping. Bill, DeFelic Pro, 93-2R Fowler St, New Haven CT 06515. 203-397-2595.

Otari 5050B-II 1/2 trk, 1/4", brand new in box, \$2350. A de Freitas, WJHU-FM, 2216 N Charles St, Baltimore MD 21218. 301-338-9548.

Otari MX5050 BQII, rack mount, manual, solid mechanically, some head wear, \$1300. P Thompson, Moonlight Sound, 4763 WCR 32, Longmont CO 80504. 303-535-4748.

Ampex 351 FT mono head-stack, housing, gate, cables, excel cond, \$70. J Newman, Box 1211, Newport RI 02840.

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Nakamichi MR-1 cassette deck, gd cond, \$400; (2) Ampex 350 mono w/Novonics elect in cabinet, \$350 ea; Scully 280B 4 trk 1/2" cabinet, \$950; (2) Scully 280 mono, no cabinet, \$250; (2) ITC 750 stereo playback decks, \$300 ea. G Liebisch, WPTF/WQDR, Box 29521, Raleigh NC 27626. 919-790-6315.

Panasonic SV-250 port DAT rcrdr, mint cond, BO. R Kaufman, Pams Prod, POB 462247, Garland TX 75046. 214-271-7825 (after 3PM).

Otari ARS1000 (4), automated radio producers, remote controls, foreclosure sale, \$500 ea. G Milsteen, WTYN-AM, 1241 E Lakeshore Dr, Landrum SC 29356. 803-457-3568.

Otari 5050 floor stand/roll around stands (3), black metal tubing w/rcrdr tilting mounts, never used, \$150 ea. R Bersani, Talk Info Ctr, 130 Enterprise Dr, Marshfield MA. 617-834-4400.

Revox PR99 1/2 trk, 7 1/2 & 15 ips, new cond, \$1600. D Furhey, Audio Center, 1812 Brim, Toledo OH 43613. 419-474-4301.

Tape-A-thon open reel tape players, bi-directional 3 3/4 ips, half trk, (2) portable 7" & 10 1/2", (1) 10 1/2" rack mount, all working, \$50 ea. E Davison, 135 N Illinois, Springfield IL 62702. 217-787-0800.

Studer port case for A77 w/mon spkrs & pwr amps, excel cond, \$275. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 213-859-5543.

Technics 1500 stereo 2-trk, \$850; **Revox A-77** stereo reel, \$450; **Revox A-77** stereo reel w/ rec amp, \$200. R Chambers, KSUE AM/FM, 3-15 Johnstonville Rd, Susanville CA 96130. 916-257-2121.

Studer HS-77 Mk IV special fact order FT mono, 15/7.5 ips, 10 hrs use, wood case, excel cond, \$475/BO/trade. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 213-859-5543.

Nakamichi 1000-ZXL computer-controlled cassette deck, w/NR-100 Dolby C, rack mount w/rosewood case, low hrs, excel cond, \$1575/BO/trade. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 213-859-5543.

Ampex 350 mono, tube elect, complete, gd appearance, \$200. D Jack, Mountain Media, POB 1826, Boise ID 83701. 208-286-7676.

Ampex 351 bridging input B-17331-1 (2), \$20 ea; (1) Ampex bridging input 4580116-10, \$20; (5) Ampex 440 bridging input 4580200-01, \$35 ea. J Newman, Box 1211, Newport RI 02840.

TEAC C3RX 3-head, rack mount, \$275; Ampex MM1000 8-trk, 1", grt shape, sell all or parts, \$2600. Tiki Recording Studios, 195 S 26th St, San Jose CA 95116. 408-286-4091.

Pioneer RT 701, 1/4-trk rcrdr, 7" reel capacity, gd cond, excel freq response, heads gd shape, \$150+shipping; **Pioneer 700** and 900 series open reel rcrdr parts: main switch assembly, (5) brake bands, (5) push bottom knobs, (3) reel holder knobs, (3) reel base screws, (3) reel base springs, \$100/all+shipping. J Heldman, 812-237-3255.

Ampex ATR 700, 7.5/15, in case, \$800/BO; (6) **Revox A77** w/rack mounts, \$300/ea/BO; (2) **Metrotech 1050** stereo PB, BO; (6) **Scully 270** stereo PB, take 14" reels, BO; **Schafel/Teac** rack mount stereo R/P. BO. M McDaniel, WBTO, Linton IN 47441. 812-847-9830.

Tascam T-2640MS and T-2640/2S dupl, forms 8x3 slave duping system, vgc, recently serviced. R Robinson, 203-269-4465.

Revox B-77 open reel rcrdr, 7.5 and 15 ips 1/2-trk, w/direct-input and tape-edit modification, improved output amp, remote cntrl, vari-speed cntrl, hrd fiber travel case, excel cond, \$1150/BO; **Revox B-77**, 7.5 and 15 ips 1/4-trk, direct-input mod, improved output amp, hrd fiber travel case, excel cond, \$750/BO. R Streicher, 818-359-8012.

Ampex AG-600 stereo, rack mount, \$250. B Kuhar, 1543 Eaton Ave, Bethlehem PA 18018. 717-645-8814.

Technics 1506 US 1/2-trk stereo tape machine, new heads, \$600. P Cibley, Cibley Music, 138 E 38 St, NY NY 10016. 212-986-2219

Fostex A-8 LR 14" 8-trk rcrdr/reproducer, new cond, \$850. R Simmons, Stonewall Brcdst, POB 50124, Austin TX 78763. 512-476-5200.

Ampex 96440-01 plug-in Nuovistor mic preamps for 602 rcrdrs, \$35 ea; Ampex 351 full-trk head stack, complete, excel cond, \$75. J Newman, Box 1211, Newport RI 02840. 401-847-0455.

Scully C-100 series 16-trk 2" tape w/meter bridge and tape counter, \$4500. A Tedecchi, Vault Studios, 106 N Page Ave, Endicott NY 13760. 607-748-4762.

Magnafax 652-1, 2-trk high speed R-R dupl, very low hrs, spare set heads, like new, BO; also, Ampex tape. L Schmitz, Soundtrax, 315-C Howard Ave, Rockville MD 20850. 301-279-0666.

Ampex 350 1/2-trk mono, 14" reel transport and Lang SS R/P elec, \$450+freight. N Mishan, POB 335, Lynbrook NY 11563. 516-582-1338.

Revox A77 (3), PB only, fair cond, \$225 ea. B Spitzer, KKLS/KMKM, Box 460, Rapid City SD 57701. 605-343-6161.

Sony TC-850 2-trk 3-motor reel, \$300/trade pro sound equip; dbx lbx series III range expander, \$125/trade for mics. B Wilson, 212 Southside Ave, Louisville KY 42718. 502-789-1505.

ITC 750, transport and stereo R/P elec, 2-trk, 7.5 and 3.75, wrkg when removed, \$500. M Friend, WTJV, Box 711, Charlottesville VA 22901. 804-924-0885.

AIWA Excelia XD-001 RDAT rcrdr, remote cntrl, 110-100 VAC pwr adpdr, Engl instruct manual, records at 44.1 kHz from digital SPDIF input, excel cond, \$935; **Tascam DA-500** RDAT rcrdr, remote cntrl, +4 and -10 dBm analog I/O, coaxial and optical digital interfaces, records at 44.1 or 48 kHz from analog and digital inputs, excel cond, \$1350. R Streicher, 818-359-8012.

Scully 270 mon 2-trk, auto-reverse, 3 3/4 or 7 1/2, \$1000. R Evans, Cable Music Network, 156 Prospect St, Wilkes-Barre PA 18702. 600-743-1221.

Want to Buy

Ampex MR-70 2 trk in gd, original cond. D deForrest, Insight Prod, 7441 Wayne Ave, Ste 10-D, Miami Bch FL 33141. 305-866-5401.

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Teac A7030SL, GSL; A7300; 3340SX, 3300SX; wrkg or not. J Parsons, 10375 Cannas St, N Huntingdon PA 15642. 412-863-9590.

Magnecord PT6 reel hold down clamps (2), orig supplied w/rcrdr, silver w/springs, also need (4) reel hold down clamps for **Revox A77**. B Berry, Karavan Brcdst, 13 Montgomery Pl, Conroe TX 77384. 409-273-2801.

Ampex ATR100 taperecorders for parts. Circuit cards, heads, motors, machine parts, or electronic parts. Call 818-907-5161.

MC/Sony capstan & reel motors, any cond., recdg heads, most mfgs, machines, new, used. Replaced then sold. Amp Services, 224 Datura St No 614, W Palm Beach FL 33401. 800-826-0601, in FL 305-659-4805.

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Jerrol UM-2 & UM-4 TV modulators, BO. Pinelocket Recording, 747 Wire, Auburn AL 36830. 205-826-0390.

Channelmatic Spotmatic Jr (4) & net-share switcher 4 chnl, cable ad insertion equip, \$1300 ea; **Tele-Engineering Ad Cue Jr**, cable ad insertion controller, \$1200. R Stone, W-AIR, 322 Bay, Petoskey MI 49770. 616-348-2000.

COMPUTERS

Want to Sell

Digital 350 prof, dual disc drive w/10 meg hard drive, PC complete (2), \$200 ea. P Russell, Bowdoin College, Sills Halls, Brunswick ME 04011.

Blue Chip IBM XT compatible, 512K, 30 meg HD, CGA, color monitor, BO. C Larko Prod, 916 Fairfield Ave, Ft Wayne IN 46802. 219-424-2405.

Tandy 6000HD II (2), w/printers, software, lots of disk space, excel cond, BO; **Apple Macintosh Hypercard** software pkg, new in box, BO. R Fess, WLRB/WKAS, 119 W Carroll St, Macomb IL 61455. 309-833-5561.

IBM PCjr (2), BASIC, Lotus 1-2-3, keyboards, cables, software, uses CGA monitor, BO. B Harris, KXLT 5350 S Roslyn St #210, Englewood CO 80111. 303-741-5654.

CONSOLES

Want to Sell

Tascam 388 Studio 8, \$2300. P Wolf, WCRM, 241 NE 10th Ave, Cape Coral FL 33909. 813-574-5548.

Gately EM 7, EQ 7 2 chnl stereo w/board EQ, echo, patch bay, monitor amp, CM Lab's & custom cabinet w/monitor system, \$795. T Shea, Shea Snd Slds, 973 McKinley, Baldwin NY 11510. 516-223-7291.

Wheatstone A-500, 6 chnl expandable on-air/prod console, brand new in crate, \$7000. P Wolf, WZCR, 2010 San Carlos Blvd, Ft Myers Bch FL 33931. 813-574-5548.

Harris Medalist 12 chnl stereo, gd cond, avail in April, \$2000. G Fallus, WZMX, 905 Wetherfield, Hartford CT 06114. 203-296-1175.

Sparta 3410 8 chnl stereo prod or air board, gd cond w/heads, \$400. D Seavy, KROC, 122 SW 4th, Rochester MN 55902.

Wheatstone 8X, 18x8x2 production board w/internal patch bay, gd cond, \$2900. M Leach, Waves, 1956 N Cahuenga, Los Angeles CA 90068. 213-466-6141.

Allen & Heath Modular Series 2000 8 chnl in/out mixing console w/equalization, pan pots, midrow facility, patch bay, \$750. B Sitzman, Music For All, 110 County Rd 146, Trumansburg NY 14886. 607-273-2970.

Gates Yard for parts. J Schloss, KICD, POB 7248, Spencer IA 51301. 712-262-1240.

Musimatic and console, 10 input stereo mixing console, \$450; **Peavey PA-100S** 10 input stereo mixing console w/built in EQ & 200 W amp, \$700. J McKinley, WJMR, 155 N Main, Fredericktown OH 43019. 614-694-1577.

Ramsa WR 8816 16x4x2 mixing console, like new, \$3600. FOB. G Jones, Southwest Mediacast, 110 Sierra, Kerrville TX 78028. 512-367-4587.

Yamaha EM1600 6 chnl powered mixer, BO; **Pyle MXK-73** hi freq crossovers, (2), BO. C Larko Prod, 916 Fairfield Ave, Ft Wayne IN 46802. 219-424-2405.

Sonex, 1/2 rolls. Richard Lynn, 615-458-6616.

Sony MX-6S 6 chnl mic & line mixer, like new cond, BO/trade. E O'Brien, Imperial Sound, 383 N Studio, Terre Haute IN 47803. 812-877-2663.

Ramko DC 8MS 8 chnl, stereo 18 inputs, excel cond, \$3800. R Trumbo, KNLF, POB 117, Quincy CA 95971. 916-283-4144.

McCurdy SS 7500 custom 10-mixer audio console, \$1200. D Gunderson, KCCM, Box 72 Concordia College, Moorhead MN 56562. 218-299-3666.

Tapco C-12 12x2x2 board w/phantom pwr, \$700. Katherine, Linden Inc, 229 N Henry, Alexandria VA 22314. 703-549-4424.

RCA BC 1518 mono 8 chnl 32 inputs, gd cond, w/manual, \$500 plus shipping. R Kerbaw, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

BE 8M250A, 8 chnl monaural, 2 yrs old, excel cond, \$2000/BO, you ship or pick up. T Adams, New Wisconsin Radio Reading Service, POB 5541, Madison WI 53705.

Collins vintage remote mixer, used for Boston Red Sox broadcasts, BO. T Heathwood, Heritage Radio, POB 16, Boston MA 02167. 617-969-9966.

Trident VFM 24x8 mixing console w/board case, \$2500. D Furhey, Audio Center, 1812 Brim, Toledo OH 43613. 419-474-4301.

Gates Executive stereo console, excel cond, \$500; **Microtrak Sport II** stereo console/elec, foreclosure sale, \$500. G Milsteen, WTYN-AM, 1241 E Lakeshore Dr, Landrum SC 29356. 803-457-3568.

Quantum QM-8 8 inputs, 4 busses, quad & stereo mon, +4 dBm nom, +18 dBm max, lrg Triad input xlmrs, Duncan linear faders, audiophile qual, excel cond, \$475/BO/trade. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 213-859-5543.

Tascam 3 recording mixer, 8 mic or line ins, 4 outs w/4 VU, sep 8x2 mixer, like new, \$500; **Ramko DAG R/E** mono dist amp, line in, 6 line outs, \$100; **Magnecorder PT6-IM4** mixer, 4 Daven 30/60 ohm pots, XLR conn rack panel, \$25. E Davison, 135 N IL, Springfield IL 62702. 217-787-0800.

Sony MX-16 8x4 mixer, mic/line inputs, input pad, headphone mon, slider pots, excel cond, you ship, \$150. G Hutchins, WZAP, POB 369, Bristol VA 24203. 703-669-6950.

Rockwell Mark 8 stereo 8 chnl, slightly modified, gd cond, in service, avail late summer, sell/trade. B Harris, KXLT, 5350 S Roslyn St #210, Englewood CO 80111. 303-741-5654.

Sphere 32x24 console w/Ampex MM1000 24-trk rcrdr, \$2700/both. Tiki Recording Studios, 195 S 26th St, San Jose CA 95116. 408-286-4091.

Tascam M-520, 20x8x2 multi-trk console, mint cond, BO. R Kaufman, Pams Prod, POB 462247, Garland TX 75046. 214-271-7825 (after 3PM).

Cetec 12-chnl mixing board, (2) phono cap & echo/effect sends, great for road/multi-trk use, \$400/BO. Lynn, World Class, POB 7055, Redlands CA 92375. 714-798-6483.

Teac 144 Portastudio, 4 chnl stereo board w/high speed cassette, excel cond, w/manual, \$200/BO. R Fess, WLRB/WKAS, 119 W Carroll St, Macomb IL 61455. 309-833-5561.

Ramsa T820B, 1.5 yrs old, 20x16x8x2, perfect production board w/8 trk, all manuals, \$4000. K Thomas, Rebel Recording, 5555 Radio Ln, Jacksonville FL 32205. 904-388-7711.

Soundcraft 400B, 24-chnl, manual, flight case, small lights, great board, \$4500. P Thompson, Moonlight Sound, 4763 WCR 32, Longmont CO 80504. 303-535-4748.

Audix 12 chnl stereo console, fair cond, w/IB, \$1500+shipping. J Sellmeyer, Rt 1 Box 270, McKinney TX 75069. 214-542-2056.

Shure M67 mixer & RCA version of same, both in excel cond, \$125 ea. H Biller, 108 Hamilton Ave, Silver Spring MD 20901. 301-565-2798.

Ramco SC-5M w/manual, \$550. R Chambers, KSUE AM/FM, 3-15 Johnstonville Rd, Susanville CA 96130. 916-257-2121.

TAC Matchless studio console, 26 inputs, 24 buses, 8 aux sends, great EQ, 2 mute groups, full TT patch bay, 5 yrs old, \$14,000. J Block, Production Block, 906 E 5th St, Austin TX 78702. 512-472-8975.

Cetec Centurion I, 18 chnl input, 3 outputs, fair cond, just removed from service, \$1150. R Beierle, KFYR-TV, 200 N 4th St, Bismarck ND 58501. 701-255-5757.

RCA BC-50, stereo/mono operation, 120 inputs, pwr & backup supply, spare parts and components, excel cond, \$400+shipping. W Tinsley, Public TV, 1123 Holcomb St, Watertown NY 13601. 315-788-3549.

Gates Executive stereo 10-chnl console, \$500. G Kneisley, WEOL-WNWX, POB 4006, Elyria OH 44036. 216-322-3761.

Quantum 12A cust mixing console, 12 inputs w/indep pan and assign to 4 output busses, stereo mon section for 4 busses or 8-chnl tape returns, full stereo 2-chnl effects/echo-sends and returns, sep 2-chnl headphone monitoring, indepen headphone cue buss, lots more features, excel cond, \$2800. R Streicher, 818-359-8012.

McCurdy SS8500 series console, (11) stereo faders and machine controls, (4) prog buses and meters, digital clock and up/down counter, (4) EQ chnls, intercom talkback and select, numerous features, clean, \$2950/firm. W Clark, Clark and Assoc, 318 E Calhoun, Macomb IL 61455. 309-837-2244.

Cetec Centurion I audio console, 18 input modules, 3 outputs, \$1100. R Beierle, KFYR-TV, 200 N 4th St, Bismarck ND 58501. 701-255-5757.

Autogram IC-10, well-maintained stereo, 10-chnl, gd cond, \$3250. T McGinley, Cook Inlet, 630 Ivy Ln, Greenbelt MD 20778. 301-441-3332.

Allen and Heath CMC-24 24-chnl studio board w/built-in computer patching, excel cond, \$2500. D Hunt, Finestkind Stereo, 284 Maine St, Brunswick ME 04011. 207-729-8815.

Ramko DC-8M touch control w/books; **Gates Yard** transistor; BO ea. M McDaniel, WBTO, Linton IN 47441. 812-847-9830.

Sparta AS30B, fair cond w/low mod; **Ramko DC5MS**, fair cond; **CCA Ultimate III** 10-chnl stereo/mono, fair cond w/low mod; all BO by 6/91. B Spitzer, KKLS/KMKM, Box 460, Rapid City SD 57701. 605-343-6161.

Sony MX-16 8x4 mixer, slider pots, mic/line select switch, headphone output, input pad, grt cond, \$150. G Hutchins, WZAP, POB 369, Bristol VA 24203. 703-669-6950.

Radio Systems ESA 10 stereo, excel cond w/manuals, \$5000/BO; **Gates Stereo Statesman**, gd cond, \$400; both \$5000. B Shannon, WKZA, 5158 Countryside Dr, McKean PA 16426. 814-476-7426.

Altec-Lansing 12-pot 3-chnl board, can run FM stereo and AM mono at same time, BO. J Randolph, WHIR/WMGE, Box 1230, Danville KY 40422. 606-236-2711.

RCA BC-7 w/spares, restorable, \$850/BO. P Keogh, 414-499-1336.

Tascam M-216 16x4x2 sound reinforcement/recording mixer. Excellent, \$900. 212-288-9798.

Want to Buy

Wheatstone 12 chnl console or equivalent; also, Otari MX50 rcrdr & Yamaha SPX 900 effects processor. R Chambers, KSUE AM/FM, 3-15 Johnstonville Rd, Susanville CA 96130. 916-257-2121.

Gates Ambassador or President cards & spare parts incl preamps, TT amps & misc parts. J Mitchell, KSTL, 814 N 3rd St, St Louis MO 63102. 314-645-4649.

Collins 212B or Altec 230B, wrkg. R Osborne, WMOV, Box 667, Ravenswood WV 26164. 304-273-2544.

API or Neve, esp API 550A and 550B; also, some mfrs EQ and other modules, anything considered. J Kreines, DeMott/Kreines Films, 5330 Kennedy Ave, Millbrook AL 36054. 205-285-6179.

WE, RCA tube mixers and consoles, stock or custom, related brcdst and rcrding equip and literature. R Van Dyke, Caffrey House, 2 Squires Ave, E Quogue NY 11942. 516-728-9835.

Sony MX-16, MX20, wrkg or not. J Parsons, 10375 Cannas St, N Huntingdon PA 15642. 412-863-9590.

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Harris ME-1 mod enhancer, \$150; Harris MSP 90 AM tri-band AGC, \$1000; Inovonics 230 AM multiband audio processor, \$900. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

Shure M62V Level Loc, BO; Compliter 610, one good, one fair, BO. C Larko Prod, 916 Fairfield Ave, Ft Wayne IN 46802. 219-424-2405.

Motorola C-QUAM & CRL processing for AM. 314-576-0909.

RCA BA-6A in excel cond, w/rack mount shelf, face plate cover & connectors, \$250 plus shpg. B Leslie, Pro Recdg Svc, 13709 Maple Leaf, Cleveland OH 44125. 216-682-1435.

CRL SGC800, SEC800, SMP900A AM-4 stereo pkg, like new, w/manuals, instructions & parts for all modifications to date, BO. S Murdoch, WFNS, 7201 E Hillsborough, Tampa FL 33610. 813-620-9100.

CBS Volumax 400, clean, works, \$100; BE Spotmaster CLE 500, \$450. P Wolf, WCFM, 241 NE 10th Ave, Cape Coral FL 33909. 813-574-5548.

CRL PMC-300A AM w/CRL SPF-300 NRSC adapter, excel cond, \$1000; CRL IPP-100 mic processor, \$1200. M Persons, WJY, Box 706, Brainerd MN 56401. 218-829-1326.

Optimod 8000A
\$1495 & UP
414-482-2638

Aphex 250 type III exciter w/bass enhancement, like new, \$700. J McKinley, WJMR, 155 N Main, Fredericktown OH 43019. 614-694-1577.

Optimod 8000A, gd cond, \$1200. Mr. Ericson, 212-477-2489.

Gates Solid Statesman, \$175. P Wells, KJQY, San Diego. 619-238-1037.

CRL complete 3-piece AM processor, w/preparation processor, spectral energy processor & NRSC clipper matrix unit, like new, \$2000. R Wright, 1208 N Locust Ave, Lawrenceburg TN 38464. 615-762-6200.

Dorrough 310 processor, AM/FM, gd cond, \$900+shipping. J Sellmeyer, Rt 1 Box 270, McKinney TX 75069. 214-542-2056.

Harris Solid Statesman FM (2), BO; Spotmaster FM sound britener, 2-chnl AGC/peak limiter, BO. K Stokes, WKJN, 3029 Sherwood Forest #200, Baton Rouge LA 70816. 504-292-9556.

Modulation Assoc CP 803, gd cond. C Edwards, WWJM, 210 S Jackson St, New Lex OH 43764. 614-342-1988.

Kahn Symmetra-Peak SP58-1A (2), \$250 ea. L Bruce, WROR, 3 Fenway Plaza, Boston MA 02215. 617-236-6841.

CRL SEC-800 spectral energy compressor, like new, \$700/BO. A Burns, WRIC. 908-932-4105.

CBS 411 & 410, stereo 411 Volumax converted to flat response, mono 410 FM Volumax. H Kneller, WKII, 3151 Cooper St, Punta Gorda FL 33950. 813-639-1112.

Optimod 8000A, gd cond, used for back up, \$1700. B Watson, KSAK, 1551 E Amhr, W Covina CA 91792. 814-946-6249.

Dorrough DAP-310, tri-band audio processors w/AM limiter cards, FM limiter cards & alignment system card, vgc, recently removed from service, \$700+shipping. Bill, DeFelice Prod, 93-2R Fowler St, New Haven CT 06515. 203-397-2595.

Harris MSP-90 dual AM peak limiter, \$500. H Kneller, WKII, 3151 Cooper St, Punta Gorda FL 33950. 813-639-1112.

Orban Optimod 8000, clean unit, \$575/BO. B Gray, Gray Audio, 223 W Mountain Rd, W Simsbury CT 06092. 203-658-7786.

UREI LA-4 (2), trade for MAP II AM processor. J Randolph, WHIR/WMG, Box 1230, Danville KY 40422. 606-236-2711.

Mod Sciences Stereomaxx, excel cond, \$1800; Optimod XT2 accessory chassis, \$1300/wrap for gd 8000A; Howe 2300 Phase Chaser (2), as-is cond, late models, \$800 ea. M Sadaacca, KCKC-KBON, 740 W 4th St, San Bernardino CA 92410. 714-882-2575.

Texar Prizm, stereo, digital controlled processor and Texar Card 5 for Orban Optimod, \$2000; Vigilant Audio Processor, \$1500. G Kneisley, WEOL-WNVV, POB 4006, Elyria OH 44036. 216-322-3761.

Aphex Compellor, 2-chnl, mint cond in box, w/manuals, \$975/BO. B Mitchell, KMXX-FM, 4745 N 7th St, Phoenix AZ 85014. 602-545-8181.

Cutting Edge Tech Dividend composite filter processor, new w/manuals, \$1500/BO. D Mettler, WFBO/WNDE, 6161 Fall Creek Rd, Indianapolis IN 46220. 317-257-7565.

Audimax 4450A, gd cond w/manual; Volumax 4110, gd cond w/manual; both BO by 6/91. B Spitzer, KKLK/KMKK, Box 460, Rapid City SD 57701. 605-343-6161.

Want to Buy

CBS Labs 4450 stereo Audimax AGC. J Pearce, KSSS, 2864 S Circle, Ste 150, Colorado Springs CO 80906. 719-579-0880.

CBS Labs 4450 stereo Audimax AGC. J Pearce, KSSS, 2864 S Circle Dr, Ste 150, Colorado Springs CO 80906. 719-579-0880.

Dorrough DAP or similar multi-band AM processor, under \$200. Tim, WOWB/WLFH, 341 S Second St, Little Falls NY 13365. 315-866-1230.

Orban Optimod 8100A. D Brooks, WCIC-FM, 3263 Court St, Pekin IL 61554. 309-353-9191.

Optimod AM 9000 audio limiter/compressor, prefer converted w/NRSC. A Crain, WAVN, Rt 6 Box 250, Byahia MS 38611. 601-895-6483.

Fairchild 660/670, Teletronix LA2A and LA3A, other tube compressors and limiters, other tube signal processing equip. J Kreines, DeMott/Kreines Films, 5330 Kennedy Ave, Millbrook AL 36054. 205-285-6179.

Optimod 8000A, will pay cash, leave message at 703-276-0125.

MICROPHONES

Want to Sell

Neumann U-87 new capsule, excel body, sound great, \$1350; Phase Linear 700, works, \$275; Phase Linear 400, loud & cheap, \$225. R McMillen, 3235 SE 39th Ave, Portland OR 97202. 503-239-6070.

B&K Type 2801 condenser mic, pwr supply, tube type, BO/trade. M O'Brien, Imperial Snd, 383 N Studio, Terre Haute IN 47803. 812-877-2663.

RCA Classic ribbon mics, send for list. B Davies, Virgo Prod, 5548 Elmer, N Hollywood CA 91601. 818-781-9831.

EV RE16, BO. C Larko Prod, 916 Fairfield Ave, Ft Wayne IN 46802. 219-424-2405.

Old Electro-Voice 635 mics w/Auricon camera labels, 50 ohm black, \$25, 250 ohm grey, \$35; Altec 690A dyn mic fits G telephone handset in place of F1 xmtr, noise canceling design, new, \$25; Sennheiser MD214 lavalier mic, used, \$35. E Davison, 135 N Illinois, Springfield IL 62702. 217-787-0800.

Telefunken Tube CM-61 by Schoeps, very rare, uses std plug-in tube w/custom pwr supply, mint cond, \$2475/BO. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 213-859-5543.

Sennheiser MD 441U mic, in case, excel cond, \$250; Electro Voice 635 mic, gd cond, \$50. R Barwig, Barwig Recording, 5254 W Agalite Ave, Chicago IL 60630. 312-283-2820.

Sennheiser MD-421-U, w/clip & cord, like new, \$175. D Jack, Mountain Mike, POB 1826, Boise ID 83701. 208-286-7676.

Shure Beta 58, super cardioid pattern w/neodymium magnet for grtr output, stand clamp and case, \$125. B Fisher, KPOK, 122 S Main St, Bowman ND 58623. 701-523-3883.

Electro-Voice RE 16, variable-D super cardioid pattern, rejects P popping well, w/clip and pouch, like new, \$125. B Fisher, KPOK, POB 477, Bowman ND 58623. 701-523-3883.

HME System 82 diversity wireless mic, w/body-pack xmtr w/Audio Technica mic, rcvr w/3-antenna syst, battery pack, road case, \$1000/BO; AKG VR-2 long exten tube for C-451 mics, never used, \$115. R Streicher, 818-359-8012.

RCA/Altec/Telefunken: RCA 44-BX, 77-D, BK-5, KU3A 10,000, SK-46, WE 639, Altec M-11 system, Altec M30 tube mic, Altec M49 & M50, (2) absolutely mint Telefunken U47's, will trade for other high quality mics & equipment. Tracy Eaves, 615-821-6099 (evenings).

Altec 639 (2), sound gd, \$500 and \$550. L Beigel, On-Cue Rcrdng, POB 85042, Los Angeles CA 90072. 800-726-9813.

Want to Buy

RCA 44's, 77's, WE & other ribbon mics, working or not, also looking for dynamic & other types of mics. B Davies, Virgo Prod, 5548 Elmer, N Hollywood CA 91601. 818-761-9831.

RCA BK-5A or B w/windscreen, gd cond. R Laine, POB 10665, Golden CO 80401. 303-238-7830.

RCA 77DXs or 44BXs, vintage ribbon mics, BO. R Kaufman, Pams Prod, POB 462247, Garland TX 75046. 214-271-7625 (after 3PM).

AKG CE-1 or CE-2 capsules for SE-5E preamp. N Pearsall, Synergy Sound, POB 632, Lutmacum WA 96325. 206-732-4198.

RCA 77A, any cond; RCA 88A, BK-10; WE 639; pre-U47 Neumanns; mic flags. B Kuhar, 1543 Eaton Ave, Bethlehem PA 18018. 717-645-8814.

RCA 44-BX mounting yoke for RCA 44-BX w/desk stand. N Allebaugh, WICE, 100 John St, Cumberland RI 02864. 401-725-9000.

RCA BK-10 TV boom mic, any cond. J Steele, WKVX-FM, Box 2525, Kingsland GA 31548. 912-729-6106.

RCA, WE, Neumann, AKG, etc, older mics, parts, stands, any cond, literature. R Van Dyke, Caffrey House, 2 Squires Ave, E Quogue NY 11942. 516-729-9835.

Tube condenser mics: Telefunken ELAM 250/251; AKG C12/C24; Neumann U47, M49, KM54, U64, SM2, SM69; also, other pro condenser mics, wrecked mics w/missing parts, any cond. J Kreines, DeMott/Kreines Films, 5330 Kennedy Ave, Millbrook AL 36054. 205-285-6179.

RCA 44-BX, and other ribbon/velocity mics by RCA, WE, etc. D DeForrest, 7441 Wayne Ave 10-D, Miami Beach FL 33141. 305-866-5401.

Sennheiser MD 421 in new cond w/case, \$300. E Welch, 182 Monitor Cir, Monks Corner SC 29461. 803-781-7583.

MISCELLANEOUS

Want to Sell

Gates 20"XX19" equip racks (2); (15) various sized metal cart racks; Gates 6' equip rack. Richard Lynn, 615-458-6616.

Rotron Blowers for Eloom, CCA, CSI, McMartin, Harris, rebuilt & new. Goodrich Enterprises Inc. 11435 Manderson St., Omaha, NE 68164 402 493 1886 FAX 402 331 0638

Large number of rebuilt fixed & variable RF inductors, hotline jacks, J plugs & meter switches at half current price, write for list. K Hyman, 5006 E Beverly Mae Dr, San Antonio TX 78229.

Patch bay, \$65; antique tube tester in vgc, \$125; 52 album sized mailers, \$25/all. S Dynes, Dynes Comm, 307 S Penn, Wheeling WV 26003. 304-233-8856.

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VHS video sales training tapes (16) 30 topics, \$1500. R Trumbo, KNLF, POB 117, Quincy CA 95971. 916-283-4144.

Kohler 30 KW 3-phase gen, currently runs on propane, \$6000. G Faltus, WZMX, 905 Wethersfield, Hartford CT 06114. 203-296-1175.

Executone Gateway K2100 electr business phone system, 5 lines, 20 extensions, working system or use for parts, \$800/BO. G Fullhart, WVKK, 4665 W Bancroft, Toledo OH 43615. 419-531-1681.

WE patch panels (12), tip, ring, sleeve, 6 rows of 24 jacks, normalised wire wrap or solder, patch cords avail from ADC, \$35 ea plus shipping; Gates/Harris 994-4703-003 & 994-5066-001 motors w/limit switches, as is, \$50 ea plus shipping; Square D 200 amp 3-phase safety switch 3PDT center off, gd cond, \$100 plus shipping. R Korbaw, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

Tellabs dual wideband repeat coil module 4425 in box; Gates 6' equip rack; 20" x 19" equip racks; dual row patch bay & cords, jacks & various parts; (2) ABC cue command decoders; (15) wall mount cart racks; (100) cart tapes; Comex Bleepmate 675 program delay; Teac audio amp w/VU meter, BO/all you ship. R Lynn, 615-458-6616.

Ditchwitch 100 SX wire pilew, low hrs. S Delay, 217-498-7339.

Tellabs dual wideband repeat coil module 4425, still in box; (2) dual row patch bay, Richard Lynn, 615-458-6616.

WHI trade deluxe hotel accommodations in Hawaii, Mexico, Bahamas, etc for audio & video equipment. C Coreson, Coreson Co, POB 22423, Milwaukie OR 97222. 503-659-7815.

Technical manuals, various manufacturers for various gear including RCA mics, tape cartridge PB, remote amp, TT, and much more, call for details, all manuals \$5. S Dynes, Dynes Comm, 307 S Penn, Wheeling WV 26003. 304-233-8856.

Blonder Tongue AMT audio modulator for TV chnl 10, puts a radio on MATV systems, \$75. E Davison, 135 N IL, Springfield IL 62702. 217-787-0800.

DIGITAL AUDIO
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Bob Stewart
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Toshiba Strata telephone systems (3); #1 has 10 lines, 10 phones; #2 has 20 lines, 20 phones; #3 has 8 lines, 20 phones; \$1000 to \$2500. Roman, World Video, 10625 Scripps, San Diego CA 92131. 619-695-1045.

Various WE phones, key & 1 line, wall & desk, also key relay, sep lamps, pwr plants w/ringing current, call for details; Raymer TPA-1 telephone interface to page amp (2), w/talk battery, relay closure, \$35 ea. E Davison, 135 N Illinois, Springfield IL 62702. 217-787-0800.

Racks, 19", 72" & 60", you ship, \$100; BNC patch bay 19" rack panel, BO. C Porter, WEAZ, POB 498, Carthage IL 62379. 217-357-3128.

TIE E300C telephone, new, TT dial, 10 buttons, \$50; conf call switch, bridges up to 5 lines together on Bell-style 6 button key phones, new, \$25; WE Magneto phones, modern w/handset, like new, \$100/PR; wall phone, single numb auto dialer, red, new, \$35. E Davison, 135 N Illinois, Springfield IL 62702. 217-787-0800.

Altec line xfrmers, (7), red, 15095, \$20 ea; (2) black Altec line xfrmers, 15356A, \$20 ea; (2) green Altec mic xfrmr, 4722, \$20 ea. J Newman, Box 1211, Newport RI 02840.

Transformers for tube equip, new & like new: Thordarson T15S93, T17R31, T75C61; Stancor A4701; UTC LS31 (2), LS30, LS32, LS34, LS141 (2), LS151, S31, S33, S34, S40, HA100, HA100X, HA101, HA101X, HA130X, HA133 (2); very low prices, call w/BO. E Davison, 135 N Illinois, Springfield IL 62702. 217-787-0800.

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Circle 113 On Reader Service Card

NBC NM-50 passive telephone (nemo) EQ, '50 vintage, \$75. B Kuhar, 1543 Eaton Ave, Bethlehem PA 18018. 717-645-8814.

Audio xfrms, Peerless, Ampex, Triad, VTC, input, matching, isolation, \$15 ea. S Lawson, KAIK Prod, 928 Hyland Dr, Santa Rosa CA 95404. 707-528-4055.

KOSS ESP-10 electrostatic headphones, compl syst w/pwring module and (2) headphones, \$100; AKG K-240 headphones, passive radiator design, dynamic, circumaural phones, cable repaired, gd cond, \$40. R Striecher, 818-359-8012.

ADC RJ41 sngl and dbl jack strips w/rack mount mats and 10' numbered pigtail; (5) Xmas tree terminals; (12) Switchcraft 17QF17 3' patch cords, some new; (2) Weatherbank 20-key keyboards, terminated in 5 pin 180° DIN plug; all BO by 6/91. B Spitzer, KKLK/KMKK, Box 460, Rapid City SD 57701. 605-343-6161.

Catal FMS 2000 FM stereo modulator, used 3 months, \$560. D Dennon, TPMD, 448 La Paloma, El Sobrante CA 94803. 415-222-5078.

Record Collection, scholarly music library, inquire 212-288-9798, evenings.

Want to Buy

Naval observatory clock, brown case, cream face, used by ABC radio & affiliates in the '40s/'50s, REA light flashes with reset. T Heathwood, Heritage Radio, POB 16, Boston MA 02167. 617-969-9966.

Military J-38 hand key and/or Vibroplex bug key, HS-30 head set. N Allebaugh, WICE, 100 John St, Cumberland RI 02864. 401-725-9000.

Heathkit weather station and accessories, latest model, computer interfactable, other models considered. Mike, MRG Assoc, 95 Colony Dr, Holbrook NY 11741. 516-447-1041.

Leitch CLK analog impulse clocks; McCurdy SA137 timer displays; McCurdy SA138 clock displays; RCA Broadcast News. B Kuhar, 1543 Eaton Ave, Bethlehem PA 18018. 717-645-8814.

Jazz record collections, 10" LP/12" LP bebop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, NNYNY 10003. 212-674-3060.

RCA Broadcast News, especially 1955 and earlier. Russ Hamnett, KNAU, Flagstaff AZ 86011. 1-800-523-8870.

MONITORS

Want to Sell

Belar AMM-1 AM mod monitor, clean & works fine, \$450. P Wolf, WZCR, 2010 San Carlos Blvd, Ft Myers Bch FL 33931. 813-574-5548.

TFT 760 EBS system w/AM rcvr, tone gen & decoder, gd cond; McMartin TBM 2200 stereo monitor & TBM 4000A FM/SCA monitor, American made, vintage, FCC type approved w/manuals, BO. B Webster, WLIT, 150 N Michigan, Chicago IL 60515. 312-329-9002.

McMartin TBM-1500 AM mod mon, excel cond, \$500+shipping; Belar RFA-2 AM RF amp, excel cond, \$450+shipping. J Sellmeyer, Rt 1 Box 270, McKinney TX 7506

RECEIVERS . . . WTS

Johnson ST-4A SCA rcvr, (18) at 67 and (20) at 92, all new and near-new, \$40 ea. R Evans, Cable Music Network, 156 Prospect St, Wilkes-Barre PA 18702. 800-743-1221.

High quality micro-miniature 67 kHz SCA decoder, about 1" square, prewired and ready to install, \$15. D Jackway, Background Music Eng, 5742 Fairpark, Springfield MO 65810. 417-881-1846.

Want to Buy

Hammarlund HQ Series general coverage rcvrs, HQ-100, -145, -180, etc, or equivalent, need not be working. M Zuccaro, Voice & Video, 5038 Ruffner St, San Diego CA 92111. 619-271-8294.

McMartin TMB-1005 5-chnl rack mounted FM & SCA rcvr. R Bersani, Talk Info Ctr, 130 Enterprise Dr, Marshfield MA. 617-834-4400.

Fisher 90-T, 100-R or 202-R tube FM/AM tuners, gd cond, reasonable \$ J Douglas, Original Oldies Show, 402 Shirley Rd, Seaford VA 23696.

REMOTE & MICROWAVE EQUIP

Want to Sell

Bext STL TX-RX, new. S Delay, 217-498-7339.

Marti RPT-25 & R-50/450 xmtrs & rcvrs set up for stereo, 450.925 & 455.925, recently factory re-aligned, \$2400/all or BO. G Fullhart, WVKs, 4665 W Bancroft, Toledo OH 43615. 419-531-1681.

Moseley TRC-15 for 10 kHz subcarrier w/Hallikainen digital display & ITO-177 computer interface, fair cond, \$400. G Faltus, WZMX, 905 Wetherfield, Hartford CT 06114. 203-296-1175.

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3-line frequency extender package with Shure SM-7 studio mics.
For more info call: Dwight Weller
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P.O. Box 4040, Baltimore, MD 21093
(301)252-8351

Marti STL-8 (2) xmtrs & (2) rcvrs for stereo STL system, will reset to your freq, \$3500. J McKinley, WJMR, 155 N Main, Fredericktown OH 43019. 614-694-1577.

Microdyne 1100-PCDR (5) satellite demodulator/receiver, SCPC, freq agile, compandered, 70 MHz input, excel cond, only one rack unit high, \$1200/BO, you ship or pick up. T Adams, New Wisconsin Radio Reading Service, POB 5541, Madison WI 53705.

Micro Control PTS-10/PRS-10 composite STL system on 947.000 MHz, \$2900/BO; Micro Control RSU-10 composite STL rcvr, automatic switcher, BO. F Anderson, WSCQ, 1440 Knox Abbott, W Columbia SC 29169. 803-791-1653.

Marti M-30B xmtr & matching receiver on 170.15 MHz, works, \$500. G Smith, KORQ, 915-673-2545.

Symetrix TI-101 telephone hybrid, \$300. M Persons, WJY, Box 706, Brainerd MN 56401. 218-829-1329.

Marti RPT-2 dual freq, gd cond, \$800 plus shipping. R Kerbawy, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

Andrew PL 619 C, 6' solid reflector dish w/feedhorn & mount, for TV use in 1.9-2.3 GHz band, \$1400. A Bowab, WDLT, 2402 Wolf Ridge, Mobile AL 36618. 205-344-3698.

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(516) 623-6114

Scientific Atlanta DAT-32 w/7.5 & 1.5 stereo card, also cue. Dale, NW Talk Radio, POB 6808, Oak Grove OR 97268. 503-774-0459.

Moseley MRC-1600 w/92 kHz card, excel cond, \$2100; Moseley SCG-8 185 kHz subcarrier gen & rcvr system, \$800. T Ringer, WI-CO, POB 909, Salisbury MD 21801. 301-742-3212.

Macom MA23CC xmtr, rcvr & antennas, gd cond, 23 GHz, will trade for Moseley PCL 606C or \$7500. C Haynes, WJMW/WORD, 1850 Lynch St, Jackson MS 39203.

Gentner SPH3 telephone hybrid, gd cond, removed from service 12/89, sell/trade. B Harris, KXLT, 5350 S Roslyn St #210, Englewood CO 80111. 303-741-5654.

Moseley SCG-8 FM subcarrier gen & Moseley SCD-8 FM subcarrier demodulator 110 kHz. P Bailion, Miles City Bldg, 1218 Pioneer Bldg, St Paul MN 55101. 612-222-5555.

Rust RC-1000 wire line remote, working when removed, new studio unit selector switch, \$300. H Kneller, WKII, 3151 Cooper St, Punta Gorda FL 33950. 813-639-1112.

Hnat-Hindes telephone interfaces (2), vgc, \$150 ea. G Arroyo, WONO, 2483 John Young Pkwy, Orlando FL 32804. 407-687-9345.

Gentner EFT-900A digital freq extender w/rack mount, \$600/BO. N Scott, KPLA, POB 77, Oakdale CA 95361. 209-847-7700.

Moseley SCG-8 & SCD-8 FM subcarrier gen & FM subcarrier demodulator, 110 kHz. P Bailion, Miles City Bldg, 1218 Pioneer Bldg, St Paul MN 55101. 612-222-5555.

Advanced Microdynamics TC-8 remote control w/ray board; CRL Systems SG-800A FM stereo gen; CRL Systems SEC-800 spectral energy compressor; VersaCount V-322 FM exciter xmtr, \$6000/BO. A Burns, WRLC. 908-932-4105.

Harris 6100/6550 satellite receive station & rcvr, foreclosure sale, \$1500. G Milsteen, WTYN-AM, 1241 E Lakeshore Dr, Landrum SC 29356. 803-457-3568.

TFT 770 non-type-accepted composite dual xmtr/rcvr STL system, 1 xmtr not wrkg, '79 vintage. BO. J Shadle, KRBE-FM/AM, 9801 Westheimer #700, Houston TX 77042. 713-266-1000.

Moseley PBR-15 remote control, studio and xmtr units, BO. L Fuss, WDTL, POB 159, Fayetteville GA 30214. 404-460-6159.

Mosely MRC 1600, Applied Digital Data R/C terminal w/mono video mon, (2) Volkmodem 12 modems, \$2950/all; will consider selling separately. D McIver, KBHL-FM, Box 247, Osakis MN 56360. 612-859-3000.

HME, prof brdcst quality VHF wireless mic system, System 85 mic, RX-722 rcvr, Excalibur aluminum case, \$395. W Clark, Clark and Assoc, 318 E Calhoun, Macomb IL 61455. 309-837-2244.

Trillium Panter II telephone key system, (20) 10-button phones, 2 speakers, KSU, KSS, 1 yr old, \$3500/BO. B Downs, KTRS, Box 3248, Bryan TX 77805. 409-846-1150.

TFT 7601-C remote cntrl syst w/xmtr and (2) studio units, configured for 2 wire telco use, all manuals, spare parts, \$2000/BO. L Lindstrom, WCCO, 1520 N Rock Run Dr, Joliet IL 60435. 815-729-4400.

Harris 6550 rcvr terminal, w/PS, down conv and baseband demod, \$750/BO; Control Resource 1055-B digital multiplexer, w/digital demod, clock recovery and Demux, \$700/BO. L Ayer, KRPL/KZFN-FM, POB 8849, Moscow ID 83843. 208-882-2551.

Want to Buy

Fairchild Dart-384 7.5 kHz dual audio module. J Cole, WBTM, 710 Grove, Danville VA 24541. 804-793-4411.

Any Ku-band TV satellite uplink, portable or not, prefer Ku-band. U George, Satellite TV, 314 West 52nd, NY NY 10019. 212-969-0240.

QEI 7775 FM ATS. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

Satellite rcvr to pick up Unistar Country. B Hearst, WWCH, 725 Wood St, Clarion PA 16214. 814-226-8600.

Gates/Harris RCG-10AC equip to operate xmtr from remote/studio location via phone pairs, older equip OK; Gates RDC-10AC or similar xmtr control and metering unit, both ends or parts, buy/trade. Chip, KCPs-AM, 408 N Main, Burlington IA 52601. 319-754-6698.

Wegener Panda II SPSC rcvr for Transtar format, main frame and card #s 1689, 2046, 1610 (2), 1644 and 1630. R Paskvan, WBJJ, 3516 Mill St, Bemidji MN 56601. 218-751-3077.

Moseley PCL 606/C rcvr in gd cond, any chnl. T McGinley, Cook Inlet, 630 Ivy Ln, Greenbelt MD 20778. 301-441-3332.

Wegner satellite rcvr for SMN or Drake Chenuit satellite services. G Kneisley, WEOL-WNNV, POB 4006, Elyria OH 44036. 216-322-3761.

Composite STL syst, xmtr and rcvr, must be in gd wrkg order and meet FCC bandwidth requirements. B Harris, KXLT FM, 5350 S Roslyn St, Englewood CO 80111. 303-741-5654.

Scale 8000/450 RF preamp. J Steele, WKVX-FM, Box 2525, Kingsland GA 31548. 912-729-6106.

STATIONS

Want to Sell

AM station in Western KY/Southern IL, town of 60,000, gd revenue, presold contracts, financing available, \$135,000 firm. 314-576-0909.

Financing wanted for stereo AM, CP obtained, will serve 3 major markets in SE Arizona. Rex, 1121 Plaza Azul, Sierra Vista AZ 85635. 602-458-5431.

AM & FM radio stations for sale in Central Arkansas, selling all or part, some financing. 501-376-0880 week days, 501-470-1525 nights/weekends.

LPTV CP in Ladysmith VA, hits Richmond, 800 W, chnl 40. 703-569-5308 leave message. 1 kW AM station, E SC town of 7,000, w/5 kW upgrade, \$90,000 w/small downpayment, owner terms. John, POB 649, Alma GA 31510. 803-661-6000.

APPRAISALS, radio, \$600 +expenses, 404-928-7906.

Low pwr TV-CP, chnl 26, buy all or joint venture, CA LPTV, ready to construct; radio station, 1290 AM, Santa Barbara CA, currently dark, \$250,000/as is, \$400,000/back on air. G Erway, Gol LPTV, 46 Freedom Place, Buellton CA 93427. 805-688-9231.

FM SCAs avail in 6 SE markets, 5 Class C, all grt tech facilities, BO. C Davis, Voyager Co, 3201 Glenwood Ave, Raleigh NC 27612. 919-781-7333.

Western PA, 1 kW AM on 960, dark since March, \$65,000, easy terms. B Shannon, WKZA, 5158 Countryside Dr, McKean PA 16426. 814-476-7426.

Class A FM w/CP to upgrade to 50,000 W, located half way between Jackson and Nashville TN, near Loretta Lynn Dade Ranch, \$150,000 w/\$25,000 down, shown only by appt, ref req'd, serious inquiries only. B Coleman, WIST FM, PBO 460, Lobelville TN 37097. 615-593-2294.

Class A FM CP in Quincy CA, excel studio facilities built to lease or buy, BO. R Trumbo, KNLF, POB 117, Quincy CA 95971. 916-283-4144.

Want to Buy

Brdcstr w/29 yrs exper looking for AM/FM or combo radio station, seeking financial assistance and need a no-down arrangement. Gary, Los Angeles. 213-661-6528.

AM/FM station, have no down, seeking financial assistance for start up. G Pinckard, 4930 Franklin Ave, Los Angeles CA 90027. 213-661-8528.

Looking for FM station, in Pacific Northwest, California, Florida or Arizona. 5 kW + desirable, will consider other FM & AM properties. Money for downpayment available, will also consider owner financing.
John Ryan Communications
6214 South Blue Court
Crystal Lake IL 60014
No calls please.

SATELLITE EQUIPMENT

Want to Sell

Scientific Atlanta 7300/7325 digital satellite receiving equip w/15 kHz cards and manuals, \$5000. B Shannon, WKZA, 5158 Countryside Dr, McKean PA 16426. 814-476-7426.

Scientific Atlanta 67300/7325 digital audio rcvr, w/(2) 15 kHz dual audio cards and voice cue card, like new, \$5500. J Zeizer, Sheboygan Brdcstg, 6400 Hawthorn Rd, Sheboygan WI 53083. 414-457-3366.

Want to Buy

3"-4" 950 MHz dish or PARA reflector; also, Marti RPT-2 VHF and UHF. R Paskvan, WBJJ, 3516 Mill St, Bemidji MN 56601. 218-751-3077.

STEREO GENERATORS

Want to Sell

AEL 2203 in gd cond, \$400; RCA BTS-1B in vgc, \$600; Wilkinson SG-1E in gd cond, \$450. J McKinley, WJMR, 155 N Main, Fredericktown OH 43019. 614-694-1577.

BE AX10 & AS10 AM stereo gen & monitor w/manuals, BO. S Murdoch, WFNS, 7201 E Hillsborough, Tampa FL 33610. 813-620-9100.

Moseley SCG4-T 67kHz SCA gen (2), \$250. P Wells, KJQY, San Diego. 619-238-1037.

Moseley SCA SCD-8 & SCG-8, on 185 kHz, like new, \$750/both; Marti SC-910 SCA gen on 67 kHz, \$225. D Jack, Mountain Media, POB 1826, Boise ID 83701. 208-286-7676.

Motorola stereo exciter and mon w/manuals, sounds grt, \$7800. B Shannon, WKZA, 5158 Countryside Dr, McKean PA 16426. 814-476-7426.

Want to Buy

Low pass filter 53 kHz low pass filter for Collins 310Z-2 exciter/stereo gen, urgently needed. J Pearce, KSSS, 2864 S Circle Ste 150, Colorado Springs CO 80906. 719-579-0880.

Optimod 8000A, will pay cash, leave message at 703-276-0125.

SWITCHERS (VIDEO)

Want to Sell

Panasonic WJ 540P B&W, \$150. D Hurd, Harding Univ, Box 853 Station A, Searcy AR 72143. 501-279-4658.

TAPES, CARTS & REELS

Want to Sell

Audico manual cassette loaders (3), \$800 ea or \$2150/all. Katherine, Linden Inc, 229 N Henry, Alexandria VA 22314. 703-524-4424.

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Circle 94 On Reader Service Card

Fidelipac 300 gray, approx 2000 in various lengths, various cond, 50¢ ea plus shipping. R Kerbawy, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

Audiopak NAB Type AA carts (45), excel working cond, various lengths, \$45; Fidelipac NAB Type AA carts (220) in excel working cond, various lengths, \$220. S Dynes, Dynes Comm, 307 S Penn, Wheeling WV 26003. 304-233-8856.

Prod music library 8 vol on LPs, BO; patch panel wired, BO. C Larko Prod, 916 Fairfield Ave, Ft Wayne IN 46802. 219-424-2405.

Country music 57 reels, from 50's, 60's, 70's on 10.5" metal reels, fair cond, 25 Hz tone on tape, \$10/reel. B Anderson, WITGY, POB 9, Charleston MS 38921. 601-647-5600.

Fidelipac 300 gray carts (200), \$1 ea or all for \$150. E Moody, KJEM, 216 N Main, Bentonville AR 72712. 501-273-9039.

Complete nostalgia/big band format w/2780 stereo cuts on 129 metal reels of Ampex 406, w/10 reels of big band Christmas music, excel cond, \$20/reel or trade for equip. S Calahan, WFTI-FM, 1120 Pinellas Bayway, St Pete FL. 813-866-3544.

TM Producer commercial & production library w/cue sheets & newspaper campaign layouts, foreclosure sale, \$250. G Milsteen, WTYN-AM, 1241 E Lakeshore Dr, Landrum SC 29356. 803-457-3568.

The Producer, new 40-record set, never used, commercial beds and used Technic TT, \$400. M Silver, KERVIKRVL, 301 Junction Hwy, Kerrville TX 78028. 512-896-1230.

Wooden cart rack, rotatable, 1200 cart capacity, well built, \$100+shipping. B Gagne, KTCZ-FM, 100 N 6th, Minneapolis MN 55110. 612-339-0000.

Radio programming service w/2 complete music format libraries on 456 Ampex tape and all recording equip. J Gelo, J & H Music, POB 1697, Marco Island FL 33937. 813-642-6899.

FM station surplus audio tapes, 10" and 14" reel music tapes, big band variety, \$20/\$30. F Anderson, 3801 5th Ave S, Great Falls MT 59405.

Fidelipac 300 Gray carts (250), most in gd cond, \$200/all or \$1 ea. E Welch, 182 Monitor Cir, Monks Corner SC 29461. 803-761-7583.

Want to Buy

Jingles used by NBC affiliates for the News & Information Service format in early 70's, usually supplied on 7" reels. R Meyers, Benchmark Comm, 4700 SW 75 Ave, Miami FL 33155. 305-995-1717.

45 and 33 1/3 RPM records from 50s and 60s, grt cond, we pay 50¢-\$100/record, 5% finders fee avail for leads, ref furnished. B Berry, Karavan Brdcst, 13 Montgomery Pl, Conroe TX 77384. 409-273-2801.

Spot prod music libraries recorded prior to '63 on disctape such as Mark Century, CBS, Capitol, NY ad agencies or similar. J Douglas, Original Oldies Show, 402 Shirley Rd, Seaford VA 23696.

TAX DEDUCT EQUIP

5 kW FM xmtr, 2 element antenna, RF wattmeter, 200' coax, sat rcvr equip. T Hunt, KILA, 2201 S 6th, Las Vegas NV 89104. 702-731-5452.

Educ FM station wants IBM or compatible computer w/MS-DOS, 20MB hard drive, floppy drive, monitor, printer; will accept parts to assemble such system; will pay shipping. R Starlipper, WMSS, 214 N Race St, Middletown PA 17057. 717-948-9136.

Bdct training school for underprivileged needs any AM bdct equip for training students unable to attend regular bdctg schools, able to pay shipping on small items. F Smith, The Bdct Training School For the Underprivileged, 2408 Chamberlain, Chattanooga TN 37404. 615-6247126.

Equip for non-profit educ FM in SD needed incl cart machines, bdct console, will also trade. C Hubbell, KTEQ, 501 E St Joseph, Rapid City SD 57701. 605-394-2231.

Tektronix 555 quad-track oscilloscope w/pwr supply & roll around cart, \$800. J McKinley, WJMR, 155 N Main, Fredericktown OH 43019. 614-694-1577.

Leader waveform monitor w/matching vector scope; field intensity meter mod BW-7A 50-270 Mz AM & FM. Dale, NW Talk Radio, POB 6808, Oak Grove OR 97268. 503-774-0459.

Tek 528 waveform monitor, strong tube, recent calibration, all paperwork, \$800. G Rise, Your Video Conn, 31844 Rancho Amigos Rd, Bonsall CA 92003. 619-749-7662.

Technics SH-3433, 4-chnl audio scope, simple oscilloscope, FM multipath scope, \$300/BO. Alan, Calvery Baptist, 1380 Valley Forge Rd, Lansdale PA 19446. 215-368-4444.

Bird 8745-677, 20 kW, water-cooled dummy load, \$750; Dielectric/Sola 1301 wattmeter w/calibrated 50 kW element & 3-1/8" line section, \$250. G Liebisch, WPTF/WQDR, Box 29521, Raleigh NC 27626. 919-790-6315.

Philips PM3226 15 MHz dual trace oscilloscope, excel cond, \$825/BO; Fluke 8050A digital multimeter, \$200/BO. D Gold, Gold Star Rec, 11434 Ventura Blvd, 102, Studio City CA 91604. 818-986-2911.

HP 651B test oscillator, gd cond, \$500+shipping. J Sellmeyer, Rt 1 Box 270, McKinney TX 75089. 214-542-2056.

Leeds & Northrup precision resistance decade box, 0.01-20K ohm, 12 decades, \$100/BO; Hickok 292X RF signal gen, AM mod, tunes 125 kHz-220 MHz, 1950 design, \$50. E Davison, 135 N Illinois, Springfield IL 62702. 217-787-0800.

Potomac Instruments AG-51 & AA-51, vgc, \$3000/BO. B Gray, Gray Audio, 223 W Mountain Rd, W Simsbury CT 06092. 203-658-7786.

HP 334 distortion analyzer & audio gen, both \$550. C Porter, WEAZ, POB 498, Carthage IL 62379. 217-357-3128.

HP 400D VTVM, perfect cond, \$150/BO; Simpson 458 oscilloscope, old but excel cond, \$100. R Fess, WLRB/WKAS, 119 W Carol St, Macomb IL 61455. 309-833-5561.

HP/Harrison 6200B, DC pwr supply

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CCA FM40E FM exciter, 40 W, freq programmable, excel cond, BO. C Genaro, WJMS, 222 S Lawrence, Ironwood MI 49938. 906-932-2411.

Exciters: McMartin B-910 tuned and calibrated to your frequency, guaranteed: Mono, stereo, SCA. Goodrich Ent. Inc. 11435 Manderson St., Omaha NE 68164. 402-493-1886 FAX: 402-331-0638

CCA FM10DS FM exciter needs crystal, BO; CCA SG-1D stereo gen, BO; Moseley SCG-9 stereo gen, BO. C Larko Prod, 916 Fairfield Ave, Ft Wayne IN 46802. 219-424-2405.

Collins 20V2. Dale, NW Talk Radio, POB 68088, Oak Grove OR 97268. 503-774-0459.

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Gates FM-1C 1000 W, tuned to 96.7 MHz, 1960's vintage, gd cond, \$3500 or trade for equip. C Hubbeling, KTEQ, 501 E St Joseph, Rapid City SD 57701. 605-394-2231.

Harris 5 kW FM w/MX-15, gd cond, \$14,500. P Wolf, WZCR, 2010 San Carlos Blvd, Ft Myers Bch FL 33931. 813-574-5548.



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Gates BC1F tube complement, pwr & modulation transformers, plus other iron. BO. J Swearingin, WARU, Box 24 East, Peru IN 46970. 317-473-4448.

Collins 310Z-2 FM exciter, excel cond, \$2000. M Persons, WJYJ, Box 706, Brainerd MN 56401. 218-829-1326.

Collins A830 (2) 10 W hybrid exciter, gd cond, \$700 ea. J McKinley, WJMR, 155 N Main, Fredericktown OH 43019. 614-694-1577.

Collins 250B FM, 250 W tube. Bob or Sam, WLSU, 1725 State St, La Cross WI 54601. 608-785-8380.

Harris MS-15 exciter composite input, \$2000; Harris FM2.5H3, tuned to 92.1, TE-3 exciter, \$12,000; Harris FM2.5H3, working when removed from 105.5, TE-3 exciter, \$8000. D Bryan, WCAZ, POB 498, Carthage IL 62321. 217-357-3128.

RCA BTA1R, 1 kW AM w/dummy load, foreclosure sale, \$1000. G Milsteen, WTYN-AM, 1241 E Lakeshore Dr, Landrum SC 29356. 803-457-3568.

LPB AM-30 w/TCU-30 coupler, complete carrier current station, or low pwr standby xmtlr w/4 xtals, mint cond, will only sell together, \$850. Steve, POB 4926, Woodland Park CO 80866. 719-687-8873.

TTC XL10 10 W FM translator, like new, w/manual, \$1850. G Jones, SW Mediacast, 110 Sierra Rd, Kerrville TX 78028. 512-367-4587.

Gates FM5C 5 kW FM xmtlr, \$3000/BO. T Tucker, Desert West, POB 36717, Tucson AZ 85740. 602-797-1008.

CSI 25,000 25 kW AM xmtlr, tuned to 1200 kHz, like new, \$30,000, you ship; CSI T-1000A 1 kW AM xmtlr, tuned to 1480 kHz, vgc, \$7000, you ship. G Arroyo, WONO, 2483 John Young Pkwy, Orlando FL 32804. 407-687-9345.

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Harris/Gates FM 1G, 1000 W FM xmtlr, gd cond, w/Collins A830 exciter, \$5000; Harris/Gates BC5P2 5000 W AM xmtlr, low hrs, \$7500; late model Marti RPT 25 2-chnl RPU xmtlr & matching RR50/450 rcvr, like new, \$2000/both; late model Marti RPT 40 2-chnl RPU xmtlr & matching RR 30/150 rcvr, on 161.70 & 161.76 MHz, like new, \$2000/both. R Wright, 1208 N Locust Ave, Lawrenceburg TN 38464. 615-762-6200.

Harris MS-15 stereo, gd cond, 1750/BO. C Edwards, WWJM, 210 S Jackson St, New Lex OH 43764. 614-342-1988.

Sparta 701 1 kW AM xmtlr, tuned to 1190 kHz, vgc, \$6000, you ship; RCA BTA-10U2 10 kW AM xmtlr, tuned to 1220 kHz, vgc, \$15,000, you ship or trade for console & STL equip. G Arroyo, WONO, 2483 John Young Pkwy, Orlando FL 32804. 407-687-9345.

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TTC/Wilkinson 2500J FM xmtlr w/TTC X exciter, 6 yrs old, on 100.9 MHz, excel cond, avail 7/1, also have antenna and transmission line. Dan, KDEC/KRDI, Highland Dr, Decomb IA 52101. 319-382-4251.

Collins 21 E/M AM xmtlr, most tubes replaced w/SS, may operate at 1-5 kW and/or adapt to 10 kW, \$4500. K Crosthwait, WTNN, 13206 Buttermilk Rd, Knoxville TN 37932. 615-531-2297.

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RCA BTF 3A 3 kW FM xmtlr, wrkg when removed, \$500. K Guenther, KYKA-FM, 1214 W Lincoln Ave, Yakima WA 98902. 509-453-6296.

Thompson CSF 334583 chnl 2 TV xmtlr w/synthesized offset, 10 W, excel wrkg cond. R Paskvan, 3516 Mill St, Bemidji MN 56601. 218-751-3077.

LPB AM-30 xmtlr w/TCU-30 coupler, complete carrier current station or low pwr standby xmtlr, w/4 xtals, mint cond, \$850/all. Steve, POB 4926, Woodland Park CO 80866. 719-687-8873.

RCA BTA10 10 kW xmtlr, \$8000; RCA-50H 50 kW xmtlr, \$12,000. V Stone, WVMO, POB 81, Cascade VA 24069. 804-685-3128.

QEI 675T20 meter panel for low pwr FM xmtlr, reads RF output, SWR and voltages, \$100. S Lawson, KAK Prod, 928 Highland Dr, Santa Rosa CA 95404. 707-528-4055.

Harris FM-1H w/exciter and harmonic filter; 6-bay antenna tuned to 93.5 and 220' 1 5/8 feed line, wrkg when removed; BO ea. M McDaniel, WBTO, Linton IN 47441. 812-847-9830.

Harris FM 3.5 K, 3-yrs old, like new. Harris FM-35K, 2-yrs old, like new. Continental 802-A Exciter, excellent. Plus many sizes of Coax Line. ALL priced to sell. (816) 635-5959

Wilkinson FME-10 Solid State FM exciter, \$750/BO. P Keogh, 414-499-1336.

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McMartin B-910 FM exciter's. C Goodrich, 11435 Manderson, Omaha NE 68164. 402-493-1886.

McMartin BF-25K, 27.5 kW FM tuned & tested to your frequency by the original designer. Guaranteed: Also have Bauer 707. Goodrich Ent, 11435 Manderson St, Omaha NE 68164. 402-493-1886 or FAX: 402-331-0638

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FM 3-or 5 kW xmtlr or PA in gd working order, price negotiable, prefer Harris, Collins, Continental, shipping arranged, please fax details. Terry-McGee, Canberra Stereo Public Radio, Canberra, Australia. Phone 61-6-2816286 or fax 61-6-2810020.

FM exciter, under \$400. A Branch, KYAY, 2402 Woodridge Dr, Decatur GA 30033. 404-325-7847.

Harris 5 kW AM, MW-5, MW-5A or MW5B, or Collins 820E, or Continental 315R. G Patschke, KIJN, POB 458, Farwell TX 79325.

Jones V-317 10 W single or dual FM translators n working order, \$1000. J Stromquist, WNCB, 2828 Piedmont, Duluth MN 55811. 218-722-3017.

Resistor for Bird 8754 water cooled load, or rebuild kit. J Schloss, KICD, POB 7248, Spencer IA 31301. 712-262-1240.

Harris MW-1 for use on 920 kHz, must be in pretty gd cond, \$6-8K. D Seavy, KROL, 122 SW 4th, Rochester MN 55902.

Harris 10K FM, w/MX-15 harmonic filter. 8-Bay antenna on 97.7 MHz. 380' heliax, 1 5/8 foam, (4) stereo gen & audio processor. 8 chnl audio consoles, (4) cart machines, STL's.

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FM xmtlr, 4-10 kW for non-profit Christian station, cash or tax deductible receipt, will pick up. D Van Zandt, WJLU, 2596 SR 44, New Smyrna FL 32168, 904-427-9000.

FM 10 kW, no PCB's, need by April, single phase preferred. P Saldis, KPCR, POB 1, Bowling Green MO 63334. 314-324-2283.

Gates FM-1B 1 kW for parts, plate transformer needs to be working; Gates M-5534 exciter for parts. J Richardson, KXIQ, POB 37, Clarksville AR 72830. 501-754-2076.

Dry xmtlr, 480V to 12,000V, 3-phase, 120 KVA. N Scott, KPLA, POB 77, Oakdale CA 95361. 209-847-7700.

RCA BTA 250K xmtlr manual/schematic. S Thompson, 1031 San Antonio, Alameda CA 94501. 415-521-1429.

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10 kW FM, 10 yrs old or less, prefer single phase pwr. P Salois, KPCR, Box 1, Bowling Green MO 63334. 314-324-2283.

FM exciter w/stereo gen, under \$1000. T Rosen, KBCC, 1129 Acacia Ave, Bakersfield CA 93305. 805-871-6094.

CCA 20 kW xmtlr equip, studio equip, translator and related equip. M Ebron, WOTJ-FM, Rt 2 Box 391, Morehead NC 28557. 919-240-1600.

Low pwr FM xmtlr, 250-500 W for booster, must be FCC approved and in gd wrkg order. B Harris, KXLT FM, 5350 S Roslyn St, Englewood CO 80111. 303-741-5654.

Two 25 kW FM's, (1) 5 kW FM, (2) 10 bay FM antennas, (2) 500' lengths 3" air coax w/connectors & hardware, (1) 500' length 1-5/8" air coax w/connectors & hardware. P Titchenal, KDHL/KOCL, 507-334-0061 or Fax 507-334-7057.

McMartin AM/FM xmtlr, any model, exciter or stereo modules. Goodrich Ent., 11435 Manderson, Omaha NE 68164. 402-493-1886.

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1973	RCA BTA 20E1, 20 kW FM	1981	McMartin BA2.5K, 2.5 kW AM
1972	Harris/Gates FM20H3, 20 kW FM	1980	McMartin BA5K, 5 kW AM
1971	Harris FM20H3, 20 kW FM	1972	CCA AM5000D, 5 kW AM
1975	Collins 831G2, 20 kW FM	1977	RCA BTA 5L, 5 kW AM
1976	CCA AM 50,000, 50 kW AM	1972	RCA BTA 10U, 10 kW AM
1975	Harris MW50B, 50 kW AM	1980	Cont. 316F, 10 kW AM
		1974	Collins 820E/F, 10kW AM

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Western Electric 417A & 412A 9 pin triodes, \$12 ea. J McLane, ODD-E-O, 115 W Gutierrez, Santa Barbara CA 93101. 805-963-3941.

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TURNTABLES

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Audio Technica stylus ATP-N2, \$12 ea; RCA 8707242-B1 tone arm, \$40; Harris 994-6890-00 equalized preamp, \$35; tonearm w/2 bases, (2) tonearm rests, (2) head shell & weights, \$65. S Dynes, Dynes Comm, 307 S Penn, Wheeling WV 26003. 304-233-8856.

Technics SP-10MKII (3) in gd cond, \$600 ea. J McKinley, WJMR, 155 N Main, Fredericktown OH 43019. 614-694-1577.

Technics SL-1200 (2), new, \$300 ea. P Wolf, WCRM, 241 NE 10th Ave, Cape Coral FL 33909. 813-574-5548.

Technics SP-25 (2) w/S-220 tonearms, \$300 ea/BO. G Fullhart, WVKs, 4665 W Bancroft, Toledo OH 43615. 419-531-1681.

Technics SP-15 quartz direct drive w/preamp in gd cond, BO; Technics SL-D1, working but older mdl, BO. A Bowab, WDLT, 2402 Wolf Ridge, Mobile AL 36618. 205-344-3698.

Ramko SP-8E stereo TT preamp, \$50 plus shipping. R Kerbawy, WTNJ, Box 1127, Beckley WV 25802. 304-877-5592.

QRK 3-spd w/matching Microtrak tonearm & (2) Gates M6244 TT preamps, complete, vgc, TT motor-mount needs new screws, \$215, B Werlime, 207-Leitersburg Rd, Greencastle PA 17225, 717-597-2213 between 2-6 PM.

Sparta MCA-1 TT controller, gd cond, BO/trade. J Roper, Imperial Studios, 383 N Studio, Terra Haute IN 47803. 812-877-2663.

Technics SP-10 MKII w/Micro-Trak arm, no base, gd cond, \$300/BO. B Gray, Gray Audio, 223 W Mountain Rd, W Simsbury CT 06092. 203-658-7786.

Stanton 310B prof stereo phone preamp, brand new, balanced output, HF adjustable; Technics SP-15 (2), brand new in box; SP-15 on black base w/tone arm, gd cond; sell/trade. B Harris, KXLT, 5350 S Roslyn St #210, Englewood CO 80111. 303-741-5654.

Gates CB77, vgc. Shure and MT 303 arms, \$95; no arms, \$75. B Kuhar, 1543 Eaton Ave, Bethlehem PA 18018. 717-645-8814.

QRK 12C, w/S-20 Rek-O-Kut tone arm, vgc, BO by 6/91. B Spitzer, KKL/SKKMK, Box 460, Rapid City SD 57701. 605-343-6161.

Want to Buy

RCA, Presto disc recorders & assoc equip, blanks, needles & pre-recorded acetates or pressed transcriptions. B Davies, Virgo Prod, 5548 Elmer, N Hollywood CA 91601. 818-761-9831.

Need motor mounts for (2) Gates CB11 16" TTs. L Townsend, Imaginary Entertainment, 332 N Dean Rd, Auburn AL 30830. 205-821-7156.

Rek-O-Kut TT & Fairchild 16" arm which play old 78 rpm AFRS records. R Lamb, POB 8159, Portland OR 97207.

Disc recording equip accessories, heads, amps, limiters, needles, blanks, manuals, literature, etc. K Gutzke, Custom Recording, 7134 15th Ave S, Minneapolis MN 55423. 612-866-6183.

Rek-O-Kut M125 lathe lead screw parts. J Parsons, 10375 Cannas St, N Huntingdon PA 15642. 412-863-9590.

Gates CB500 or others, prefer wrkg w/arms. R Osborne, WMCV, Box 667, Ravenswood WV 26164. 304-273-2544.

CMX Edge A/B controller w/Sony Type V interfaces, gd cond, \$1800. G Sive, Your Video Conn, 31844 Rancho Amigos Rd, Bonsall CA 92003. 619-749-7662.

Panasonic Edit System S-VHS (2), AG-1960's w/A95 edit controller, low hrs, perfect cond, w/manuals, \$2000/tirm. R Larson, Larson Prod, 3 Braden St, Pl. ME 04769. 207-764-3770.

Laird VC2000P video processor, \$600; JVC BR6400 1/2" VHS source deck, rack mount kit, RM P53U hand held remote control, \$1000; Sony RM300 handheld auto search control, \$100. D Hurd, Harding Univ, Box 853 Station A, Searcy AR 72143. 501-279-4658.

Convergence 195 LM editor w/Type 5 cards, like new, \$3750. R Peterson, Pacific Comm, 1801E 4th Ave, Oly WA 98506. 206-754-7081.

Sharp AP55, \$100; JVC CD1636 (new), \$300. J Parsons Sr, 10375 Cannas, N Huntingdon PA 15642. 412-863-9590.

Sony LDP-1000 industrial laser video disk player, plays CAV & CLV disks, w/external sync & subcarrier inputs for use on line, RS232C serial port for computer interface, RM1002 remote, flight case, \$500. J Krepol, RNDL, 6147 Walker St, Philadelphia PA 19135. 215-624-1050.

JVC RM82V video editing controller for JVC 3/4" editors, excel cond, \$225. G Ormrod, GFO Prod, 432 E X St, Tumwater WA 98501. 206-352-8028.

Convergence 195 LM editor w/type 5 interfaces, 3 yrs old, excel cond, 3750. R Peterson, Pacific Comm, 1801 E 4th Ave, Olympia WA 98506. 206-754-7081.

Echolab SE2 6-input 2-buss special effects gen w/Sony CG101 color sync gen; TEK RM529 waveform mon; (2) Hitachi 14" color video mon, excel cond, \$2000/BO. J Krepol, RNDL, 6147 Walker St, Philadelphia PA 19135. 215-624-1050.

Bosch Compositor dual-chnl character gen, (2) keyboards, graphics compose console election pkg, working cond, \$1800; Chyron RGU-1 dual-chnl character gen, (3) keyboards, 2-me-colorizers, remote panel, manuals, disks, in use now, \$8500. Roman, World Video, 10625 Scripps, San Diego CA 92131. 619-695-1045.

JVC RM820 video editing controller for JVC 3/4" editors, excel cond, \$175. G Ormrod, GFO Prod, 432 E X St E, Tumwater WA 98501. 206-352-8028.

Want to Buy

RGB encoder for converting composite video to RGB signal. B Cooke, GBC Electronics, 125 Birch St, Blountville TN 37617. 615-323-2976.

Edutron CCD 2H-2 tech manual, will pay for Xerox and related costs. R Carlsen, Univ of Wash, M/S SB 54, Seattle WA 98195. 206-543-8455.

VIDEO TAPE RECORDERS

Want to Sell

JVC CR4400U 3/4 port recorders (4) w/access, \$800 ea/BO; (3) Sony RM-430 edit controllers, \$500/BO; JVC BR-6400U VHS recorder, \$1500/BO. T Quinn, Monte Vista St, 208 Cherry, Capitola CA 95010. 408-475-0423.

VIDEO PROD EQUIP

Want to Sell

Sony AC-2400 & AC-3400 power supplies, BO/trade. J Roper, Imperial Studios, 383 N Studio, Terra Haute IN 47803. 812-877-2663.

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