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Eureka-147
Standardization on hold;
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wide. **See page 4.**

Vol 17, No 17

Radio's Best Read Newspaper

September 8, 1993

More Digital Delays The Safest Prediction

*Politics, Technology,
Money Shortage Stall
Digital Broadcasting*

by Randy Sukow

WASHINGTON The digital audio radio (DAR) standards process in the U.S. is a bit muddled just now.

On the surface, DAR progress appears to be steady. Five DAR systems have agreed to testing by the Electronics Industries Association (EIA) and the National Radio Systems Committee (NRSC).

A suitable testing laboratory, NASA's Lewis Research Center in Cleveland, has been reserved.

Detailed test procedures are almost completely formulated.

A date to begin lab tests, Dec. 31, 1993, is set (albeit nine months after the original EIA target date). EIA and NRSC have obtained promises in writing that the start-up date will not slip beyond that date.

Perhaps most importantly, the terrestrial radio industry has coalesced around in-band, on-channel (IBOC). It is intended to be the DAR technology that insures competitiveness with other digital audio media and a link to the switched digital universe of the future, that at the same time does nothing to disrupt radio's current business environment.

Girded by uncertainty

At the same time, the entire process is girded by uncertainties that place the very existence of a U.S. digital radio business in doubt.

"The standard-setting is just so loose right now that I've been telling people

that I don't see much happening with DAB for the next year," said John Abel, executive vice president, operations, National Association of Broadcasters.

The test procedures may be near completion, but they are still a source of potentially divisive disagreements among the developers.

The FCC's enthusiasm for DAR (not to mention who will even sit on the FCC a year from now) is unknown.

Or, the FCC could take a sudden, active interest in DAR and rapidly approve transmission of the many available satellite radio systems before terrestrial radio agrees on a system.

IBOC progress has been encouraging, but it is taking longer than expected. On the eve of lab testing, the basic question—Will it work?—remains unanswered.

If lab tests ultimately prove IBOC is substantially inferior to the proven, but unpopular Eureka new-band terrestrial system, will broadcasters reconsider the new-band approach? Many undoubtedly will not, opting instead for no digital system of any kind.

Even if broadcasters were to have a

continued on page 10 ►



The Miami Beach Convention Center will be the site of the **Society of Broadcast Engineers** National Convention. See story page 37.

Country Format Rules

by Mark Strausberg

WASHINGTON The Country radio format is much like the Energizer Bunny—"It keeps going and going." It seems nothing can top the Country format, as it remains the No. 1 format in the U.S., according to figures compiled by The M Street Radio Directory. There

are more stations now carrying country than there were two years ago, and industry insiders expect it to only grow.

The No. 2 format, Adult Contemporary, is dwindling, but still has a strong hold on the 2nd largest format in the country. However, the No. 3 format, News/Talk/Sports, has made a comeback and many industry insiders expect it to continue to increase.

Why is country so popular? There are a few explanations. One explanation, according to Ed Shane, principal and programming consultant at Shane Media Services, is the style of country itself. "It's good clean music sung by nice people. You can go up to them and they'll be happy to give you an autograph." He also credited weaknesses of the other formats for Country's popularity.

John Parikhal, a consultant at Joint Communications, said "People want songs they can sing along to that tell a story." Another reason industry experts agree upon is that production values are high.

Kent Burkhardt of Burkhardt/Douglas & Associates said another reason was "The repetitive refrains are appealing not only to women, but also to men."

Add to that the continuous evolution of the music and its audience. In the country format, like AC and rock before it, there is the hint of fragmentation. Insiders do not expect a sharp split, but they do see Country being fragmented into different types, with a younger, newer country and an older, more traditional country.

Shane believes the fragmentation is not so much music driven but target audience driven. According to Shane, the old country appeals to those over the age of 32, but it is

continued on page 17 ►



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NEWSWATCH

RF Docket Comment Deadline Extended

WASHINGTON Based on a request by the National Association of Broadcasters (NAB), the FCC extended the comment deadline for Docket 93-62, "Guidelines for Evaluating the Environmental Effects of Radio-frequency (RF) Radiation."

The comment period was extended from Aug. 13, 1993 to Nov. 12 1993. The customary reply period that follows the comment deadline is now Dec.

13, 1993 for the docket.

The NAB argued that the comment extension was necessary to complete a study it undertook to come up with measurement techniques for the impending new RF exposure standard that is part of Docket 93-62.

KKIS License Renewed, Station Fined \$25,000

PITTSBURG, Calif. The FCC renewed the licenses of KKIS-AM-FM last month, but

imposed special reporting conditions and a \$25,000 fine for Equal Employment Opportunity (EEO) violations.

Several civil rights had argued that the station's license should be subject to hearing, but the Commission said the renewal was justified. Conditions include a short-term license period.

Stations Required To Pay Annual FCC Fees

WASHINGTON Because of a last minute legislative deal, radio stations will be assessed an annual fee of \$250-\$900, depending on technical classification, as part of the federal

budget legislation passed by Congress and signed by President Clinton last month.

The fees will be: Class D AM Daytime, \$250; Class A AM Fulltime, \$900; Class B AM Fulltime, \$500; Class C AM Fulltime, \$200; and Construction Permits, \$100. For FM stations the annual fees are: Class C, C1, C2 and B FMs, \$900; Class A, B1, and C3, \$600; and Construction Fees, \$500.

According to the National Association of Broadcasters (NAB) Spokeswoman Lynn McReynolds, the group is "very unhappy" about the user fees being added to the budget bill late in the process.

SMPTE to Join Fall Super Show

WASHINGTON The Society of Motion Picture and Television Engineers is joining the pack of broadcast-industry trade associations forming an annual fall "super show," starting in 1994.

In early August, the National Association of Broadcasters agreed to merge its fall radio show with the annual Radio-Television News Directors Association (RTNDA) and Society of Broadcast Engineers (SBE) annual conventions in an effort to reduce costs for registrants and exhibitors, many of whom appear at all of the shows.

SMPTE represents a major addition to the collaboration. Its annual attendance (over 11,000 last year) is far greater than the other three shows, which tend to draw between 1,000 (SBE) and 6,000 (NAB).

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Radio Handles Floods

by Bob Kirby

KANSAS CITY As the errant water of the Mississippi flowed to the Gulf of Mexico, the Great Flood of 1993 challenged the technical abilities and ingenuity of engineers and programming staffs in markets across the watershed.

None of the stations contacted suffered physical losses to flood waters. But numerous stations and vendors reported lightning damage from a very stormy spring.

"We've seen lots of lightning-related rush shipments go out," said Linda Baker with Harris Allied Broadcast Equipment, Quincy, Ill., "but none due to flooding."

"Our FM was down two days due to lightning," said Jon Book, chief engineer of WOC(AM) and KUUL(FM), Davenport, Iowa. Book patched the transmission line breach with insulation putty under electrical tape and was operating at 40 percent normal power until permanent repairs could be made.

In the area known as Quad Cities (Davenport, Iowa; Moline, Ill., Bettendorf, Iowa; and Rock Island, Ill.), WOC is the news/talk station. Phone-ins and live remotes were important elements in WOC's coverage. "We don't need more RPU gear, but I do intend to budget for more two-ways, 800 MHz SMR trunked units, in the future," Book said.

Continual information

WKBF(AM) and WPXR(FM), Rock Island, Ill., operations manager Terry Simmons said his stations produced hourly updates and broke format for urgent information. News Director Nick Linberg, with WLLR-AM-FM Moline, Ill., said he produced numerous public affairs programs.

KJOC(AM), Davenport, Iowa, and WXLP(FM) Moline, Ill., covered flood

efforts extensively, airing updates during each stopset and relying on a Marti-equipped reporter, according to General Manager David Bevins.

Des Moines chief engineers were challenged by the loss of most public utilities. Telephones were disrupted when the US West central office and a downtown cell site were flooded. Power was off in much of the city. Some stations, those with large generators cooled by city water, were briefly dark after the city lost its water supply.

It was frustrating for Raleigh Rubenking, chief engineer for WHO(AM) and KLYF(FM). "Ours is a 100 kW generator, enough to keep the consoles up and allow minimal TV lighting and studio operations. When we lost the generator, I used a 3.5 kW generator powering a Shure mixer, headset and the STLs. We split the signal out of the mixer and fed AM and FM," he said.

WHO broadcasts a mix of local and network talk shows, "but we were non-stop local for four or five days, 24 hours a day," Reporter Gary Barrett said.

Make contingency plans

What lessons were learned? "We're going to make sure everybody knows how to get us back on the air," Barrett said. "We thought we had every contingency covered. Nobody could have guessed we'd lose our generator due to loss of water. Our engineers did a good job with bailing wire getting us back on-air in short order, considering."

The staff of Des Moines' classic rock station, KFMM(FM), developed a sense of humor about their situation. Located in a renovated warehouse area known as the Court Avenue District, staffers commuted to work *by canoe*. The studios are on the first floor at loading-dock height. "By July 12th, water was six inches from our door. We remained dry, but the

continued on page 8 ►

by Bob Kirby

DES MOINES Local radio station WHO(AM) Des Moines, Iowa, has an affinity for U.S. presidents.

Being in the heartland of the country, presidents have always found their way here for one reason or another. Long before he became a politician, Ronald Reagan used to call ball games over the air from WHO.

So it was only natural that President Bill Clinton would stop by and take a few calls while touring flood-ravaged Iowa during the apex of the disaster.

WHO news-man Gary Barrett recounted President Clinton's station stop. "His visit to Des Moines and to the studios helped morale a lot," he said. "At the time, the community needed a pick-up. It seemed like nothing was gonna end—the rains, the lack of (city) water."

The president is coming

After receiving confirmation the president would visit, an ad hoc network quickly was established. "We

have a SCPC uplink on Galaxy 6 for our Palmer Radio Network," Chief Engineer Raleigh Rubenking said. "That event was picked up by most anyone who wanted it."

Audio by phone

Rubenking said program audio also was fed to a bank of dial-in auto-coupled phone lines.

The program aired live on WCCO (AM), Minneapolis, KMOX (AM), St. Louis and KCMO (AM), Kansas City, among others, and CNN cameras gave cable viewers scenes of the president answering questions about federal flood relief and taking calls from WHO listeners.

Barrett said presidential security was relaxed, and the president was very friendly with the staff. "The staff here had been working 24 hours a day. And he made a point of shaking everyone's hand. He went out of his way to let everyone know he was concerned. We've had Bush and Reagan here, and security was so tight they wouldn't let Average Joe staff member get even close."

President Visits Midwest; WHO Des Moines Covers Stop

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New Wrinkle in Eureka-147 Plan

by Alan Carter

COLOGNE, Germany The fate of Digital Audio Broadcasting (DAB) in Europe—and the potential of its prospects worldwide—took another turn when the consortium developing the Eureka-147 broadcasting system delayed standardization and opened membership to those outside Europe.

Rather than being an European system developed by and for Europe, it now seems those behind the Eureka-147 DAB system want to adapt the proposal for international use.

The decision, however, does not appear to be unanimous. European broadcasters that are members of the consortium wanted to go forward with standardization by the European Technical Standards Institute (ETSI) and the International Radio Consultative Committee (CCIR). But manufacturers carried the vote to withhold the documentation.

Aftermath of ARD

The two-fold action approved in mid-August by the consortium, composed of European broadcasters and manufacturers, came three months after the ARD, the federation of German public broadcasters, unexpectedly delayed consideration of implementing Eureka-147 from 1995 to 1997 citing financial restrictions and questions surrounding frequency allocation.

Egon Meier-Engelen, who directs the Eureka-147 project at the German Aerospace Research Establishment here in Cologne, said the vote by the consortium was a reaction to the "unfortunate decision" by the ARD.

Manufacturers that want to join the consortium will have to pay 150,000 DM, or approximately US\$88,000. The money will be allocated to marketing and promotion, Meier-Engelen said.

"We would like for the system to become a worldwide standard and find strong allies," Meier-Engelen said.

He confirmed that the broadcasters pre-

ferred to go forward with the standardization process. But there was a "high majority" of manufacturers who wanted to delay the process. The consortium said it would make a decision on releasing the documentation no later than December 1994. Some sources suggested European manufacturers want to maintain control of building the equipment, and the decision to open membership to the international community was a compromise to allow the delay of standardization.

Meier-Engelen said the consortium would be open to any new members, but there will not be "substantial" changes made to the Eureka-147 proposal. "We don't want to disregard what we have been doing and develop a new specification," he said.

Waiting for receivers

While there is transmission equipment available, according to Meier-Engelen, from Thomson-LGT in France and Telefunken Sendertechnik in Germany, there are only a few experimental receivers.

Meier-Engelen said one of the first companies expressing interest in joining the consortium is Pioneer. He also estimated that receiver manufacturers could have product available within 18 months notice once stations are ready to go on the air.

On the air

Test broadcasts are on the air in Germany in Munich, here in Cologne and planned for Berlin this autumn.

In the U.K., the BBC will begin tests this year within the M25 motorway that circles London. Henry Price of the BBC said from his London office that the BBC "is very keen" on the technology, the governing board of the BBC has not made a final decision on DAB implementation.

Meier-Engelen noted that the French plan to put two transmitters on the air for test transmissions this autumn to cover Paris and the suburbs and other test transmissions are on the air in Sweden. He also said there is strong interest from Norway,

Denmark and Italy.

From Toronto, Canada, where extensive Eureka-147 developments for L-band broadcasting are underway, Steve Edwards, who is corporate engineering vice president for Rogers Broadcasting, said important to Canadians is the action can speed the process of receiver develop-

ment and manufacturing.

In the U.S. where commercial broadcasters are more interested in a system that does not require new frequency, one developer was optimistic about the opportunity still available for a different approach.

"Our focus is to submit an AM DAB and a FM DAB system simultaneously to the NRSC testing," said Paul Donahue who is engineering vice president for Gannett Radio based in Los Angeles and a developer of the USA Digital Radio in-band on-channel (IBOC) system.

Mergers & Basketball

WASHINGTON It is convention time again and many of you will be reading this column in Dallas, site of this year's NAB Fall Radio Show. The buzz around here is that business will be good, and if you checked out our preview issue, you know that it was our biggest fall show preview ever. Lots of companies will be displaying lots of goods and services for your broadcasting pleasure.

This issue is packed full of good stuff for you as well, including Randy Sukow's analysis on digital radio. As we were doing the final proof on the issue,



there was a latebreaking story on the Eureka-147 DAB Consortium which could have positive repercussions for the U.S. digital proponents. The story is important enough that I gave up part of this page to bring it to you. (There really was nowhere else to put it—we had so much other good stuff.)

Speaking of NAB, RW's Dream

Team will be playing in Dallas. Regulars will be receiving a personal invitation to play again from Computer Concepts' Sean Bowers. All the logistical details were not available as we went to press, but: There will be a game on Saturday, Sept. 11, sometime around 5:30 a.m., somewhere in Dallas. Swing by the Computer Concepts booth (No. 345) for details, or, if you read this before the show, call Sean Bowers at 800-255-6350.

★ ★ ★

Convention time always seems to mean a flurry of business activity behind the scenes. Two important deals have just been announced. Transmitter manufacturer LARCAN Inc. will acquire controlling interest in Television Technology Corp. (TTC). The companies have signed a Memorandum of Understanding which calls for LARCAN to acquire a controlling interest in TTC and is subject to fulfillment of a number of conditions.

Harman International Industries Inc. confirmed that it has an agreement in principle to acquire a majority interest in Austria-based microphone maker AKG Acoustics. The agreement includes an option to acquire the remaining minority interest. The acquisition is subject to approval by the respective boards of directors.



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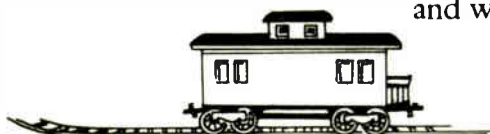
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EBS: Who needs it?

Dear RW,

An RW editorial (Aug. 11) notes that EBS is not needed to warn of "obvious" floods, but that such a system would come into play when waters overrun the treatment plan, contaminating household water.

Funny, but that's just what's been happening here along the flooded Missouri, and EBS played no part in heroic efforts by dozens of local broadcasters to get word to those affected—just as it played no part in Hurricanes Hugo or Andrew, the San Francisco earthquake, California fires or even the Gulf War.

What about this new EBS? I fear it only replaces a radio station daisy chain with a government daisy chain.

Instead of the sheriff calling us directly about a tornado, the sheriff calls some district office, which calls some regional office, which calls some central office, which calls a sleeping bureaucrat, and so on.

Elsewhere in your publication you point out that the only possible valid national EBS message involves thermonuclear attack, an event I personally do not wish to be aware of. Only local emergencies remain, and we local broadcasters have proven for decades that we do a pretty darn good job of handling them without EBS.

I have two proposals: 1. Make EBS voluntary. If it really works, we'll gladly embrace it. 2. Eliminate it.

Shellby L. Hendee, president
KMRN-Cameron, Mo; KAYX,
Richmond, Mo.; and
KLEX, Lexington, Mo.

Dear RW,

After more than 40 years of failure, one might concede it's time to admit the idea is flawed. But the Emergency Broadcast System hoopla continues with no one asking, "Why?"

Can anyone honestly say that if we never had EBS, the public would be uninformed

in case of an emergency? The broadcasters I know are ahead of EBS. The NOAA/NWS alarm box beats EBS. EBS is nothing more than a bureaucratic perpetuation of an idea that was obsolete long ago.

Like many governmental programs gone sour, the original idea, ConElRad, probably had merit. This was before TV had blanketed the nation and we had a very nervous nuclear threat. But President Kennedy didn't even use ConElRad during the Cuban Missile crisis. The only time there was any real national stir about EBS was when some AP operator mistakenly sent a real alert down the wire instead of the usual test.

As the federal government searches for ways to cut spending, now would be an excellent time to eliminate the FCC's EBS office. I am sure the people in that office would be assimilated elsewhere, so the spending cuts would be minimal, but think of the savings to the broadcaster. Not just the initial outlay of \$750 to \$3000 that we hear mentioned as "ballpark" costs of the new gear, but maintenance savings and freedom from heavy fines for equipment that's not working properly.

In my real world, which I acknowledge is well outside the Beltway and away from major population centers, we have radio and TV stations that still sign off at various hours of the night. In many small markets, the 2 a.m. "surprise" emergency message is a phone call from the overnight cop or civil defense person who has fired off the big siren already and needs you to sign on the station and tell the folks why they are being awakened.

Where does EBS fit into this picture? Does the station operator need the two-tone warble to precede the announcement of an imminent tornado?

Isn't it time we end this antiquated program? If for one second I thought that just one listener or viewer would be put in jeopardy by not continuing EBS in any form, I'd be on the bandwagon. But the "broadcasters in your area" are doing just fine without any two-tone warble, or whatever might be dreamt up as its successor.

William L. Spitzer
WLS Communications
Rapid City, S.D.

Dear RW,

Thank you for your recent coverage of the EBS field test in Denver. Those of us who are involved with EBS on the local level are all watching with great interest as we move into the next era of emergency communications.

In my opinion, the most vocal critics of the current system come from the areas where the local broadcasters and local governments fail to understand or participate in the planning and implementation of the system. In North Carolina, we have an effective system that can and does inform the public in the event of an emergency. It is far from perfect, but works because of the active participation of the N.C. Department of Crime Control and Public Safety, local governments, and local broadcasters.

Any new system will only work as well as the people who use it. Conversion to a

Time Well Spent

A few months ago—as digital audio radio tests originally scheduled for late 1993 completion were sliding toward a mid-1994 timetable—this page asserted: "There should be no cause for alarm if tests are delayed even more."

Now that tests have, in fact, been delayed again (Start: Dec. 31, 1993; end: nobody can say), that

statement stands.

If the process seems out of joint at the moment, radio broadcasters can be comforted by the ample time they have to set it right. There is every reason to be patient.

A number of complicated issues have come up in the development of Electronic Industries Association/National Radio Systems Committee test procedures. Valid parallel trials of very different DAR approaches are proving difficult to write.

Poorly constructed side-by-side tests of in-band, new-band and S-band satellite DAR, especially subjective tests, could certainly descend into comparisons of the proverbial dissimilar fruit. It is just as well that these issues are resolved at a deliberate pace.

More delays, even if all systems arrive at NASA's testing facility on time this winter, will not be surprising. They should be greeted with similar patience.

Rival digital media, such as cable radio services and the various digital playback and recording technologies, will eventually press broadcasters to agree on a digital technology. But terrestrial broadcasters' one potential mobile radio rival, satellite DAR, is not likely to strike out alone.

As the NAB's John Abel says in this issue, satellite developers would be "dumb" to spend billions on birds before standard digital satellite/terrestrial radios are available (an eventuality RW encourages).

In-band supporters, worried that new-band DAR's relative advantage in system maturity gives it an edge in testing, should note the Eureka item on the facing page. New-band development could well be slipping to match in-band's time frame (if not out of existence entirely).

No one knows what to expect at the end of the coming EIA/NRSC tests. Perhaps none of the systems will be deemed worthy of recommendation to the FCC and developers or some new consortium of developers will be forced back to the drawing board.

DAR's launch is still many years away, even under the rosier of scenarios. But it must be done, and there is plenty of time to do it well.

—RW

new EBS system will require a massive education program of government, broadcasters, and the public.

It is my hope that the FCC will choose a system that makes it easy for everyone to become an active participant.

Carl W. Davis
VP, Engineering
Voyager Communications
Raleigh, N.C.

More C-QUAM debate

Dear RW,

I've been bemused by the recent flurry of letters growlingly questioning why C-QUAM became the AM stereo standard. Quite simply, it was because Motorola was the only system proponent with the ability to get an AM stereo system into consumer radios.

I preferred the Harris system and a brilliant engineer of my acquaintance maintains that the Magnavox system was best, but all of that is beside the point. Without Motorola's clout in the car radio arena, today we would have no AM stereo system, because under the FCC's "marketplace" decision, there was no incentive for any manufacturer to make receivers.

Today there are over 20 million AM stereo radios in the U.S., almost all in cars and trucks, and Motorola put them there. Arguments over which system is best are pointless. C-QUAM is the standard. It sounds good, platform motion is nonexistent and there is no coverage differential if it is processed properly.

If Kelly D. Alford of Seattle can't believe AM stereo can actually sound better than FM stereo ("Readers Forum," Aug. 11), I suggest using a Denon TU-680-NAB

tuner and A/B comparing KINK(AM) and simulcast FM in Portland, Ore.

Eric Norberg, publisher
The Adult Contemporary
Music Research Letter
Portland, Ore.

Dear RW,

After years now AM stereo is still one of the most talked-about issues. I couldn't resist sending a couple of comments of my own.

First, despite the acceptance of C-QUAM, I keep reading that people still think the Kahn system would have been better. This intrigues me: I know nothing about such a system. We all know about C-QUAM. How about RW publishing a little historical article on the theory of the Kahn? Would it truly have been superior had it been the winning system?


Second, I am convinced that it is the hi-fi (15 kHz) audio that would make the successful difference, not so much stereo. Instead of using C-QUAM's quadrature modulation to transmit stereo information, why not use it to transmit the crucial missing audio portion (from 10 to 15 kHz) for non-stereo C-QUAM receivers?

Dennis Pieri
Bext, Inc.
San Diego

Editor's note: The battle between Motorola's C-QUAM, the Kahn system and a handful of other rival developers was extensively reported by RW and several other publications during the 1970s and '80s. RW is preparing an in-depth report on AM stereo, including some historical background. Look for it in future issues.

Radio World
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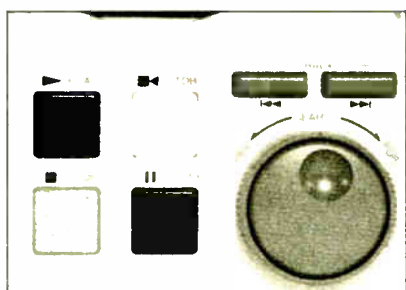
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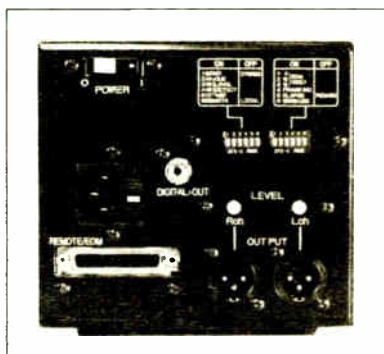


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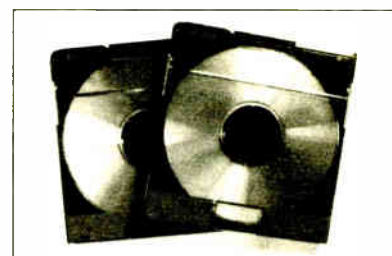


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World Radio History

Stations Help Out In Relief

by Bob Kirby

ST. LOUIS Radio stations and their listeners, far from the swirling, nasty Midwestern flood waters, expressed concern and compassion for flood victims.

As July ended, KMOX(AM) St. Louis, was organizing a flood relief network. Stations were raising funds and supplies, sending them to the St. Louis regional Red Cross and doing guest-shots on KMOX to let victims know help was on the way.

Tom Langmyer, KMOX program director, was coordinating the effort by telephone and airing round-robin phone reports with WWWE(AM) Cleveland, WHAS(AM) Louisville and others.

Listeners in Burlington, Vt., took special interest in the residents of Burlington, Iowa, providing a five-truck convoy of relief items.

The event grew from a comment Rod Hill made during his morning show on WOKO(FM), Burlington, Vt., July 16. Hill co-hosts the show with program director Jim Whitehead. Hill told listeners he might fill his minivan with supplies and drive to Iowa. He'd learned Burlington, Iowa, was founded by settlers from Burlington, Vt.

Events snowballed. The Vermont station organized a formal relief drive the following week, according to WOKO personality Thom Richards.

"Ben and Jerry's Ice Cream donated two semi-trucks, drivers and fuel," Richards said. "Another owner-operator came through with a flatbed truck for donated construction materials. One of our advertisers donated a skid-steer loader. It's got a revolving brush on the front to help clean the streets," he said.

As the convoy drove to Iowa, mobile cellphones permitted live progress reports on WOKO and KBUR(AM), Burlington, Iowa.

The convoy arrived July 28th, according to KBUR and KGRS (FM) chief engineer Bernie Garcia. "We simulcast the ceremony from a big tent in front of the station," he said, to both AM/FM combos in Iowa and Vermont. Even the municipal band played.

How was the broadcast received by listeners in Vermont?

With lots of emotion, Thom Richards said. "Lots of people called saying it was the perfect cap to their volunteer efforts. It made them feel so good to hear how the folks in Iowa responded to it and felt about it. People were choked up. It was good radio, and that's a phrase heard less and less these days," Richards said.

Coping Without a Bridge

by Bob Kirby

HANNIBAL, Mo. Although separated by Old Man River and residing in different states, folks in Hannibal, Mo., and Quincy, Ill., have always thought of themselves as residents of one community.

"The radio stations may localize slightly, but our TV stations are common to both communities," said Tim Bealor, director of RF and studio products at Broadcast Electronics, in Quincy. "Hannibal and Quincy are pretty much one trade area, one market."

Since the onslaught of flood waters put the Illinois approach to the bridge under water and forced the July 16th closing of the Bayview Bridge connecting those communities, formerly convenient neighbors—and jobs—now literally became hours apart. It's likely to remain that way well into autumn.

Harris Allied Broadcast Equipment representative Linda Baker said several Missourians work at the Quincy plant. "Most of them are living with friends or

relatives here, or have brought campers over," she said. Otherwise, it's a 2.5 hour, 250-mile commute. One-way.

Ken Okamoto, Harris Allied's director of human resources, reported at the height of the flooding, more than 13 percent of the staff was disrupted by the outage, "including three Illinois residents who work at our antenna test site at Palmyra, Mo." Okamoto said workers were given the option of working four 10-hour days so they could commute home for long weekends.

It was the same at Broadcast Electronics. "Of 135 employees, we have about a dozen who live in Missouri," Bealor said. "They're staying here with friends or renting. One guy had a motorhome out in our parking lot."

It used to be a 20-minute commute from Jeanne Robinson's home in Quincy to KGRC's newsroom in Hannibal. Robinson is news director. "I'm lodging here in Hannibal during the week," she said, "then driving north 125 miles to

Formerly convenient neighbors—and jobs—now literally became hours apart.

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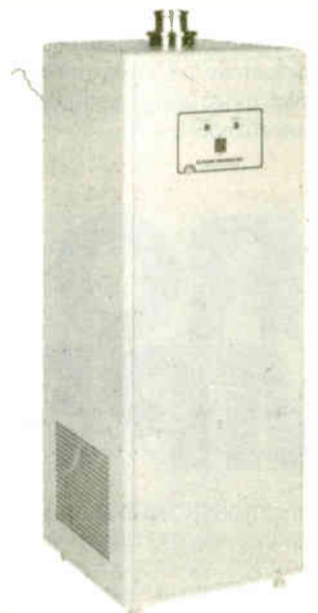
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Keokuk, over the bridge, then south 125 miles to Quincy for the weekend."

Some Quincy organizations were arranging shuttles to pick up and deliver Missouri people over the Keokuk bridge, according to KOKX-AM-FM Keokuk, Iowa, News Director Andy Jeffries. He said that when the Bayview bridge went out, heroic efforts got the Keokuk bridge back in operation.

"Our bridge was out when Bayview Bridge closed," he said. "The Illinois approach was under five feet of water. The Illinois Department of Transportation said 'Let's get to work raising this roadway and get this bridge open.' Basically, they put some concrete barricades up and laid-in tons of gravel to raise the level of the roadway," he said.

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FCC Evaluates Modulation In New Notice of Inquiry

by John Gatski

WASHINGTON After nearly two years, the FCC has initiated an inquiry into modulation measurement for broadcasters.

The Notice of Inquiry (NOI) 93-225 will explore "rules and policies relating to the definition and measurement of aural modulation limits."

In 1991, the Commission was pressured to take a look at the modulation measurement issue. The pressure was based on uncertain-

In the NOI, "The commission is seeking information that will enable it to accurately set meaningful modulation limits on peak amplitude, peak duration, peak recurrence rates and the time interval over which the peaks are to be counted."

The FCC also will "examine an alternative concept that emission limitations can replace modulation limitations."

William Hassinger, FCC Mass Media assistant chief for engineering, said the process has taken so long because the number of alternatives had to be considered, including, at one point, a Notice of Proposed Rulemaking.

Hassinger said the NOI is the best way to proceed in order to get industry input. "A lot is going to depend on what

comes back," he said.

Hassinger also said the FCC will take a long look at the possibility of an emissions limit replacing the modulation limit. He said that instead of setting a modulation limit to control emissions, a direct emission limit could be spelled out.

Currently, the FCC has to study whether the technology to monitor emissions is readily available and if stations could afford it, according to Hassinger.

All monitors on the market were considered accurate gauges of modulation.

ty about whether current modulation monitor techniques adequately gauged over-modulation. The FCC stopped type-approving modulation monitors in 1983, but said in 1991 that all monitors on the market were considered accurate gauges of modulation.

The controversy stemmed from monitors that ignore very fast modulation peaks, that could allow stations to increase modulation without "over modulating" and interfering with adjacent channels.

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Circle (87) On Reader Service Card

Stations Challenged

► continued from page 3

basement flooded," News Director Doug Cooper said.

KFMG lost electricity but never went dark. "One of the best moves I ever made was installing 1 kW uninterruptible power at the microwave rack and the control room," Chief Engineer Jeff Hansen said. "They kicked-in instantly, and I powered them from several small generators, which were loaded so heavily they had to be refueled every couple hours."

In the aftermath, one of Hansen's biggest head-ache was repairing cart decks and reloading carts containing the station's commercial library. "We went nine days without air conditioning," he said. "We had three feet of water surrounding the building. Ninety-degree temperatures with all that humidity. Every one of our cart machines and analog tape players went down, and I've got ITC 99B and Delta machines with ITC Scotchcart II carts.

"I've always been amazed at those carts. They've never shedded (oxide) much. Now I'm seeing serious shedding from all that humidity," he said. Hansen said his jocks were cleaning heads after each stopset.

Phone company kudos
Hansen praised US West for quickly restoring phones. At one point, he said, "there were five guys in the basement cutting pairs over to the new demarc." His wish list now includes a large generator and transfer panel.

Lightning hits and closed roads were the only impediments reported by St. Louis-area broadcasters at press time.

"We're offering flood information on both stations, but the effort has been most visible on KSD," said Karen Vail, KSD (FM) and KUSA

(AM) news director. "We do local news heavily in the morning, even though it's a classic rock station," she said.

KUSA aired two-minute hourly flood updates in its CNN Headline News format.

Format to fit

News-talker KMOX(AM) altered its format, adding a five-minute update at :55 past, 24 hours a day, pre-empting even ball games. "That information pertains not so much to the news of the flood, but more to the community service aspect for the people most affected by it," Program Director Tom Langmyer said. Owned

by CBS, the station was bolstered by on-loan network and other O & O staffers, and the station was using the network's audio satellite live truck to file some reports on-scene.

"We've taken it down along the levees and other areas where a Marti or two-way hit is really difficult," Langmyer said.

As July gave way to August, the nearest bridge still conducting traffic across the Mississippi was at St. Louis, 150 miles distant. Keokuk, Iowa's KOKX-AM-FM stations were producing half-hourly flood reports and did a remote from a disaster center opening, according to News Director Andy Jeffries.

Forty miles north at Burlington, KBUR(AM) and KGRS(FM) Chief Engineer Bernie Garcia said his stations did extensive on-scene reports using an additional three remote packs he assembled to augment two-way and RPU installations in the station van and staffers' cars.

□ □ □

Bob Kirby, a former radio station general manager and news director, is a free-lance technical writer in Kansas City. He can be reached at 816-941-4356.



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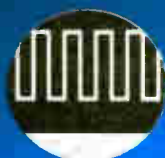
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Digital Broadcast Future Uncertain

► continued from page 1

change of heart over Eureka, it may be impossible to convince the FCC and other powerful government agencies to provide the needed spectrum.

One of the greatest uncertainties is the extent that technology and business relationships could change during the coming months of testing.

The DAR standardization process has often been compared to the FCC's effort to write a terrestrial high definition television standard. Five proposed HDTV systems stood ready to go into laboratory tests in the summer of 1991, just as five DAR systems stand ready today.

At the end of the HDTV tests (originally planned to last about a year, but ultimately extending into early 1993), most expected one of the proposed systems to be recommended to the FCC for standardization.

Instead, the testing ruled out standardization of only one (analog) system. The quality level of the four remaining digital HDTV systems was found to be indistinguishable and none of them were considered worthy of FCC approval without more development. In the end, the digital HDTV developers formed a "grand alliance," which now hopes to complete a new system by early next

year.

Is digital audio about to face similar turbulent evolution?

"I think there is a likelihood of that kind of thing happening here," Abel said. "Probably the safest thing to predict is that there will be delays. I frankly think the DAB issue is a lot more unsettled than HDTV, by comparison, the same number of months out of testing. There was a more refined system of disclosure in the HDTV testing process."

If there is any technical change and movement toward alliances among the developers, look for it to happen among

the in-band developers: USA Digital (a co-venture of Gannett Radio, CBS and Group W), which is developing IBOC systems for AM and FM; AT&T Bell Laboratories, Murray Hill, N.J., which is developing an FM in-band, adjacent-channel (IBAC) DAR system; and Amati Communications Corp., Palo Alto, Calif., which is already in a partnership with AT&T to build an FM IBOC system.

From what he infers through contacts with the FCC and radio broadcasters so far, John Cioffi, Amati vice president, engineering, believes "if one works, it will be in-band, on-channel. The other alternatives will go away."

Nikil Jayant, head of the signal processing branch of AT&T Bell Labs, agreed that if Eureka and the in-band systems are found to produce about the same quality, the odds will favor in-band.

"The new-band system has the obvious advantage of a wide frequency range to play with," Jayant said. "On the other hand, some of the in-band systems we are proposing are very powerful and are based on very good engineering."

Nevertheless, Paul Donahue, vice president, engineering, Gannett Radio, speaking for USA Digital, said there should be strict limits on comparisons of in-band and new-band. The EIA/NRSC objective and subjective test procedures, as they are now written, may invite some inappropriate comparisons, he said. (See story, page 13).

"I know that people in the new band would much prefer us to compare a new-band system that has no constraints on it—power, allocation or anything else—with something that has to exist in the broadcasting infrastructure," Donahue said. "It is a comparison you cannot make."

On the highway

"For terrestrial broadcasting, most of the options that are possible with the in-band, on-channel solution are not, in fact, very interesting. It looks as if the future will be digital simulcasting—period," Edward Coltman, director, policy development and planning, Corporation for Public Broadcasting (CPB), said during a July National Public Radio (NPR) board meeting.

"So much attention is being given to protecting the status quo in radio broadcasting, why don't we really protect the status quo and not do digital broadcasting?" The 'aristos' (of commercial broadcasting) would be very happy with that solution if it were possible," Coltman said.

Indeed, Eureka would have a distinct advantage if increasing the number of radio voices to the public and development of ancillary, non-audio services such as two-way voice and data communications.

"Eureka has the capability to be a very high-data-rate transmission scheme for any kind of data. The possibilities of broadcast in place of fiber are enhanced," said Clint Pinkham of Thomson Consumer Electronics, Syracuse, N.Y., U.S. spokesman for the consortium. (Thomson CSF of France is one of the major sponsors of the DAR system.)

"Eureka is a 1.5 MHz-wide digital stream that can be used in a number of ways including up to six CD-quality stereo channels, or it can be less audio

continued on next page ►

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| 10:14:18A | (I Can't Get No) Satisfaction Rolling Stones :14/3:33/F 1965 C20105 10:14:18 #1 for 5 Weeks in the Winter of '65 | :14 | Studio Mic. 1 | Manual 6 |
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| Start F2 | Back Announce - Linked to C12608 Dave Scott :00/0:08/C BAL VT0214 10:21:15 | F6 Move Up | News Mic. 3 | Music Library 8 |
| Start F3 | McDonald's 2 for \$2 Special JT Q: Now Thru Saturdays Only. :00/1:00/C COM DA1103 10:21:23 | F7 Move Up | Marti 4 | Spots 9 |
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► continued from previous page and a really significant amount of digital data," Pinkham said.

The EIA/NRSC tests will examine how the various systems work with the NRSC-standard Radio Broadcast Data Service (RBDS) technology. Otherwise, in band is not likely to offer more than the current FM subcarrier capacity, Jayant and Cioffi said.

(Donahue said USA Digital's FM system would exceed subcarrier data rates.)

Eventually, IBOC could be a more

same data capacity as current FM subcarriers, satellite people, as Abel said, "see data as being quite central to their proposal. Some of them, like AMSC, are already in the data business."

This factor alone could be enough to convince the FCC that S-band satellite DAR approval would be a positive move, if not before the terrestrial standard, at least simultaneously. Many radio broadcasters fear either option.

Simultaneous approval of satellite/terrestrial DAR "is a good option," said

Different Goals Evident In DAR System Proposals

The five digital audio radio system developers participating in the Cleveland tests approach the process from different backgrounds and with very different goals.

For some developers, FCC standardization will lead to profits through royalties, equipment manufacturing and sales.

Others connect DAR to radio-industry political and economic strategies, aimed at protecting current station licensees while at the same time preparing for competition with other digital media.

Standardization is also a point of national pride for some proponents. Both European and North American governments have subsidized DAR development.

New-band DAR

Interest in DAR began in the U.S. in the late 1980s with the news of a system developed by the Eureka consortium—a confederation of European governments, high-tech equipment manufacturers and academic institutions.

Eureka-147 system was developed with an eye toward forming a new European radio digital infrastructure within either the UHF-TV band or L band (frequencies near 1500 MHz) combining local, terrestrial signals side-by-side on the dial with continent-wide satellite service, all receivable on the same digital audio radios.

The Canadian and Mexican governments have endorsed Eureka and plan to begin satellite and terrestrial DAR service in the L band, which was allocated for digital transmission over most of the globe at the 1992 World Administrative Radio Conference (WARC) in Spain.

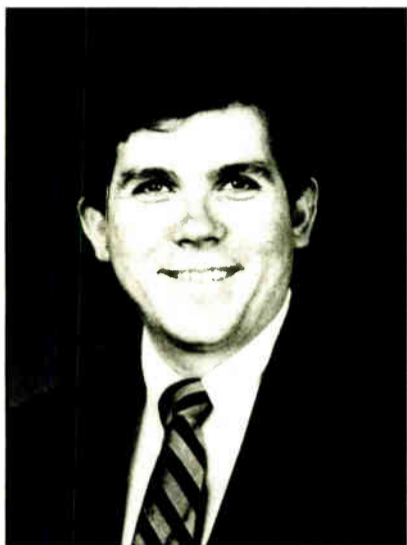
For the purpose of the U.S. tests, Eureka is proposed as a terrestrial, L-band system, in spite of the fact that the U.S. radio industry has rejected the new-band

approach in favor of in-band, on-channel (IBOC) DAR.

Momentum to establish Eureka DAR in the rest of the world is also showing signs of stalling. Recent funding and intellectual-property complications could delay near-term Eureka start-up plans in Britain and Canada (see page 4).

Nevertheless, Eureka continues to push for U.S. acceptance of its system because "it works," said Thomson Consumer

continued on page 12 ►



"I know that people in the new band would much prefer us to compare a new-band system that has no constraints on —power, allocation or anything else—with something that has to enlist in the broadcasting infrastructure. It is a comparison you cannot make."

—Paul Donahue, USA Digital

active player in the digital communications marketplace. All parties agree that broadcasters will be able to do much more once the analog signal is removed. IBAC will also be aided when adjacent-channel analog signals are deleted from the FM band, Jayant said.

The date when the FCC and broadcasters can safely remove all analog signals is in the very distant future. But at some interim point, the penetration of digital receivers may be high enough for some occasional digital-only broadcasting. Cioffi said: "I would advocate letting each broadcaster make the decision on his own."

With the exception of the NASA/VOA system, which is designed to about the

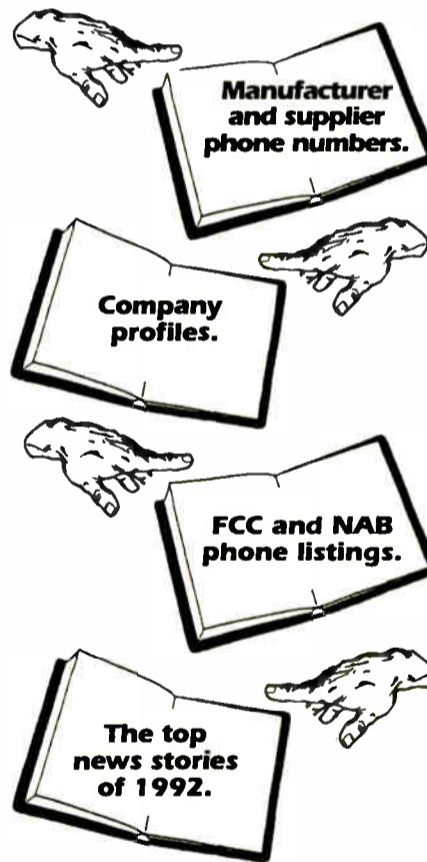
NASA's James Hollansworth, program manager of its DAR project. "I think it will complement (terrestrial broadcasting). I understand completely (broadcasters' opposition), but if you look at the bigger picture, there is a tremendous international market that satellite could really do the job for."

That "complementary" aspect of satellite/terrestrial broadcasting makes Abel confident that there will be no satellite service before terrestrial is ready.

"Are they going to drive a de facto standard with their receivers in the marketplace? Why am I going to buy a receiver that only works on one or two satellites?" he asked. "I think it would be a dumb thing to do."

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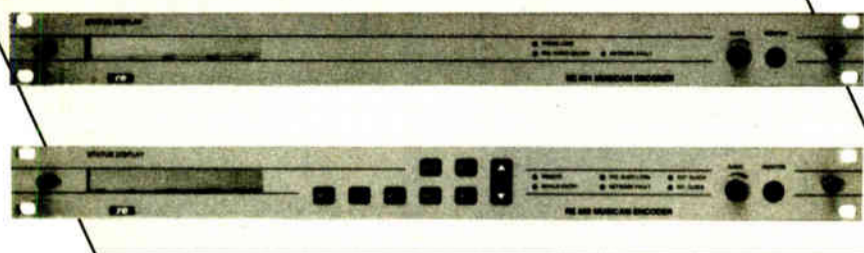
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Goals Vary Among DAR Proponents

► continued from page 11

Electronics' Clint Pinkham, Eureka's spokesman in the U.S.

"We're the only people out there that have demonstrated anything. IBOC is a fantastic idea. If it does everything it says, Thomson will be right there in line to for a license. But if it doesn't do everything it claims to do, there should be an alternative."

The IBOCs

The USA Digital Consortium formed in fall 1990 to challenge Eureka.

FM broadcasters opposed the migration of analog AM and FM stations to the L

the system's immunity to multipath. (Eureka had already conducted the same demonstration many times before in Europe and Canada).

U.S. broadcasters were unimpressed. Within months, broadcaster pressure forced NAB to withdraw its early endorsement of Eureka and led the FCC, which was preparing to secure U.S. allocations within the L band at WARC over the objections of the Defense Department, to instead take a neutral DAR position to the conference.

Broadcasters were heartened by the progress of Project Acorn, which was attempting to prepare a mobile demonstration of its FM system for the 1991 Radio Show in San Francisco.

Two years later, that mobile demonstration has yet to be held.

Both the AM and FM systems have been demonstrated using prototype hardware, but no one will be able to

say IBOC works until it has been shown to be solid technology for car radios.

Development has been slowed, in part, by budgetary problems. "Our whole effort is geared to presenting systems to the NRSC right now, not to doing shows," said USA Digital's Joe Donahue.

Amati and AT&T, developers of the only other proposed FM-IBOC system, are not yet ready to say conclusively that IBOC will work.

"Conceptually, it's close. We think you can just barely do it and there are certain situations where it will not work in a very difficult fading environment," said Amati Communications' John Cioffi. But recent laboratory computer simulations of difficult transmission conditions have boosted Amati's confidence in eventual success.

Like USA Digital, Amati/AT&T is now perfecting hardware for the Cleveland tests.

Early in the development of the Acorn systems, USA Digital approached Amati about a plan to build one of the Acorn sub-systems. The deal was never sealed, but USA Digital "piqued my interest. I just continued to follow the area," Cioffi said.

During a panel discussion at last year's NAB Radio Show in New Orleans, Cioffi said he would be interested in entering a partnership with anyone interested in Amati's ideas. A number of companies responded, "and AT&T was one of them," he said.

Ultimately, the IBOC partners hope DAR will be a lucrative business. "Royalties could be pretty good. Here at Amati we do have manufacturing. We would be interested in being a supplier of digital receivers for any large car companies," Cioffi said. "We haven't had any discussions with them, but obviously those companies are coming to the meetings."

IBAC

Before its partnership with Amati, AT&T had already begun work on an in-band system of its own. The major difference was that its system was to be transmitted over current FM stations' adjacent channels rather than on their channels.

"The reason we have two systems is because we don't pretend to understand the complex tradeoffs that are involved technically and from nontechnical aspects, such as transmitter cost, licensing and regulatory issues," said AT&T's Nikil Jayant.

Beside the fact that one system is on-channel and the other is not, "these two systems are not as different as you may think," Jayant says. "The IBOC system has a special 'single side-load' mode, and if you think about it, the single side-load and the IBAC (adjacent channel) are not

very different."

AT&T hopes to be a winner at the end of the testing process, regardless of whether its IBAC system ultimately becomes the FCC standard. A larger goal is the promotion of its Perceptual Audio Coding (PAC) compression algorithm, designed to maintain CD-quality audio at a data rate of 128 kilobits per second (RW, July 14).

The odds may be in its favor. There is only one other competing algorithm, MUSICAM, which is incorporated into Eureka and Acorn. Both AT&T in-band systems use PAC, as well as the only satellite system participating in the EIA/NRSC tests.

Satellite

NASA and the Voice of America were tracking the progress of the Eureka system in the late 1980s with an eye toward a possible satellite radio service to complement VOA's international shortwave services.

Once the U.S. radio industry's position toward Eureka turned sour and the 1992 WARC placed U.S. allocation for satellite digital audio in the S band (frequencies near 2300 MHz), the government decided to begin developing an S-band satellite system of its own.

The general supposition before WARC was that S band would be inadequate for satellite or terrestrial DAB. The power needed to transmit digital audio at such high frequencies, it was thought, would drive the prices of satellites and land transmitters too high to make digital audio a profitable business.

"I think that was a perceived problem," said NASA's James Hollansworth. A prototype of the NASA/VOA system was successfully demonstrated in Pasadena, Calif., last June, he said. "It worked fine."

Hollansworth was also confident that S band would be useful for international satellite broadcasting, in spite of the fact that most world DAR will be on L band. The list of countries where S band will be receivable includes: China, Russia, India, Pakistan, Japan, Korea and much of Southeast Asia, he said.

Another NASA/VOA goal is technical advancement to benefit U.S. high-tech industry. "Transferring technology to U.S. industry creates jobs and could increase shipping of receivers overseas. What we have developed in the government belongs to the American people," Hollansworth said.

For some developers, FCC standardization will lead to profits. For others it is a point of national pride.

band because all stations in the digital domain would have the same audio quality and coverage areas. FM stations risked losing their dominance after waiting decades to finally overtake AM.

The Acorn developers proposed two systems: FM-IBOC, delivering compact-disc-quality sound to match Eureka's, and AM-IBOC, which would approximate current FM quality.

Within six months of its formation, USA Digital was already demonstrating a breadboard version of its FM system at the 1991 NAB spring show.

At that same show, Eureka offered a mobile demonstration of its system, inviting broadcasters onto specially equipped buses to compare Eureka quality to AM and FM transmissions and to experience

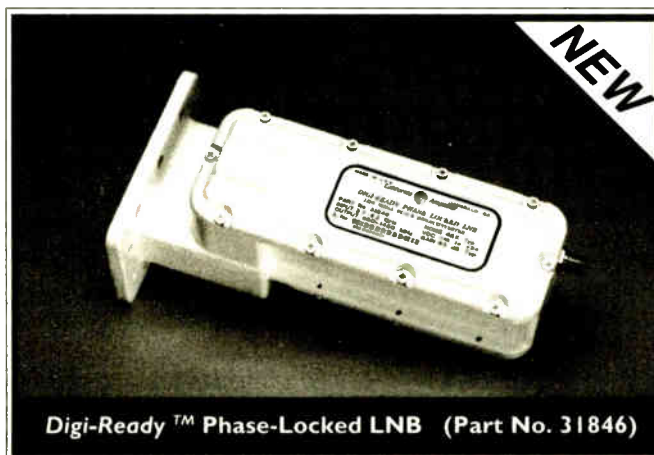
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Groups Sort Out DAR Test Parameters

The most difficult task for those conducting the Cleveland tests will be avoiding controversy.

The five systems (six if you count USA Digital's AM IBOC as a separate system) employ widely varying technologies to reach significantly different goals.

Many parameters do not appear to have been defined yet.

A satellite system, for example, may or may not penetrate a building more successfully than an IBAC or IBOC system, depending on the power at which the satellite system transmitted.

A new-band signal may be measured as more robust and with wider coverage and better audio quality than an IBOC, because the new-band system is subjected to different forms of interference and may operate in a wider channel.

EIA/NRSC's latest-version test procedures plan for the laboratory tests in Cleveland (see chart, page 14), attempts to get around these comparison problems. But some are not satisfied that the subjective tests, to be conducted at the Canadian Research Center (CRC) in Ottawa, have been adequately constructed to avoid comparing the wrong things.

The laboratory testing will begin on Dec. 31, when all five of the system developers are to have their prototype equipment delivered and ready for testing

at the NASA lab. The tests are expected to last for several months.

The start-up date is not expected to stray beyond Dec. 31. NRSC approved a motion by Charlie Morgan, vice president and director of engineering, Susquehanna Broadcasting, York, Pa., to get promises in from the proponents to be ready by that date.

At some point, probably after Dec. 31,

couple of reasons that they'll get into this testing, and one is to publish all the results and maybe make filings at the FCC, I begin to wonder what the outcome is going to be," said USA Digital's Paul Donahue.

EIA and NRSC members picked CRC to conduct the subjective tests because of its high reputation for scientific research and because its facilities for such tests

equipped to analyze and choose appropriate test materials and later send them on to CRC, Morgan said.

Meanwhile, details of the every-day procedures during the lab testing phase in Cleveland are still sketchy. NASA will be providing equipment and personnel; EIA personnel will oversee and conduct the tests. (Consultant Tom Keller, former head of NAB's science and technology department, has been hired by EIA to head the project.)

But it is not yet clear how many EIA and NASA people will participate. "I don't think that's been settled yet," said EIA spokesman Alan Haber.

The system developers are also not sure what presence, if any, they will maintain in Cleveland during the months of testing.

"They'll probably be coming in for the initial calibration and some training of the EIA test personnel. That'll probably take a few weeks," said Eureka spokesman Clint Pinkham. The Eureka representatives will all be coming from Europe. "We don't want them to have to take out permanent citizenship here," he said.

Field tests of the systems to determine field strength in various, real-life situations will be held after the lab tests, probably in late 1994.

By earlier agreement, NRSC will write a report and recommendations on the IBOC systems only following the lab and subjective testing. EIA's report will deal with AT&T's in-band, adjacent-channel system and the two new-band systems.

A great deal of discussion had focused on the question of how to choose the subjective test materials and which organization should do the choosing.

subjective test materials—digital tapes of music and other audio samples—will be chosen for the CRC tests, which will be conducted independently of the Cleveland process.

A great deal of discussion has focused on the questions of how to choose the subjective test materials and which organization should do the choosing.

Some eyebrows were raised when it was announced that CRC itself would be choosing the materials and would be more deeply involved in other parts of the process than was originally planned.

"When the CRC says there are only a

are deemed superior to anything in the U.S.

At the same time, some questioned the wisdom of allowing an organization funded by the Canadian government—which has already endorsed the Eureka system—to choose test materials that will be fair to all systems.

"I believe the CRC people doing the testing will not be biased...There is a perception in the United States that because CRC is owned by the Canadian government, there will be bias," Morgan said. "I don't think we need to have that perception."

Several labs in the U.S. are adequately

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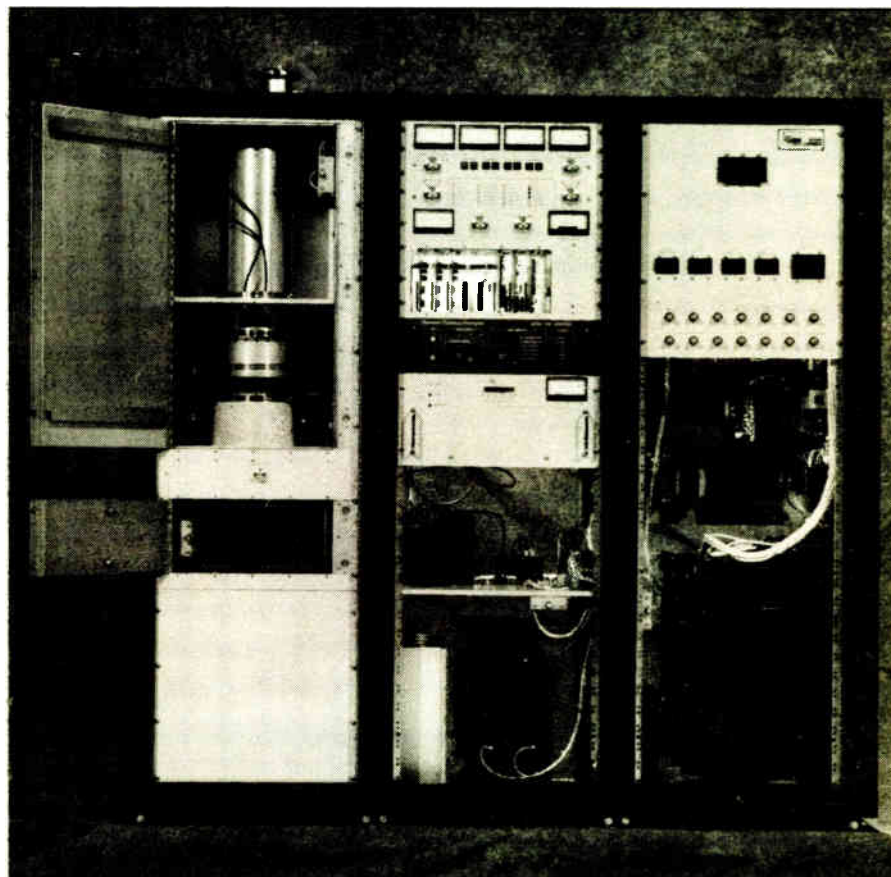
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Tentative DAR Itinerary

The chart on this page outlines the latest version of the EIA/NRSC digital audio radio test procedures, discussed during the test planning meeting in Washington, July 27. Further additions and modifications are expected.

As the chart indicates, special circumstances (co-channel and adjacent-channel interference, IBOC-to-analog interference) require an especially long list of tests for in-band systems. At least one in-band system will be involved in the 48 tests planned so far. USA Digital's AM-IBOC system, for example, will undergo all but three of the

tests. Two tests (C4 and C5) are designed for the AM-IBOC system alone.

Most of the objective results will be measured in the form of channel characteristics at the point of failure (POF) and changes in bit-error rate (BER).

EIA and NASA personnel will conduct the objective tests under the leadership of consultant Tim Kelley, former head of NAB Science and Technology.

Objective tests are scheduled to start on Dec. 31 in Cleveland. A date for subjective tests in Ottawa is yet to be announced.

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| Test Description | System to be tested | Data to be recorded |
|--|---|---|
| A. 1. Daily system power check 2. Daily system spectrum check 3. Daily POF 4. Daily audio recording at moderate signal strength 5. Weekly analog channel fast proof | All systems " " " " " " In-band systems only | Power level Spectrum record Point of failure Digital audio recording for the record Frequency response, separation and distortion levels |
| B. Signal failure characterization 1. Noise 2. Multipath and noises | All systems " " | Noise level at POF Noise and multipath at POF |
| C. DAR performance with impairment 1. Impulse noise 2. Continuous wave 3. Airplane flutter 4. Environmental noise 5. DA simulation | All systems " " Eureka, AT&T, FM-IBOCs only USA Digital AM-IBOC only " " | Pulse amplitude (volts) at POF POF sensitive levels across DAR channels Multipath parameters at POF Interference amplitude at POF |
| D. DAR-to-DAR interference 1. Co-channel 2. 1st-adjacent 3. 2nd-adjacent | All systems " " All except NASA/VOA | POF & data channel BER " " |
| E. DAR-to-DAR interface with multipath 1. Co-channel 2. 1st-adjacent 3. 2nd-adjacent | All systems " " In-band systems only | POF for each multipath and signal level " " |
| F. DAR-to-analog interference 1. Co-channel (objective) 2. 1st-adjacent (objective) 3. 2nd-adjacent (objective) 4. Co-channel (subjective) 5. 1st-adjacent (subjective) 6. 2nd-adjacent (subjective) | In-band systems only " " " " " " " " " " | S/N; RBDS noise; SCA noise; BER on digital subcarrier " " " " Subjective analysis of processed FM classical and rock music, silence and voice samples " " |
| G. DAR-to-analog interference with multipath 1. Co-channel (subjective) 2. 1st-adjacent (subjective) 3. 2nd-adjacent (subjective) | In-band systems only " " " " | Subjective analysis of DAR-to-analog interference compared to analog-to-analog using processed rock music " " |
| H. Analog-to-DAR interference 1. Co-channel 2. 1st-adjacent 3. Simultaneous upper & lower 1st-adjacent 4. 2nd-adjacent 5. Simultaneous upper & lower 2nd-adjacent | In-band systems only " " AT&T and USA Digital/AM-IBOC only In-band systems only " " | POF and data BER 1 dB below POF " " " " |
| I. Analog-to-DAR interference with multipath 1. Co-channel 2. 1st-adjacent 3. Simultaneous upper & lower 1st-adjacent 4. 2nd-adjacent 5. Simultaneous upper & lower 2nd-adjacent | In-band systems only " " AT&T and FM-IBOC systems only AT&T and USA Digital AM systems only AT&T and FM-IBOC systems only In-band systems only | POF for each multipath combination; BER with interference at 1 dB of POF " " " " |
| J. DAR acquisition & reacquisition 1. Simulated weak signal failure & acquisition 2. Simulated acquisition with multipath and noise | All systems " " | POF; acquisition time at each noise level Acquisition time for each multipath and noise combination |
| K. DAR transmission quality 1. Selection of audio test segments 2. Transmission quality (objective) | All systems " " | Subjective analysis of audio quality, with and without impairments POF: noise at POF |
| L. IBOC-to-host analog interference 1. Quality test 2. Objective test 3. Subjective test 4. With multipath | IBOC systems only " " " " " " | Proof of analog channel Distortion; frequency response; RBDS errors; SCA characterization Subjective analysis using processed classical and rock music, silence and voice samples RBDS errors |
| M. Host-analog-to-IBOC 1. With no impediments 2. With multipath | IBOC systems only " " | Changes in data BER; subjective analysis " " |
| N. Multiple spurious 1. DAR + FM interference to FM | IBOC FM systems only | TBA |



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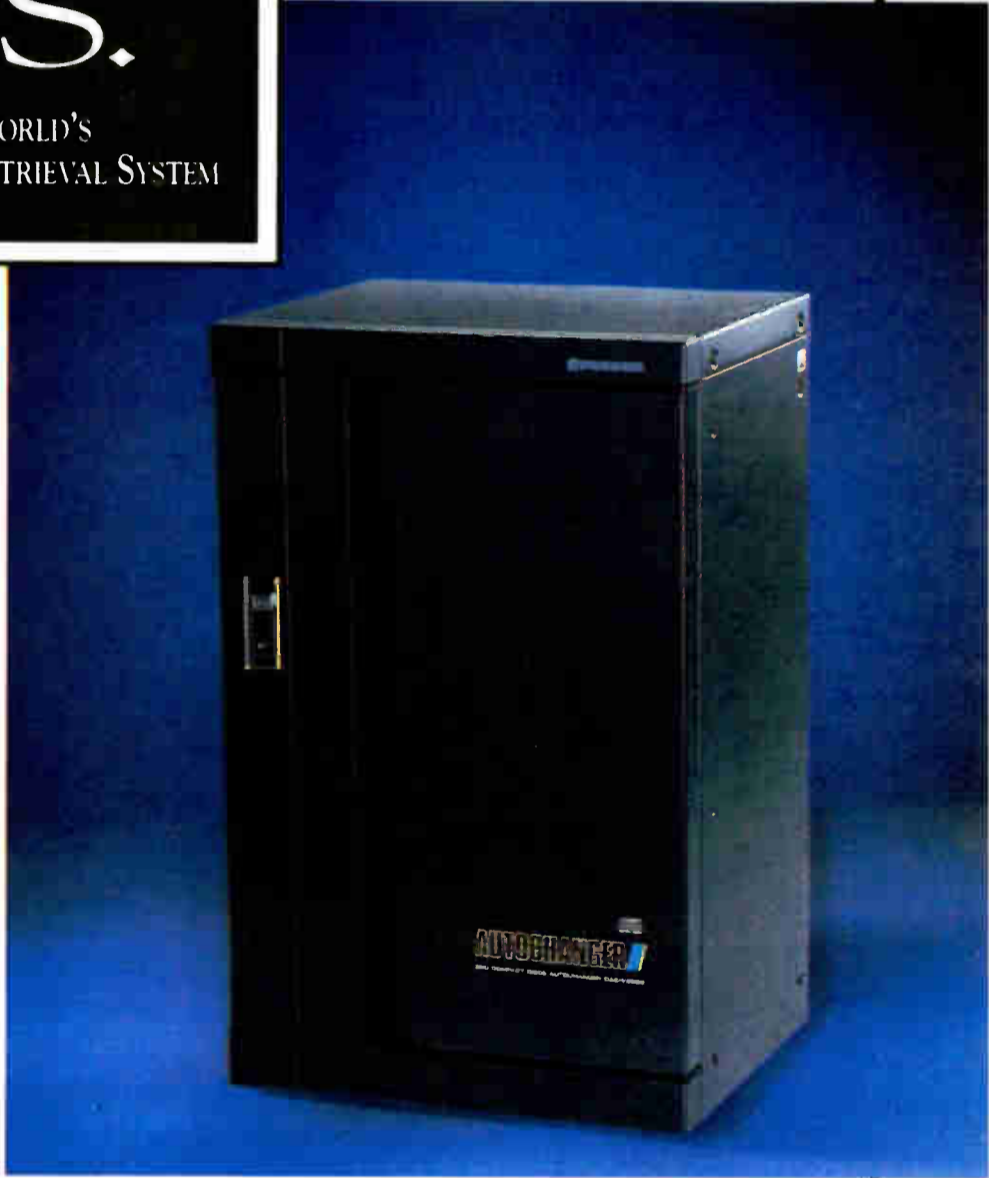
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See page 25.**

Country Format Dominates Airwaves

► continued from page 1

also popular with younger listeners. However, younger listeners prefer the new country which is not very popular with the older listeners.

Burkhardt concurred with Shane and further explained why the fragmentation will not be so sharp. "In the Southern regions you can kind of splinter it up but if you take Country to Boston you can't split it into five types, you'll have *maybe* two stations."

The future of AC

While Country continues to grow, Adult Contemporary continues to dwindle.

AC continues to dwindle but still continues to be popular. This paradox has a number of explanations. "The continuity of the sound tends to put people to sleep, and its not real exciting" said Burkhardt. According to Burkhardt, a lot of AC stations have only about 400-500 records and are having to spend a lot of money on promotions. Burkhardt predicts hot AC with its fresher music and cold AC with its large popularity in places like the dentists office will thrive while mainstream AC is going to have extend its music list to survive.

Shane provided another explanation, saying that AC just doesn't have the passion that other formats have. Yet despite a lack of passion, it is still listened to often. "You don't have to have passion about something to do it everyday," said Shane. Shane also sees the mainstream AC having to change. "Us baby boomers are going to have to move out of the way," said Shane.

Parikhhal sees another route. "I think the whole format needs a major name revamp because it is not really very contemporary at all." Including other formats, such as classic rock, within the umbrella of Adult Contemporary, he does not see the declining of Adult Contemporary and actually sees classic rock, oldies and "the advent of a '70s station" becoming stronger. It is in name

and structure only that he sees a decline.

Parikhhal believes in the strength and size of the 25-50 market, which is the largest size market. With the 12-25 market, "advertisers want them but don't know how to reach them.

"Those that thought AM was dead ten years ago, should go back and read their clippings," said Burkhardt. Talk radio has certainly made a comeback. Parikhhal

With sports, there is some dissenting opinion. Most agree that play-by-play has great potential because it is an event. "There will be at least two more major sports networks in the next year and a half," said Burkhardt. Shane, however, sees sports shows playing a more limited role.

Burkhardt thinks that sports shows will continue to do well. "These guys (sports

ever, he was weary of business and thinks that entertainment talk will continue to be more popular. Most agree with Parikhhal. "It's a good format in the major financial cities," said Burkhardt "But I don't see it being a big deal in the next five years."

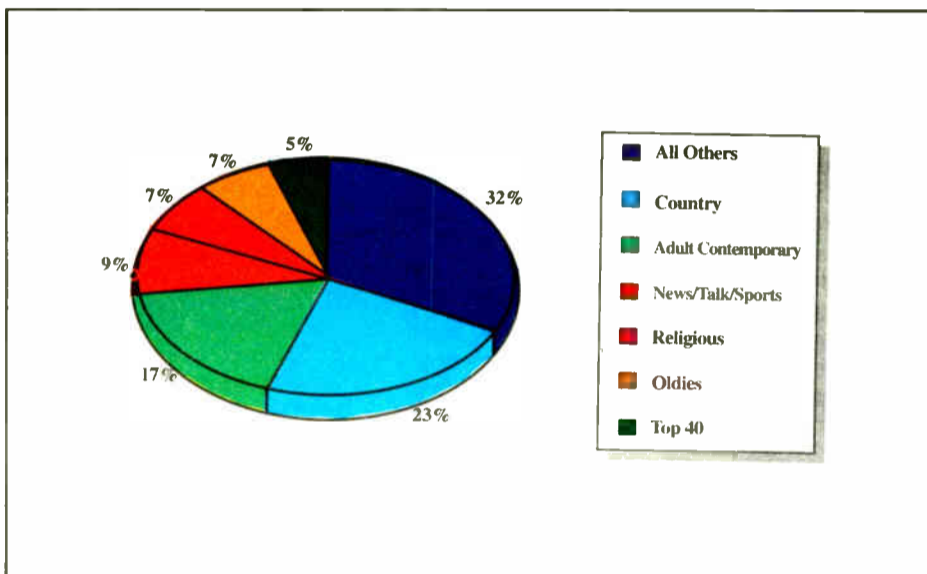
The future

All the experts agree that Country will continue to be popular regardless of any sort of fragmentation. The No. 2 format, Adult Contemporary, will either continue to dwindle or will be reformatted. The No. 3 format, Talk, is expected to grow. Experts see more national talk show personalities, AM becoming more popular and FM stations converting to talk.

"Personalities will continue to happen," said Burkhardt. Burkhardt also sees classic rock having problems. "How many times can you hear 'Stairway' by Led Zeppelin?" asked Burkhardt. "They need to get more current music on the air." This is one of the reasons insiders expect Alternative/Modern Rock to take off sooner or later.

Hand-in-hand with this idea is the prediction that CHR will eventually die. With the loss of CHR, insiders expect oldies, '70s and similar rock to increase. Spanish programming is also expected to rise as that population segment continues to increase in the U.S.

These smaller formats are expected to grow, but not overtake the format giants. Country will continue to dance and stomp over the other formats but will have to keep its eyes open as well as its ears as News/Talk/Sports/Business continues to capture the country's ear.



believes that the emergence of talk has stemmed strictly from the demand for talk. "People wanted a Stern or a Limbaugh," said Parikhhal.

Strike a chord

Shane said that those hosts who play on people's fears or fantasies are the most popular. For example, Shane cited a columnist who described the ultra-conservative talk show personality, Rush Limbaugh, as "the white male's happy Buddha." Shane said Limbaugh "seizes on the fantasies and fears of 35-year-old white men." Another industry insider said that Limbaugh appeals "to the Archie Bunker of the '90s. He is not ashamed because the Archie Bunker of the '90s wears a nice suit and speaks better."

show hosts) have got it down," said Burkhardt.

News and business, according to Parikhhal, is popular because it is great for those people who don't have time to read the newspaper. Parikhhal said, how-

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Polka Ideal for Niche Programming

by Charles Taylor

CHILTON, Wis. While Janet Jackson and Mariah Carey may own summer radio around most of the country, on a handful of radio stations in the Midwest, no one can top the likes of Jimmy Sturr, Eddie Blazonczyk or Tuba Dan.

And while hip hop and rave may be battling to predominate on the nation's dance floors, in Wisconsin, there's no contest over an evening of waltzes, schottisches and laendlers—all traditional dances associated with the time-worn melodies of polka music.

So popular are the various strains of polka here, in fact, that two radio stations have bypassed more routine formats like country or news/talk for a full-time blend of the merry ethnic melodies. Others have been airing two- and three-hour weekly polka programs for as long as 20 years.

Sentimentality

"There's a great deal of sentimentality that comes out of it. For many, it's a pastime, for others, polka is the only kind of music they know," says Dr. John Check, who has played in polka orchestras for more than 50 years and hosts polka shows on three Wisconsin radio stations: WXOL in Oshkosh, WTKM in Hartford and WMBE in Chilton. "It attracts a cross section, from factory workers and people who are retired, to professionals and doctors."

It also exemplifies a trend that has helped many stations survive in tough economic times—niche programming. "We struggled with formats from all-news and talk to rock and contemporary. We were banging our heads against the wall in an effort to keep from selling the station," recalls Jim Choudoir, who was general manager of WRJQ(AM) in Appleton/Oshkosh, Wis., in the mid-1980s. "Finally, I suggested that with a ton of polka bands around here, perhaps we could capitalize on that."

The station's two owners were reluctant, but, void of other ideas, gave in. "We had news, weather and sports and professional radio announcers. We did everything a normal radio station would do, except we just happened to have polka," says Choudoir (now general manager at WMBE, which mixes farm programming, polka and big band). WRJQ went on to gain a respectable 4 share in the market, which is particularly

impressive for an AM station playing music: "People realized we were for real in the third-largest (radio) market in Wisconsin."

WAUN, a polka-playing FM in Kewaunee, Wis., has been proving the viability of the format since it went on the air with polka full-time in 1973. Advertisers include department stores, banks, garages, funeral homes, farm implement stores and dairies.

"Everybody and anyone, all have their little part," says Cletus Bellin, WAUN program director. "We are located in a Czech, Polish and German area where it's primarily a farm community. Most of the businesses don't even consider *not* advertising because it's polka. Besides, it's a proven fact that cows give more milk to polkas than they do to rock."

The cheese capital

The format's center in the nation's cheese capital, of course, revolves around the ethnic blend of the region. Much of the state comprises those of Central European descent, who identify with the music as a dynamic reminder of their homeland and ancestry. In general, the music developed distinctive characteristics of its various originating nations during the early 19th century.

Because it has such a strong tie to these communities' people, polka stations maintain an active role in the cities they serve. A predominance of polka festivals in many Wisconsin cities offers stations direct opportunities to show their dedication to the music and the people who cherish it.

"There are polka festivals every weekend in the Midwest," says Choudoir. "Bands come from all over, and people get together and enjoy their beer and brat," slang for bratwurst, a highly seasoned sausage.

"We cover summer church picnics, breakfast on the farm and all local sporting events," Bellin says. "We also do a lot of live broadcasts from polka dances and polka festivals. We'll go and broadcast three consecutive days, putting bands live on the air."

As well, many of the on-air personalities are involved in local polka bands themselves. "I have some vested interest, yes," admits Check, who traditionally includes three selections in his show from the 10-piece orchestra he leads, The Wisconsin Dutchmen.

"Being in an orchestra gives me a run-down of the various styles of music, especially where I'm from, which has a high percentage of German, Norwegian and Polish," adds Gary Brueggen, who hosts a four-hour weekend polka show on WKLJ(AM) in Sparta, Wis.; and plays the "concertina" (a smaller version of the accordion with buttons instead of keys) in Gary's Ridgeland Dutchmen. "I base the format of music on the ethnic background of those who see the orchestra perform. That way, I don't set my sights on a single style."

The variety of the format is as diverse as the nations that originated the music. Aficionados are quick to point out distinct differences between polka selections out of Poland, Czechoslovakia, Bohemia, Yugoslavia, Switzerland, Germany and other polka-originating nations, including instrumentation, tempo and the general spirit of the music.

"The music does not all sound the same. You can do all sorts of neat things with it," says Choudoir. "No way is it all one sound."

Appeal to the young

Polka draws its primary appeal at radio in older demographics, however, proponents insist that polka also has its place among younger listeners.

"I've noticed since I've been playing polka that there's more and more of a younger audience. I'd say it ranges from 30 to 80," says Kevin Pierskalla, a polka DJ and sales consultant at KASM(AM) in Albany, Minn., which airs 40 hours of polka programming a week. "It's a fun type of music to listen to. It's exciting and it draws attention. The more excitement you can build up, the younger an audience you can get. We have all kinds that call for requests on the show."

But perhaps the best testimonial comes from Brueggen at WKLJ: The musician and on-air talent is 20 years old and has been in polka ensembles since age 9. He and his sister are the 17th generation in the Brueggen family to become involved in the industry.

"I'm prouder than all get out that I'm a polka DJ and a musician," he says. "I wouldn't have it any other way."

Most involved in the format feel that its livelihood will remain intact for many years to come.

"In this day and age with AM radio, you've really got to be something a little different. Most listeners have already gone to the FM dial," Choudoir says. "But with the agricultural influence of our listening area and their German background, we're reaching our little niche."

Adds Bellin, "Polka music in Wisconsin is really still going pretty well. Parents instill this in their children as part of their national heritage. I don't think it's going to die for a while."

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MANAGER'S NOTEBOOK

Careful Budgeting Makes Life Easy

by Sue Jones

BURKE, Va. Budgets are a tedious task at best, but necessary for a well organized and managed station. Now is the time to begin thinking about preparing next year's budget. Planning your management objectives and budget should begin in earnest by the beginning of the fourth quarter and be finalized by early December so that the sign-offs and approvals can be obtained before the end of the year.

If you do your homework on time, you should be ready to implement your new budget by January 1st.

The way you develop the budget will depend on the size of your station and previous budgets. If you are a major or medium market station with several departments, you may consider letting each of the department heads prepare a budget for his/her department, complete with the personnel costs, professional fees and services for each area's furniture and equipment.

In on the costs

A department head who prepares his own budget will be aware of the costs associated with each budget item throughout the year. Taking the concept one step further, you could hold each head accountable for achieving his department objectives within budget.

Those who accomplish their objectives within budget might be given a bonus at

the end of the year. However, if you are a medium to small market station, you may develop the entire general and administrative (G&A) operating budget yourself.

Budgets have to be realistic projections of revenues and costs. You may make a list of objectives of what you wish to accomplish next year by quarter (MBOs) and the costs associated with each objective. However, if your objectives exceed the projected revenues, the budget will have to be trimmed before it is finally approved and implemented or you will have to find new sources of revenues to support the objectives.

If you have projected costs for standard line items, cutting the budget before implementation or during the year will be a little easier, and more equitable. Your budget should be based on realistic revenues. It is better to prepare a smaller budget based on lower revenues and have a surplus left over at the end of the year because your revenues were higher than projected. If you find yourself in this situation, carry the additional funds over to the next year and create a larger budget for that year.

Certainly you do not want to be caught in the other possible scenario where your budget is too large for the revenues.

Major market stations and stations that have established formal budgets can begin with the current 1993 budget. Compare the projected costs for each line items to actual costs. You may find that you over-

or underestimated for some line items. If so, you will want to make the necessary adjustments for the coming year. If your projected costs were more wrong than right, analyze why costs were lower or higher than anticipated. Understanding these reasons will contribute to a strong realistic plan for next year.

If you have never developed a formal budget, begin by reviewing the expenses posted in the corporate check book or an accounts payable year-to-date report if you have an automated accounting computer system. You can develop your own outline with the major line items by grouping the similar expenses into major categories such as personnel expenses, building expenses and professional services. An outline of standard budget line items is included in this article to get you started.

Plot out the year

After you have identified the major line items and the projected costs, the next step is to divide those costs over a twelve month period. The simplest method is to take the line item cost, such as marketing brochures, and divide by twelve. However, you may plan to have brochures printed twice a year. In that case, you may want to divide your marketing brochure costs by two and put them in the two month's budget that you anticipated developing and printing them. That budget line item will have zeros in it for the other ten months.

Other costs such as salaries and rent costs should be divided by twelve since those expenses are relatively stable and occur every month. Be sure to include a pay increase for salaries and/or new salaries for anticipated hires of additional staff.

Assembling all of this information can be incredibly time consuming, especially if only one person is doing the work. Asking department heads to develop their own budgets will enhance their understanding of the financial operations of the station and improve their own management skills. It will spread the work load around but may also take longer to complete the task.

When all of the information is assembled, you must prepare the final budget. This can be done manually or with computerized budget software packages. If you are preparing the budget manually, I would recommend that you do it with a columnar accounting pad available in office supply stores.

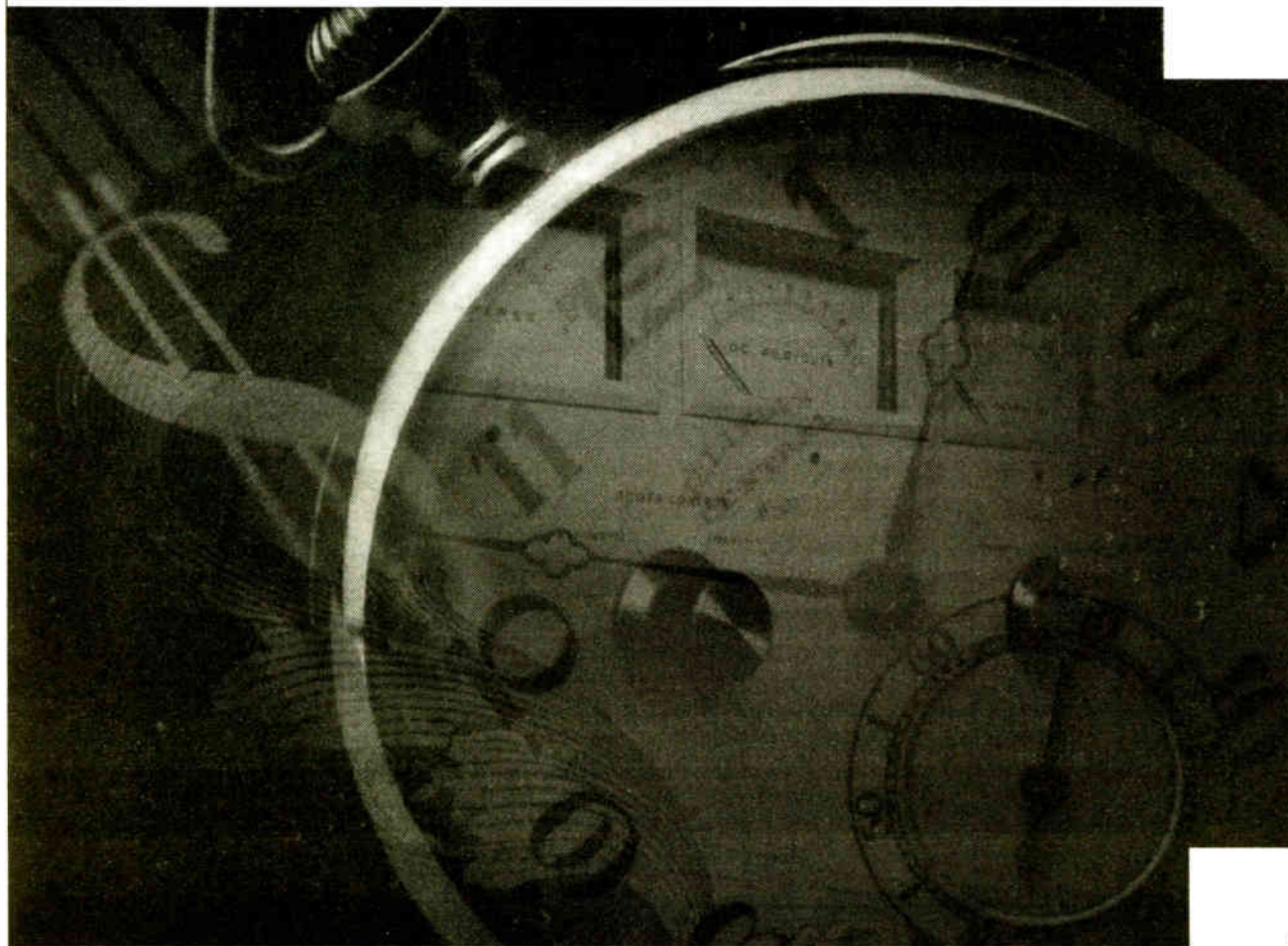
Budgets can also be developed with spreadsheet software. It may be worthwhile to invest in software that will assist in developing the budget and also assist in monitoring monthly variations of the budget compared with actuals. This information enables you take corrective action when the problem occurs within 30 to 60 days.

This covers the basics for G&A budget development, but does not cover capital budget planning. Look for that in my next article.

□ □ □

Sue Jones is a senior manager for Computer Data Corporation Inc. in Rockville, MD. She can be reached at 703-323-0491.

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| Jingle Pack | Promotions | Trails | Packages | Dave Winds. | Steve Knight | Eng Test | Fill Carts |
| 00 | Permanent Blank | | | 10 | BFBS Sting | | 3.8 |
| 10 | 1 Main Theme :52.3 | Instumental | 3.1 | 11 | BFBS Sting | | 3.4 |
| 20 | 2 Main Theme :52.2 | Vocal | 3.2 | 12 | BBBBFBS | | 3.2 |
| 30 | 3 Main Theme :52.3 | End Vocal | 3.3 | 13 | Non Stop Hits BFBS | | 4.7 |
| 40 | 4 Main Theme (Light) :50.6 | End Vocal | 1.6 | 14 | BFBS | | 3.2 |
| 50 | 5 Main Theme (Rock) :52.5 | End Vocal | 3.3 | 15 | Most Music Power/ BFBS | | 4.2 |
| 60 | 6 Short Main Theme :13.5 | End Vocal | 4.3 | 16 | The Most Music/ BFBS | | 4.8 |
| 70 | 7 Short Main Theme :13.7 | No End Vocal | 4.5 | 17 | .Bed-BFBS | | 4.2 |
| 80 | 8 BFBS Sting | | 2.8 | 18 | .BFBS Sting | | 2.7 |
| 90 | 9 BFBS Acap | | 1.7 | 19 | BFBS Acap Sting | | 1.0 |

Load Break in Cart 1

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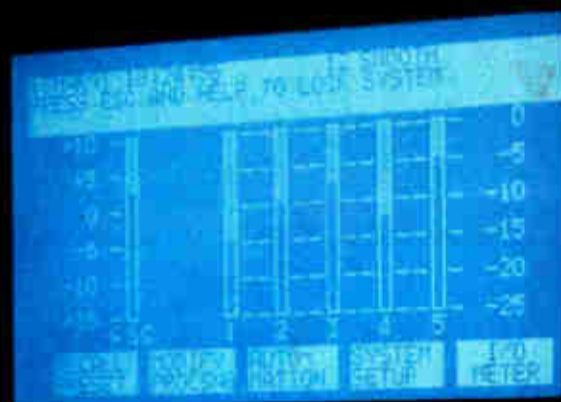
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Colorado Stations Broadcast Pope's U.S. Visit

by Dee McVicker

DENVER Six Denver AM stations slightly changed the meaning of "mass" media to mark Pope John Paul II's visit to Colorado for World Youth Day '93 (August 11-15).

The Pope's Sunday mass and other ceremonies were broadcast over a foreign-language pool, including KBNO (Spanish), KHOW (German), KNUS (Italian), KRZN (French) and KWMX (Polish). KOA aired the English feed.

Planning and set-up for the radio pool required nine months of preparation by broadcasters and members of World Youth Day organization.

Over 500,000 youths from all parts of the globe attended the festival and most of them were able to follow the events in their native tongues by simply tuning in the local AM frequencies.

Unique feeling

"I don't think anyone has ever tried to achieve this before," said Mason Lewis, KNUS program and news director. From the time he first heard of the language pool, Lewis said he was looking forward

Most foreigners were able to follow the events in their native tongues by simply tuning in the local AM frequencies.

to finding out what it would feel like to scan the AM band and hear Italian, French and the other foreign languages.

He and hundreds of thousands of other portable stereo owners got the chance to find out. (Sony Walkman sales in Denver are said to have reached record numbers before and during the event).

Former network announcers Wayne Wicks and Bob Asman were hired by the Denver broadcasters to provide audio and technical services to sustain such a mega-media event.

It was the World Youth Day organizers that approached the Denver broadcasters to coordinate the foreign-language broadcasts. "Usually when there's an event like this, the networks get involved and they put a pool together and sell the coverage to whomever wants it," said Larry Crandall, operations manager for KOA and pool coordinator for the event.

Wicks and Asman were kept busy coordinating all satellite, RF and microwave transmissions, and lining up power as well as feed distribution for the nine months leading up to the event.

"I think we have everything under control," Wicks was heard to say just two days before everything had to come together. He added, somewhat nervously: "We have enough RF in the air over Cherry Creek to cook a chicken."

KZRN Program Director Lee Roberts was on-site for coverage of Sunday

mass. Roberts and the volunteer translators had to clear high-security background checks to stand close to the pope. "We're estimating 75 to 100 yards from the pope, which puts us in front row seats," he said.

The KRZN crew brought a small mixer to blend musical segments in with the translated mass. Audio was sent over an 8 kHz phone line to the KRZN studio for regular broadcast.

Translators stood by

Other radio language pool participants remained in the studio to translate services. In fact, the entire KNUS Italian-

translation staff stayed in the studio to maintain a controlled environment. Most of the translators, who were provided by the World Youth Day organization, were not broadcasters by trade. Each station had a staff of four to eight translators.

KNUS capitalized on a satellite feed (set up for the TV pool) that included a main channel and a director's audio channel. The station also sent out roving reporters to call in on cellular from the festival's four major public events: a ceremony at Mile High Stadium on Thursday; the "Way of the Cross" celebration on Friday; a vigil mass on Saturday, and the final Sunday mass.

Many stations also covered President Bill Clinton's speech on Thursday.

"We're really delighted to be a part of this," KBNO General Manager Evelyn Casias said. The regularly formatted Spanish-language station also was fed to other Spanish stations nationwide by the Spanish International Network and via satellite to Mexico, Central and South America via satellite by NBC.

"The reason we're doing the foreign language translation is simply because there is no bigger event in the history of the state," Roberts said just before the start of the festivities. "We are going to participate in any way possible."

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continued on page 40 ▶

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MARKETING & MANAGEMENT

Business-to-Business a Whole New Ballgame

by John Cummuta

ALGONQUIN, III. If you sell a business-to-business product or service, you're dealing with a different set of customer motivations and budgetary considerations than you are with consumer-directed campaigns.

First of all, people who are employees of a company aren't as price sensitive as consumers who are spending their own money. What business consumers are concerned about is being successful in their jobs. They want to make good decisions, as perceived by their superiors.

So, as you climb into your prospect's mind, to see how he might view your product, your company, your offer, your competitors and so on, remember what his primary motivation is. He wants to do things that look good to the boss. Your challenge then becomes one of figuring out what his boss really wants, so you can frame your offer to that perspective.

Profit matters

Marketing in the business-to-business arena is somewhat simplified by the fact that you already know what the boss' biggest desire is: profit! No matter what you're selling, the prospect (and his superiors) will be unflinchingly fixated on the bottom line. Especially in today's economy. If you can connect the benefits of what you're selling to his P&L Statement, you are operating from his mind's perspective.

Price is not usually the primary consideration, as it often is in the consumer market. Most mid-level managers, for instance, would rather have to justify why the company's paying a higher price for quality equipment and services, than the frequent breakdowns or faulty service.

In other words, the safe play is what most employee/managers are interested in. So, as you put together your market-

ing concepts and message, fill your materials with reassurances that yours is the "best, most dependable, longest-lasting widget, with the most satisfied customers in the world." And have numbers and other evidence to back up your claims.

Published reviews of your product or service, unsolicited testimonials and brochures with photos (not drawings) are musts for the successful information

The main purpose of your customer database is to allow you to keep on top of your customer relationships.

package. You are trying not only to prove that yours is the best widget, but you are also showing the prospect (and his boss) that yours is the "safest" widget to put the company's money on the line for.

Prospects and customers

Just as with consumers, you want to target your marketing as effectively possible. This strategy eliminates wasted marketing dollars and it maximizes the profit from each campaign.

When building a business-to-business database, you will want to concentrate on gathering somewhat different information than you did when tracking consumers. The company is your primary customer, while the individual you most frequently deal with at the company is your contact. This may seem to be a depersonalized approach to marketing, but the fact is that people change posi-

tions within a company or even leave altogether. You want to build your information base so that a new contact person can be easily edited in, but the primary company information remains valid.

Another difference is that you should include additional fields in your database record structure to carry information on other influential persons in the decision-making chain. These people may be above or below your contact in the company's chain of command, but their opinions weigh heavily on the buying decision.

By the way, do not underestimate the importance of your contact's secretary or assistant. Treat him/her well. He/she may be the person off of which your contact bounces all his big decisions.

In terms of company information, you should consider including the firm's SIC (Standard Industry Classification) code. Having this code in every customer record will allow you to later sort out certain types of businesses for specific promotions or offers.

Other data you will want to have fields for may be: source of lead, amount of average purchase, method of payment, timeliness of payments, name of accounts payable person assigned to your account, special production requirements, special shipping requirements, special delivery requirements, special volume pricing agreements, date of last transaction, length of time on file, frequency of purchasing, geo code, territory code, promotion code and anything else you can think of that you might later want to index reports on or by which to make segmentation selections.

Where to get names

Your best list is your customer list. The company most likely to buy from you is the one that already has purchased something from you. You have a relationship

with them, and you should continue to build that relationship.

But you must also maintain programs designed to bring new customers into the system, to build your business and to replace customers you lose or who go out of business.

Most business lists are compiled, meaning that the list provider copied them out of the yellow pages, industry directories, trade association directories, etc. These are not *buyer* lists containing proven direct-marketing responders. They are

continued on page 29 ►



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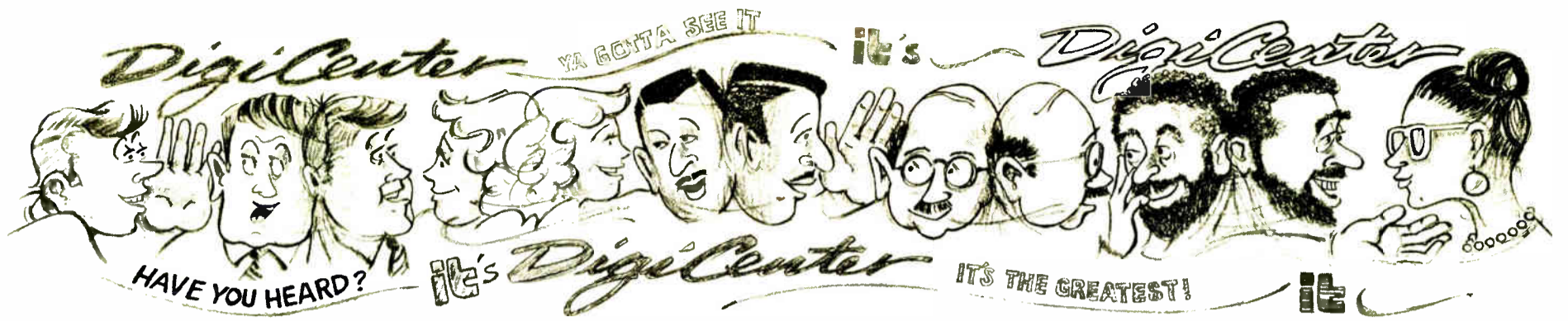


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TECH TALK

FCC Modulation Inquiry a Long Time Coming

by Judith Gross

NEW YORK If you've ever lived in Washington, you know that all those nasty comments about how slowly our government moves and horror tales of bureaucratic red tape are more or less true. I called the nation's capital home for six years or so, and the grind of the Washington machine—or grinding down—is at least one of the many reasons I now call New York home.

Take the FCC (please! to paraphrase an old Henny Youngman line). Two years ago, there was a major storm over modulation monitoring in the context of loudness wars. Stations were nailing it to the wall on their modulation, and some of the more aggressive members of the fold were getting fined on a regular basis—fines they apparently paid with little or no remorse.

Then one manufacturer introduced a modulation monitor that basically ignored shorter peaks and gave a station

(not one already nailing it to the wall) the option of squeezing an extra little bit of modulation than previous mod monitors had.

Just a second, please

Here's one way to look at it. You're driving your car and you know that if you go 56 mph for more than 15 seconds at a stretch, the trooper with the mirror-sunglasses and the evil smile is going to pull you over for speeding. Your speedometer is probably accurate, but hey, who really knows? So you generally keep the needle just under 55 mph, say

around 52 or maybe 53, just to be sure. Maybe it zings up to 56 or even 57, but only for a second.

Now along comes a new speedometer manufacturer who says you are only going to read 56 mph if you are going that fast for at least ten seconds, not for only a second or two. Now you have at least five seconds to back off on the accelerator, plenty of time, so you drive at exactly 55, knowing you have time to decelerate if you see the needle hit 56. You are now driving at least two to three miles faster than you could before.

The analogy is a bit of a stretch, but it

gives you some idea of what the argument was about two years ago, when Modulation Sciences introduced ModMinder.

"FCC OKs ModMinder," read the headline in *RW*, drawing a storm of comments pro and con. Well, that too, was a bit of a stretch. (I was Editor at the time, so I'll take the flak.) The FCC had actually decided to stop requiring type-notified mod monitors in the late 1980s, so it didn't need to approve or disapprove ModMinder.

Instead, in response to an inquiry by

continued on page 35 ▶

Selling to New Market

▶ continued from page 27

rather listings of companies and sometimes positions within those companies, where people may have a need for what you sell.

Dunn & Bradstreet (in your local phone book) can supply compiled lists. Other companies providing lists, and catalogs from which you can choose lists, include:

*American Business Information 402-331-7169

*Database America 201-476-2411

*American List Council 800-ALC-LIST

*Best Mailing Lists 212-868-1080

Managing your database

It is probably better to keep your prospect lists and your customer database completely segregated. First of all, it is illegal to keep names you rent for a marketing campaign. They are for one-time use only. The second reason is that you don't want to clog up your customer database with unproven or unproductive names, because the larger the database file, the slower any segmentations or queries will run. If your computer has to sift through thousands of unimportant names, it will just leave you staring at an unresponsive monitor that much longer.

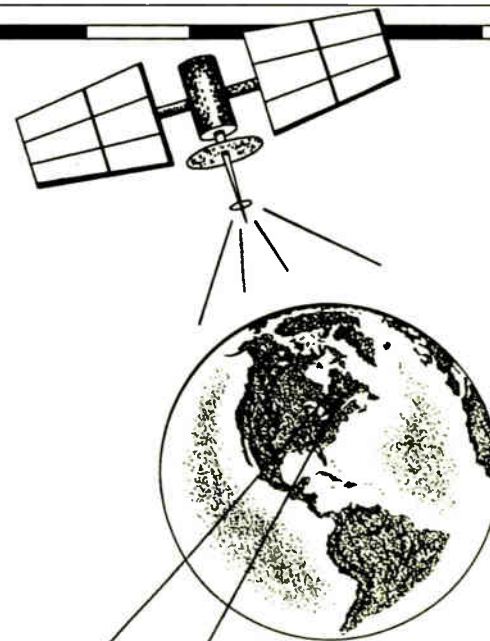
The main purpose of your customer database is to allow you to keep on top of your customer relationships, making sure that you are always making them offers that meet their needs and never leaving them out in the wilderness where your competition can easily pluck them from you.

In business-to-business marketing, relationships are even more important (and profitable) than in the consumer arena.

□ □ □

John Cummuta is an independent marketing and management consultant and the author of the "Sales Machine" database marketing course and "Sales Machine" database marketing software. He can be reached at 708-658-9107.

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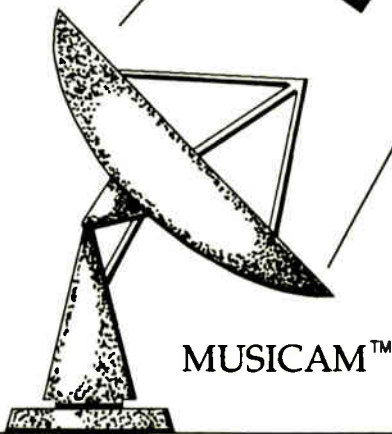
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How Well Do You Know Radio's Past?

by Frederick John

HONOLULU Remember radio?

Not all that talk and sweet and sour music they have today. Remember the good old days when America stayed



Jim and Marian Jordan played a famous couple on radio for years. What was the most famous part of their house at 79 Wistful Vista?

home at night to hear Jack Benny, Mr. District Attorney, The Hit Parade, the Quiz Kids, Walter Winchell, and all

those other great shows?

Do you remember the dynamic duos of the airwaves—the great radio teams of yesteryear? How about Vic and Sade, Myrt and Marge, Ethel and Albert?

Do the names ring a bell? If so, you may enjoy a trip down memory lane to meet a lot of other famous radio pairs.

Test yourself

Test your knowledge of early radio shows with the following quiz.

1. The most famous part of Fibber McGee's home at 79 Wistful Vista was: a) The kitchen where Molly made her famous pies; b) The hall closet where there never was room enough to hang a hat; c) Fibber's workshop where he didn't have tools.

2. The Lone Ranger and Tonto met for the first time: a) When they were youngsters in Texas; b) When Tonto nursed The Ranger back to good health after he was wounded; c) When the Ranger saved Tonto from a lynch mob.

3. The Shadow's "friend and companion" was: a) The lovely Lois Lane; b) The lovely Margo Lane; c) The lovely Lola Lane.

4. "Amos and Andy" was one of radio's

most famous shows. The parts were played by: a) Jackie Kelk and Ezra Stone; b) Peter Donald and Alan Reed; c) Charles Correll and Freeman Gosden.

5. Lum and Abner owned: a) The Jot



Can you name Bergen's other dummy?

'Em Down Store; b) The B-Bar-B Ranch; c) The Breakfast Club.

6. Barbara Luddy and Les Tremayne were the stars of: a) Mr. and Mrs. North; b) The First Nighter Program; c) The Thin Man.

7. Fanny Brice played Baby Snooks on radio for years. Hanley Stafford played her father. His name was: a) Osgood Conklin; b) Lancelot Higgins; c) Clifton Fadiman.



Brett Morrison played the invisible one on radio for years. Who was The Shadow's girl friend?

8. "Easy Aces," one of radio's longest running shows, was about: a) a couple of airplane pilots; b) a happily married couple; c) a couple of professional gamblers.

9. "My Friend Irma" was a top radio favorite. Who played Irma's best friend, Jane? a) Gloria Gordon; b) Marie Wilson; c) Cathy Lewis.

10. Abbott and Costello featured their famous baseball routine on radio for years. Name the first baseman on the mythical team: a) Why; b) I Don't Care; c) Who.

11. Blondie, a popular comic strip, was also on radio for several years. Penny Singleton played Blondie. Who played her husband, Dagwood? a) William Bendix; b) Arthur Lake; c) Victor Moore.

12. Joan Edwards was the female singer on "Your Hit Parade" for several years. Her male singing partner was a crooner known as "The Splendid Splinter." He was: a) Bing Crosby; b) Perry Como; c) Frank Sinatra.

★★★

How well did you do? Check the correct answers below.

1. (b) When that closet door opened,

everything fell out. America waited for it to happen every Tuesday night.

2. (a) They played together as children. Later, Tonto saved The Ranger after he was wounded in an ambush.

3. (b) The lovely Margo Lane never married Lamont Cranston, who was the Invisible Shadow, even though she went everywhere with him. This raised a few eyebrows back then.

4. (c) Correll and Gosden were on radio for years. Kelk was Homer and Stone was Henry on The Aldrich Family. Donald and Reed were a couple of characters who lived on Allen's Alley.

5. (a) The store was located in Pine Ridge. Bobby Benson, radio's boy cowboy, owned the ranch, and Don McNeill was host of "The Breakfast Club," a long-running Chicago radio show.

6. (b) Different half-hour dramas were performed in "the little theatre off Times Square." Luddy and Tremayne were the weekly stars. Mr. First Nighter was the host of the show.

7. (b) Higgins was Snooks' long suffering father. Gales Gordon played Conklin, the school principal on "Our Miss Brooks," and Fadiman was the moderator of "Information Please," an intellectual quiz show.

8. (b) "Easy Aces," a fifteen minute show broadcast three nights a week for years, featured Jane and Goodman Ace, a real-life married couple.

9. (c) Cathy Lewis was Jane, and Marie Wilson was Irma. Gloria Gordon played Mrs. O'Reilly on the show.

10. (c) Next to Lou Gehrig and a couple of other Hall of Famers, Who is probably baseball's best known first baseman.

11. (b) Lake, a splendid comedian, also played Dagwood in the movies and on television.

12. (c) Sinatra was also known as "the swooner-crooner" in his younger days. He has put on some weight since then. Frank



Do you know the names of the men under the makeup?

and Joan sang the nation's top tunes every week on "Your Hit Parade."

How did you rate?

Each right answer is worth ten points. 100 to 80: You probably heard all of FDR's Fireside Chats. Seventy to 50: You may have missed a few Fireside Chats—but not one episode of Captain Midnight. Forty to Zero: You've watched too much television.

□□□

Frederick John is a freelance writer living and working in Honolulu. He can be reached at P.O. Box 25895, Honolulu, HI 96825.



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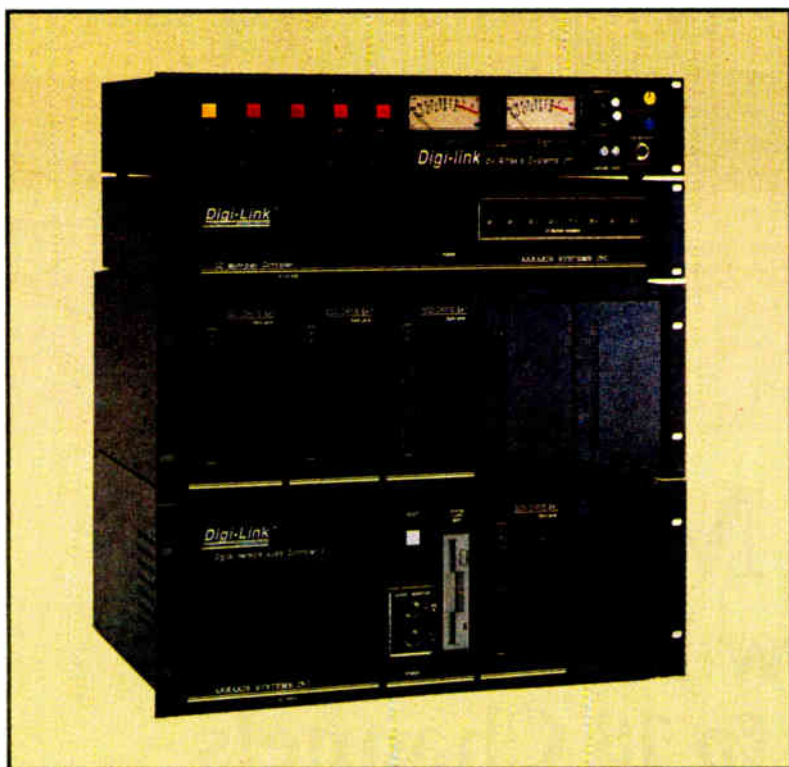
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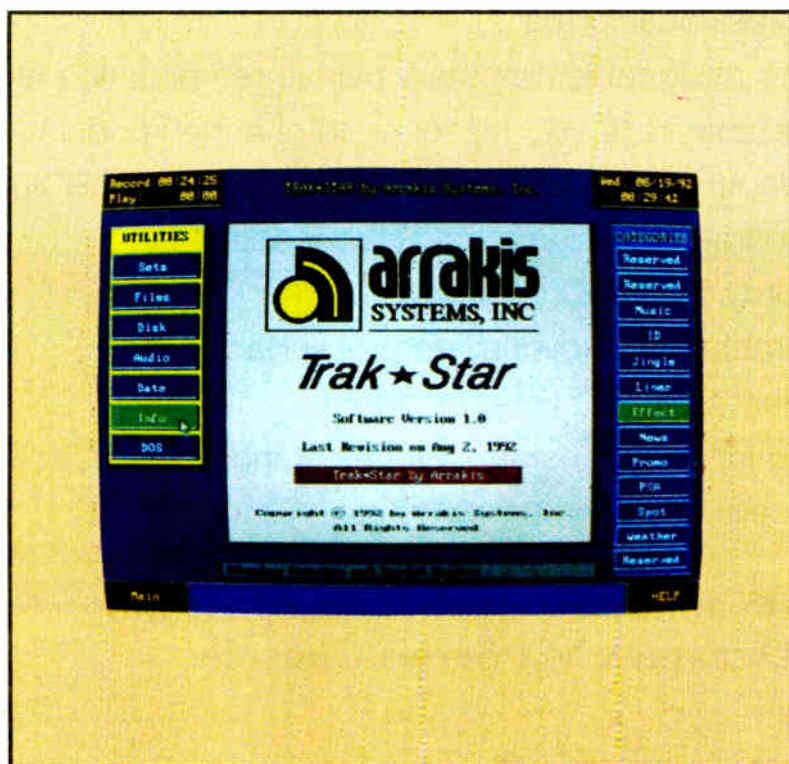
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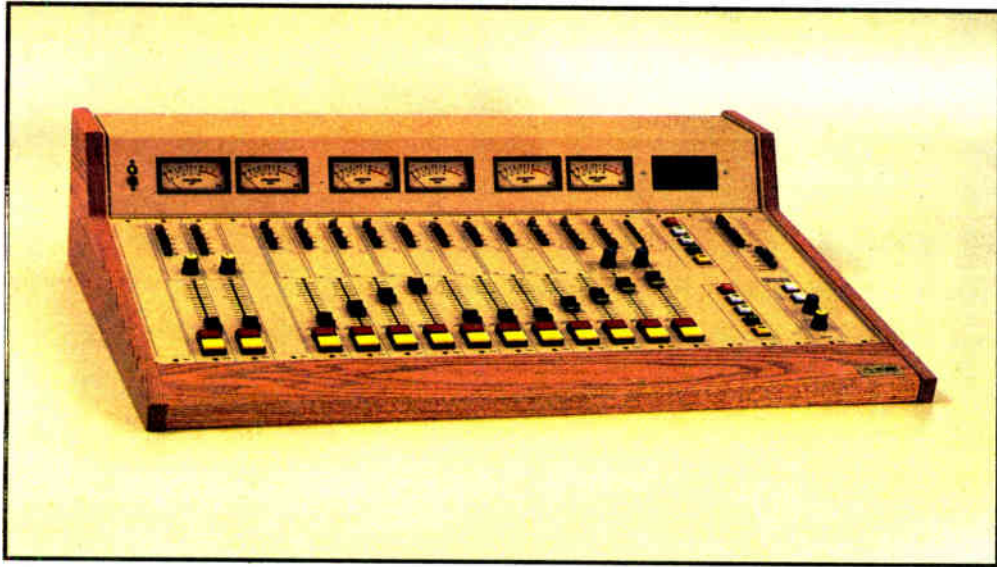
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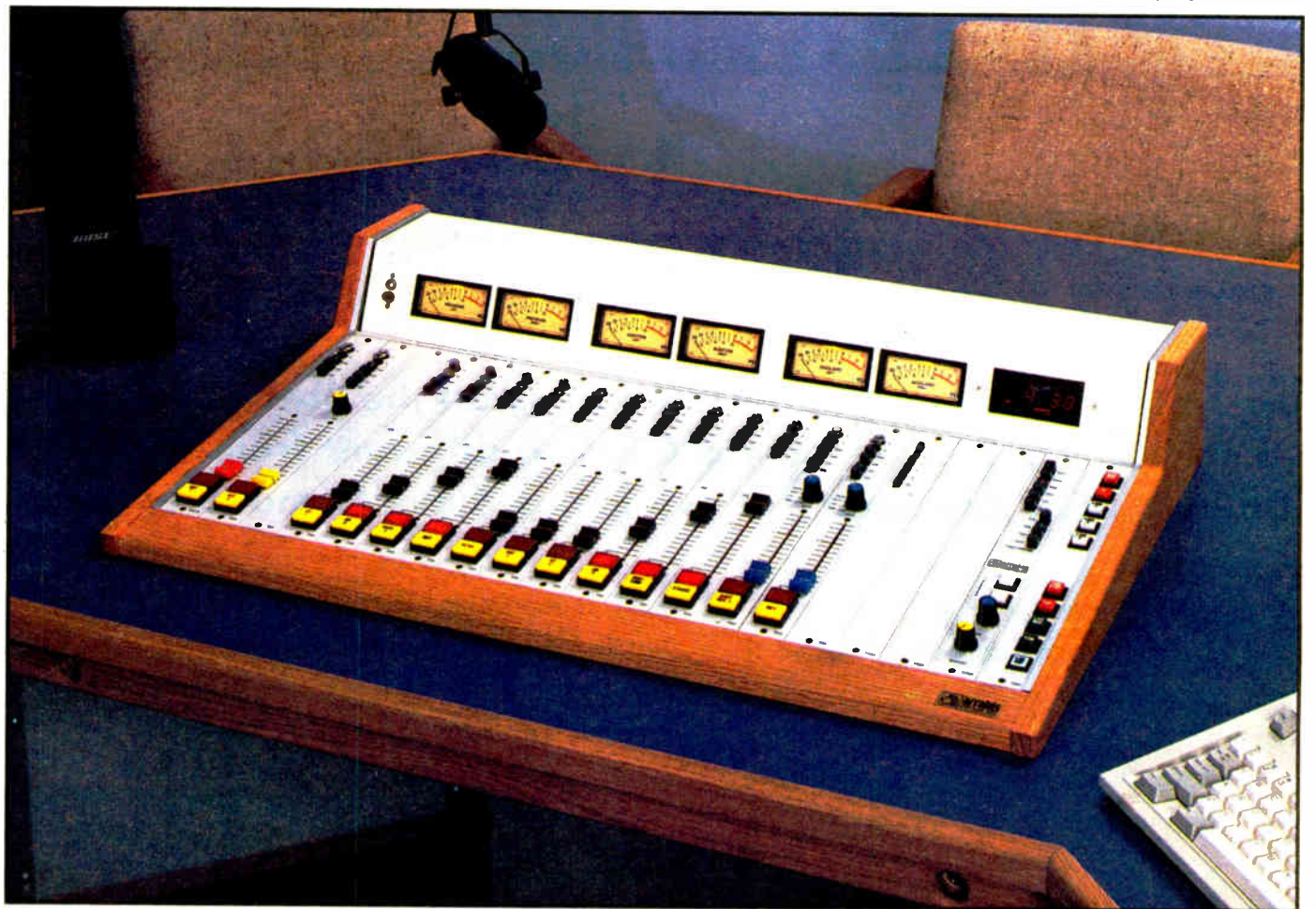
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World Radio History

FCC Modulation Inquiry in the Works

► continued from page 29

Modulation Sciences pertaining to the legality of its ModMinder amid a storm of controversy, Thomas Stanley, the FCC's chief of engineering, had more or less written that a station could use ModMinder or any other suitable device for tracking its modulation and the Commission couldn't care less.

But he emphasized that all stations had to stay within modulation limits, no exceptions.

Storm brews larger

Did this end the controversy? No way.

For one thing, the Commission's FOB, tasked with enforcing the rules, wouldn't say exactly how its field inspectors kept tabs on modulation, whether there was a standard or if it differed from region to region, or if the way the monitors measure your modulation is substantially different from the way the Commission does.

I heard from engineers in some regions how the local field office would call up and have a friendly chat with you if they observed your breaking the "speed limit" once too often. In other regions, one infraction and Wham!, you got hit with a fine.

Chaos reigned. Things got so bad at one point that one unnamed player actually triggered off the FCC's spot check of modulation of stations in a particular locale, just to help define the question. A mob of outraged engineers promptly converged around this individual at a trade show, and the mob was ugly.

The NAB, under cloak of the NRSC, even began to toy with the idea of becoming involved (they wisely ultimately demurred), and my own involvement as a reporter covering all this got me thrown out of an EIA meeting and

(alas!) the press barred from NRSC meetings ever after.

At any rate, two years later, the whole brouhaha has died down. Other brands of modulation monitors on the market handle modulation the way ModMinder does, many stations have actually opted to clean up their own acts and the "nail it to the wall" philosophy is not running amok these days.

And now, two years later, when the problem has more or less taken care of itself, the FCC has finally gotten around to addressing the whole issue in a recent NOI (FCC 93-370). Your tax dollars at work.

Time for a definition

The Commission is taking a good hard look at modulation (two years late) and basically asking three things:

1) How do you define overmodulation? In other words, short peaks or long enduring peaks, and how long? Or should they define it at all? They won't be able to separate this answer from the whole controversy over how you measure modulation. Like that tree falling in the forest, if it isn't "heard" or measured, it doesn't have a definition.

2) Should we replace the crime of "over-modulation" with "exceeding occupied bandwidth?" Since the idea of keeping tabs on modulation in the first place came from the commission's desire to stop interference, wouldn't it make more sense to only punish stations when they are taking up more real estate than they are licensed for?

3) If we go with the idea of "occupied bandwidth" as opposed to "modulation," will it be more complicated and expensive to measure, and should we maybe allow modulation monitors as an option? To the FCC's credit, they rarely want to

put manufacturers out of business, or be accused of going in that direction.

The last one could open up a whole new can of worms. I did some asking around and it seems that right now, the only way to go about measuring occupied bandwidth is to follow a fairly complicated procedure set forth by the CCIR—an international engineering group. It uses several devices and, believe me, you don't want to know. There is no commercial measuring device sold solely for this purpose as of now. (If you hear of one, let us all know.)

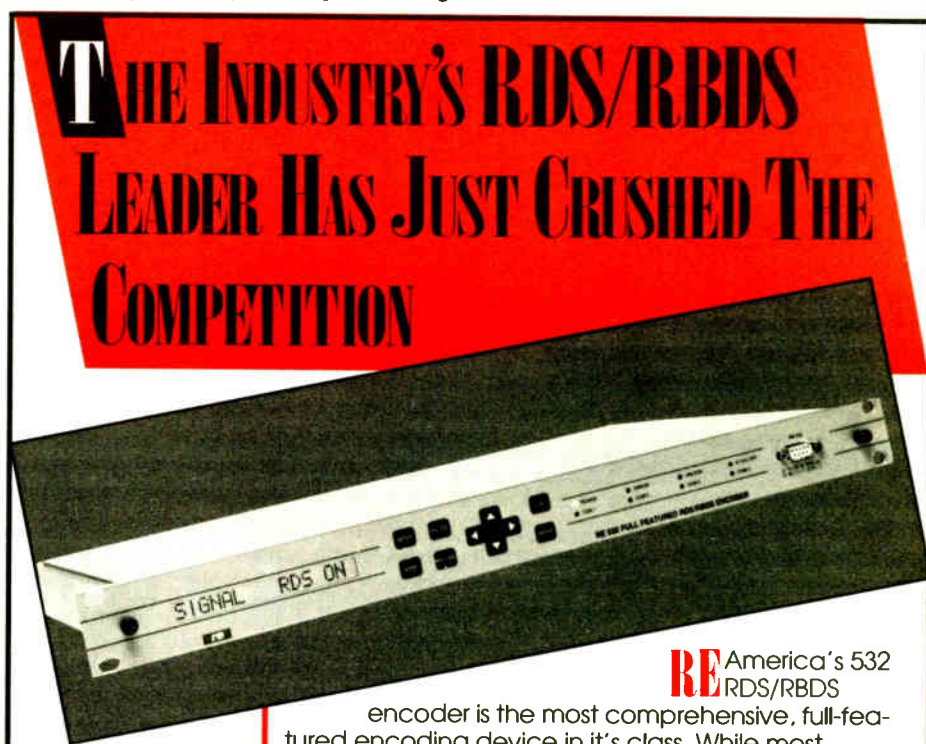
It's nice of the commission to address an industry concern after all this time, even though it may end up breaking

more eggs before we get anything that resembles an omelet. If you're interested in putting in your two cents worth to the Commission, the deadline for comments on its NOI is November 5.

It will be interesting to see what current manufacturers of mod monitors, especially Modulation Sciences, have to say about all this in comments, and also whether there's an engineer/inventor sitting in a basement lab somewhere, right this very moment, breadboarding a cheap, easy occupied bandwidth monitor and praying that the FCC comes through for him or her.

□□□

Judith Gross is a writer with Media/Scan, an advertising and public relations agency specializing in broadcast and pro-audio technology. She can be reached at 212-929-6108.



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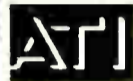
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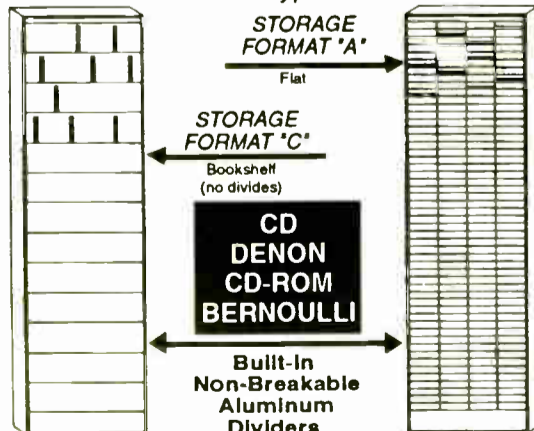
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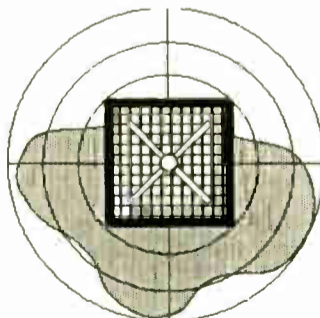


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READER SERVICE NO. 172

SBE Show Promises A Full Menu Of Technical Sessions

by John Gatski

MIAMI Despite predictions of a low turnout, the SBE's last convention before combining forces with the NAB in 1994 promises a full schedule of technical sessions ranging from antennas to digital radio broadcasting.

SBE President Rick Farquhar is upbeat about the Miami convention and emphasized the quality of the program.

The convention is scheduled for Sept. 29-Oct. 2 at the Miami Beach Convention Center and will be held concurrently with the Radio Television News Directors Association, which also will be joining with the SBE in combining with NAB, starting in 1994.

In recent years, there has been some dissatisfaction with the SBE conventions because of their constant location changes, which members said limited the attendance when it wasn't held in a central location. Some conventions, such as

Dallas in 1991, lost money, but last year SBE said it made money in San Jose (vendors, however, said attendance was sparse).

Nonetheless, SBE President Rick Farquhar is upbeat about the Miami convention, and emphasized the quality of the program.

The radio-related sessions begin Thursday morning, Sept. 20, with New Technology for Radio, moderated by RW Editor Lucia Cobo. Speakers include Walter Johnson, Voice of America, "Technology to Extend the Life of High Power Vacuum Tubes"; George Whitaker, Practical Radio Communications, "Favorite Technical Tips"; Timothy Cutforth, James Engineering Consultants, "Broad Band Implementation of Physically Short, Highly Toploaded Anti-Skywave Antennas"; and Skip Pizzi, consultant, "Preparing for the Multi-cast Environment."

The Thursday afternoon sessions will cover Emergency Broadcast Systems Testing. Speakers will include Paul Montoya, Broadcast Services, "Testing New Technologies for Emergency Alerting Systems"; Richard Smith, FCC, "This Is No Longer A Test"; and Richard Rudman, KFWB, "User Friendly EBS."

Also, on Thursday afternoon, SBE's

continued on page 40 ▶

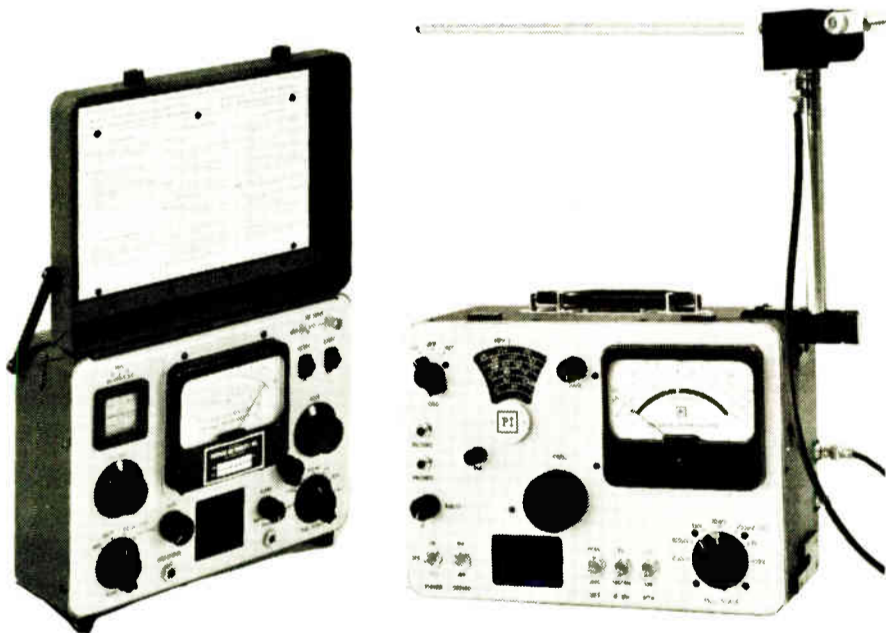
SBE Exhibitor List

NEWS/TECH '93 LIST OF EXHIBITORS AS OF 8/16/93

| | | | |
|--------------------------------------|-----------|-----------------------------------|-----------|
| Abekas | 931 | Broadcasters | |
| Accu-Weather Inc..... | 1118 | General Store..... | 724 |
| Accuracy in Media Inc..... | 1102 | Browning Labs Inc..... | 1000 |
| Advanced | | Bureau of the Census | 831 |
| Designs Corporation | 1302 | Cheetah Systems Inc..... | 619 |
| Alden Electronics Inc..... | 1200 | Chemical Manufacturers Assoc. .. | 512 |
| Amer. Assn. | | Citizens Against | |
| of Retired Persons..... | 819 & 919 | Govt. Waste | 834 |
| American Cancer Society..... | 804 | CNN Television | |
| American | | Turner Pro. Svcs. | 906 |
| Medical Association | 1227 | Coalition for Vehicle Choice..... | 631 |
| American Osteopathic Assoc. | 720 | Colby Systems Corp. | 702 |
| American Speech-Hearing Assn. | 1207 | Colorado Ski | |
| Andrew Corp | 1221/1223 | Country USA | 1400 |
| Associated Press | 1106 | Comark Communications Inc. | 1001 |
| Audience Research | | Comprompter Inc. | 1124 |
| & Development | TBA | Computer | |
| Automated | | Engineering Assoc. | 1513/1515 |
| Weather Source Inc. | 630 | Consumer Reports | |
| Avid Technology..... | TBA | TV News..... | 1237/1239 |
| AWA-TV | 1142/1143 | Crowley Broadcasting Inc. | 1126 |
| BAF Communications | 1234 | DCM Inc. | 820 |
| BASYS Automation Systems | 1218 | Disneyland Walt Disney World..... | 806 |
| Best Power Tech. | | Distilled Spirits Council..... | 1401 |
| Sales Corp. | 1002 | Dr. "Red" Duke's | |
| Boeing..... | 618 | Health Report..... | 706 |
| Broadcast Design International... .. | 1306 | Dynatech Colorgraphics..... | 1018 |
| Broadcast Electronics Inc..... | 1202 | | |

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PROMO POWER

Wacky Stunts Are Good for Business

by Mark Lapidus

ALEXANDRIA, Va. A group of office workers are hanging around the coffee machine in the morning talking about a DJ who's been living on a billboard for the last two months. They can't remember much about it except the call letters of the station and that it seems that this particular radio station is somehow always in the news.

Would you like that station to be yours? It can be if you pick the right events and choose stunts that capture the public imagination. Most great radio stations and personalities are known not only for the music they play, but also for the stunts or events they launch.

Good stunts transcend format and reach a very broad audience. If you have to explain a stunt to somebody you're on the wrong track. It's like trying to explain a joke; once you explain it, it's not funny. Call your station attorney with a few of these ideas. When the attorney doesn't like it but reluctantly says okay, you know you're onto something.

Words were flying

Typewriter Toss: I've done this one five years in a row and local and national camera crews have fought for position year after year. Schedule it on National Secretaries Day. Find a restaurant/bar where bosses take their secretaries to

lunch. This establishment must have a balcony and should be located near the television stations.

A good rule of thumb is to do stunts in areas convenient for camera crews. It can make a tremendous difference in the amount of coverage you obtain. Here is the operation: Call a typewriter shop and obtain 10-15 typewriters that they were going to throw out.

Get a gun shop to donate a life-size shooting target which you will label "Boss." This target will be affixed to the huge mat that you've borrowed from a health club. Stop by a lumber yard and get a few sheets of plywood that bouncers in the bar will hold up around the perimeter of the mat to stop the typewriters from flying out at the customers.

Then, one week prior to National Secretaries day, invite all bosses to bring their secretary to lunch for the toss. Conduct a random drawing for the ten tossers, verifying that they are really secretaries before announcing their names.

Each secretary has to put on your station t-shirt because you don't want them to get their outfits dirty (and you want your call letters on TV). They select a typewriter and walk up to the balcony. Your banner is hanging on the balcony so there's no chance you'll be cut out of coverage. (Frequently, you'll be referred to as "a local radio station," so heads up!) The game is played like horseshoes

with the winner being the one whose typewriter is closest to the head of the boss at the conclusion.

DJ interred

Bury a DJ: On Halloween night, put one of your jocks in a coffin six feet under for a live broadcast. Make it really kinky by choosing a contest winner of the opposite sex to be buried with them. You'll need the local rescue squad, oxygen, and a

If you have to explain a stunt to somebody you're on the wrong track.

bulldozer. Some stations have used a hypnotist to put the jock under a spell so that he/she doesn't need to eat or use the bathroom. (This doesn't always work!)

Make the largest anything: Try building a pizza a block long with forty-thousand mushrooms; making the world's largest bowl of gelatin in an olympic size pool; or baking an apple pie the size of a carousel.

These events work better when you're able to tie them into events. The pizza could be built for National Pizza Month; the giant gelatin for the anniversary of Jell-O®; and the apple pie is perfect for celebrating Elvis' birthday.

Morning Coffee: A great method of introducing your new morning team is to create a real coffee with their name. An ideal partner for this is a local gourmet coffee shop capable of producing the blend and willing to sink a little money into manufacturing and marketing in exchange for publicity. This coffee shop should have commercials cut describing your new team in coffee terms: "McKelly's Morning Blend Coffee is a

whole new way to wake up and tastes great at work, in your car, and at home."

The coffee shop buys time on your competitors' stations a few days before your new team starts. Be sure and notify the press as soon as the spots air. A portion of the proceeds could benefit a charity. The most expensive part of this proposition is producing good-looking artwork and labels, which is very important. Once the surprise is known around town, you can serve and sell the coffee at your morning show remotes.

Turkey on wheels

Mayflower for Thanksgiving: Do a marathon broadcast from a Mayflower moving truck. Start about a week prior to the holiday and don't stop until the truck is filled with canned food for the homeless. You have to be careful with this one, because it is possible that you won't fill the truck.

Make sure to do it in a supermarket parking lot, so people have easy access to food. Having a back-up for donations directly from the grocery is a good idea just in case you need more than you've been able to raise.

Topical Stuff: Nearly every day there's something in the news that can be turned into a stunt. The larger the story the better the stunt possibilities. When President Clinton recently received his expensive haircut on Air Force One, a DJ decided to get *his* haircut in the middle of the Golden Gate bridge during rush hour. (He was arrested but did get a lot of press.) A jock in Baltimore once stayed on the air until the Orioles won a game—it was a long marathon.

There are also stunts that are similar to contests and require no action other than offers. When Pepsi was going through the needle-in-the-bottle scandal, Rick Dees promised a million dollars to anyone who could prove they found a needle in a Pepsi. Then there was this disc jockey in Iowa who decided to start a little flood...

□□□

Mark Lapidus is promotion director for WCPT(AM)-WCXR(FM) Washington. He can be reached at 510 King Street, Alexandria, VA 22314.

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World Radio History

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SBE Exhibitor List

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|--------------------------------------|-----------|---|-------------|
| E-N-G Mobile Systems Inc..... | 1336 | Northwest Source Group Inc..... | 600 |
| Earthwatch Communications Inc.. | 1130 | NPR Satellite Services..... | 726 |
| EEV Inc. | 817 | Odetics Broadcast..... | 1418 |
| Fidelipac Corporation..... | 1037/1039 | Panasonic Broadcast & TV | 1028 |
| Fonet Inc. | 1523 | PHI Enterprises Inc. | 1519 |
| Food Marketing Institute..... | 920 | Pinnacle Systems Inc. | 625 & 627 |
| Frank N. Magid Associates..... | TBA | Pioneer Communications ... | 1527/1525 |
| Frontline | 606 | Polyphase Corporation | 900 & 901 |
| Fujinon Inc..... | 1322 | Poynter Institute | 918 |
| Harris Allied..... | 1034 | Prodigy Services Co..... | 1412 |
| Hero Satellite Services..... | 1244 | Project Earth | 803 |
| Holiday Industries Inc..... | 930 | PVS | 524 |
| Investment Company Institute | 905 | Pyramid Broadcast Publishing | 612 |
| Ivanhoe Communications Inc..... | 814 | Reuters America | 1330 |
| JAMPRO Antennas Inc. | 904 | Rohde & Schwartz | 704 |
| JVC Professional Products | 1225 | Ryder Communications Inc..... | 832 |
| Kavouras Inc. | 1030 | Second Chance Body Armor Inc.. | 822 |
| Kiplinger Washington Editors | 714 | Softech Systems Inc. | 1430 |
| Knight-Ridder/Tribune | 1406 | Sony Electronics Inc..... | 1100 |
| Leitch Incorporated | 1026 | Sports Newsatellite | 518 |
| Loral Microwave Narda | 921 | Standard Communications Corp. | 845 & 942 |
| LPGA..... | 708 | Starquest Prime Time Inc..... | 800 |
| Medstar Communications Inc..... | 1206 | Talent Link Communications..... | 621 |
| Microtime Inc. | 615 | Tektronix Inc..... | 1424 |
| Microwave Radio Corporation | 1219 | The Freedom Forum Media | 617 |
| Money Talks..... | 1103 | The Sports Network | 573 |
| Multimedia Graphic Network | 1318 | U.S. Army Reserve | 1144 |
| NASDAQ Stock Market Inc. | 826 | U.S. Ctrs. for Disease Control..... | 833 |
| National Rifle Association | 1521 | Univ. of Florida..... | 1045 |
| Nemal Electronics international..... | 1300 | Universal Studios Florida | 1518 |
| Newsmaker Systems | 1136/1138 | U.S. Space Camp | 710 |
| Northern Technologies..... | 821 | Videssence..... | 700 |
| | | Vinten Broadcast Inc. | 1324 & 1326 |
| | | VYVX (Wiltel) | 924 |
| | | Washington International Teleport | 524 |
| | | WCIX-TV | 1301 |
| | | Worldwide Television News | 936 |
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| | | Zapnews | |
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World Radio History

SBE Promises Full Plate

► continued from page 37

Mexico affiliate will present a two-hour session in Spanish on a variety audio-related issues.

On Friday, Oct. 1, Skip Pizzi will moderate the Digital Radio Broadcasting Progress Report. Speakers will include David Garth, CBS, "Digital Radio Progress in Canada"; Segio Beristain, AMITRA, "DAB Implementation in Mexico"; Robert Culver, Lohnes & Culver, "Progress in Terrestrial Testing"; and Don Messer, VOA, "DBS Radio Development at VOA/NASA."

The Friday afternoon Digital Radio Format Proposals sessions again will be moderated by Skip Pizzi. Speakers for the session include John Bingham, Amati, "Digital Sound Broadcast with Auxiliary Control"; Nikil Jayant, AT&T, "AT&T Bell Laboratories Digital Radio Broadcasting System"; Tony Masiello, CBS Radio, "In-band, On-Channel DAB: An Update"; and a panel discussion.

Saturday will be FCC Regulation Day. The first session panel is "NAL Shopping List," moderated by Dane Ericksen of Hammett & Edison. The afternoon session panel, also moderated by Dane Ericksen, will be "Broadcast Auxiliary Licensing: Who's on First?"

At 3:30 p.m., The session "FCC vs. FAA: Round 5," will be moderated by John Allen, Airspace Consultant.

Later on Saturday evening, the SBE reception and awards banquet will be held.

STATION SERVICES

► continued from page 26

views and live-on-tape performances from various House of Blues clubs. Elwood Blues will profile regional and national Blues, R&B and rock talent, in addition to keeping Blues fans informed on upcoming Blues festivals and other events happening around the country.

The House of Blues Breaks is a collection of five "mini-programs" produced to air Monday through Friday. These daily features are about three to five minutes in length and include one artist interview and one music track.

For information, contact Ben Manilla at 415-421-1220, Michael Murphy at 504-523-7320, or circle Reader Service 75.

CBS Radio and Court TV Become Co-Council With Audio Coverage of Courtroom Trials

NEW YORK CBS Radio Networks and Courtroom Television Network (Court TV) are joining forces to provide regular audio feeds of certain courtroom trials to CBS' 600 affiliates. The Court TV service will be fed via two different audio channels, giving stations a choice of full-length uninterrupted coverage, or special written-for-radio cuts. The service debuts on Sept. 13.

For information, contact Lloyd P. Trufelman at 212-268-3888 or circle Reader Service 68.

PLCs Produce Remote-Control Cost Savings

by Richard Mertz

WASHINGTON This column will cover broadcast related-computer topics. This implies a review of software or hardware products that the author—lucky guy—has had a chance to play with.

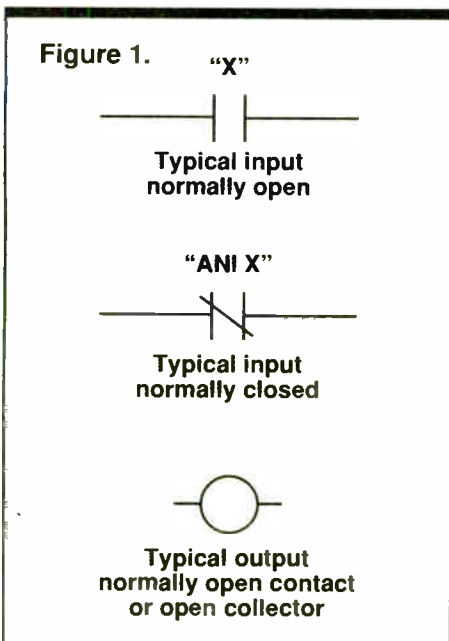
My intention is to present a new slant on using computers in a broadcast environment. There may be the occasional review, but I will lean toward actual applications pieces.

A station's engineering department installs equipment needed to produce the station's product—on-air programming. Whenever there isn't a commercial piece of equipment to satisfy a particular requirement, the engineering staff designs and builds it.

In the '90s, as those charged with stations' financial health often remind us, we must economize. There is less time, less money and fewer, if any, engineers. When the need arises for a custom-built piece of equipment, what do you do?

Magic box

In the past you would get out the data books, a yellow pad and sharp pencils. The time and money needed to complete a project this way is not always available anymore. It sure would be nice if switches, buttons, lights and other peripheral devices could be connected to a magic box that would handle all the timing, logic and control functions required.



There is such a magic box—the PLC.

A programmable logic controller is, put simply, a box with a microcontroller inside. Connected to the microcontroller are isolated inputs and outputs and an internal 24-volt power supply.

PLCs are designed to operate in an industrial environment. Dirty AC power sources and interfering fields generated by large motors and equipment are not a problem. They work well at RF infested sites.

The inputs can be relay coils or optical isolators. The outputs can be relay contacts or isolated open collectors depending on the configuration.

A PLC can be used as the brains of your project. Forget CMOS, TTL, breadboards and all the other design problems normally associated with custom projects. Simply connect switches

and relay contacts from other equipment to the PLC's inputs and program the desired results at the PLC's output.

Connect the PLC's outputs to the device or devices you want to control, and you're set. All timing and logical functions are easily handled by the microcontroller.

PLCs are god-sends when the power fails. An internal battery retains the controller's position in the program. When power is restored, the PLC will

either continue where it left off or start from the beginning of the program, depending on how it is programmed.

In the '90s, stations have less time, money and fewer, if any, engineers.

Memory options for retaining the program include EPROM, RAM and, my personal favorite, EEPROM.

Basic PLCs come with 12 inputs and

12 outputs and are easily expanded. Additional modules are available for analog inputs and outputs, temperature sensors and frequency counters. There are also interfaces for key pads and displays.

The 'M' word

I know what your thinking. Any device with the prefix "micro" has to cost a bundle.

Consider the cost of three enclosed magnetic latching relays at about \$80 each. Add the cost of the power supply,

continued on page 48 ▶

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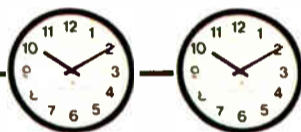
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World Radio History

GUEST COMMENTARY

Many Russian-Made Tubes Make the Grade

by George Badger

PORTOLA VALLEY, Calif.

Svetlana is a well-established power tube company based in St. Petersburg, Russia. It was the primary tube supplier to the Russian scientific/military establishment and is the largest power tube company in the world. Svetlana was recently privatized forming a joint stock company with Svetlana Electron Devices Inc., with corporate headquarters in Huntsville, Ala. My responsibility is to introduce Svetlana power tubes throughout the world in countries other than Russia.

The article by John Bisset, "Beware Cut-Rate Transmitter Tubes," in the August 11 issue of *RW* caught my attention. On first reading, the article appeared to bash Russian tubes in general. Reading the article again, more carefully, I agree with most of what John says, but was prompted to elaborate on his comments. I want to set the record straight on Russian power tubes and to advise broadcasters on how to purchase power tubes wisely in today's confused power tube marketplace.

In the article, John describes a cheap tube scam. Mervill Lawson of WMOR-AM-FM Morehead, Ky., was the victim. I called Mervill and learned that his problem is not so much with the product, as it is primarily with his distributor. The glass 833A tubes he bought are marked U.S.S.R., but there is no brand name or indication of the place of manufacture. Further, the U.S.S.R. is no longer in existence, so these tubes are probably surplus.

Two of Mervill Lawson's 833A tubes appear to be performing satisfactorily. There's one fact for certain, these tubes were not made by Svetlana. Svetlana does not make the 833A; the Svetlana product line is primarily of modern ceramic construction (more on Svetlana's product line below).

John Bisset is absolutely right. Be careful of what you purchase; more importantly, be doubly careful of the company with whom you place your trust. Make certain that you know about the company and that the company has a strong financial incentive to treat you right. An excellent source for power tubes is the company that manufactured your transmitter.

From a technical point of view, no one knows better than the equipment manufacturer what tube is best for his transmitter. No one knows tube quality better. From a business point of view, equipment manufacturers are strongly motivated to give you the best value possible because they want to sell you

your next transmitter. Their prime motivation is not to make a profit on the sale of a spare tube; their prime motivation is to provide you with good service.

You can buy directly from a tube manufacturer. Reputable tube companies such as Thomson, EEV, and Svetlana will sell broadcast types to broadcasters, with no middleman.

Another good source is your local general broadcast and

parts distributor. In general they are not in the tube business any longer because they were squeezed out by the large tube specialty distributors and the U.S. tube manufacturing establishment. Of course all of that is changing now. Call your favorite local distributor. Try to place your order with him. He would like to get back into the tube business.

Be careful of brand names.

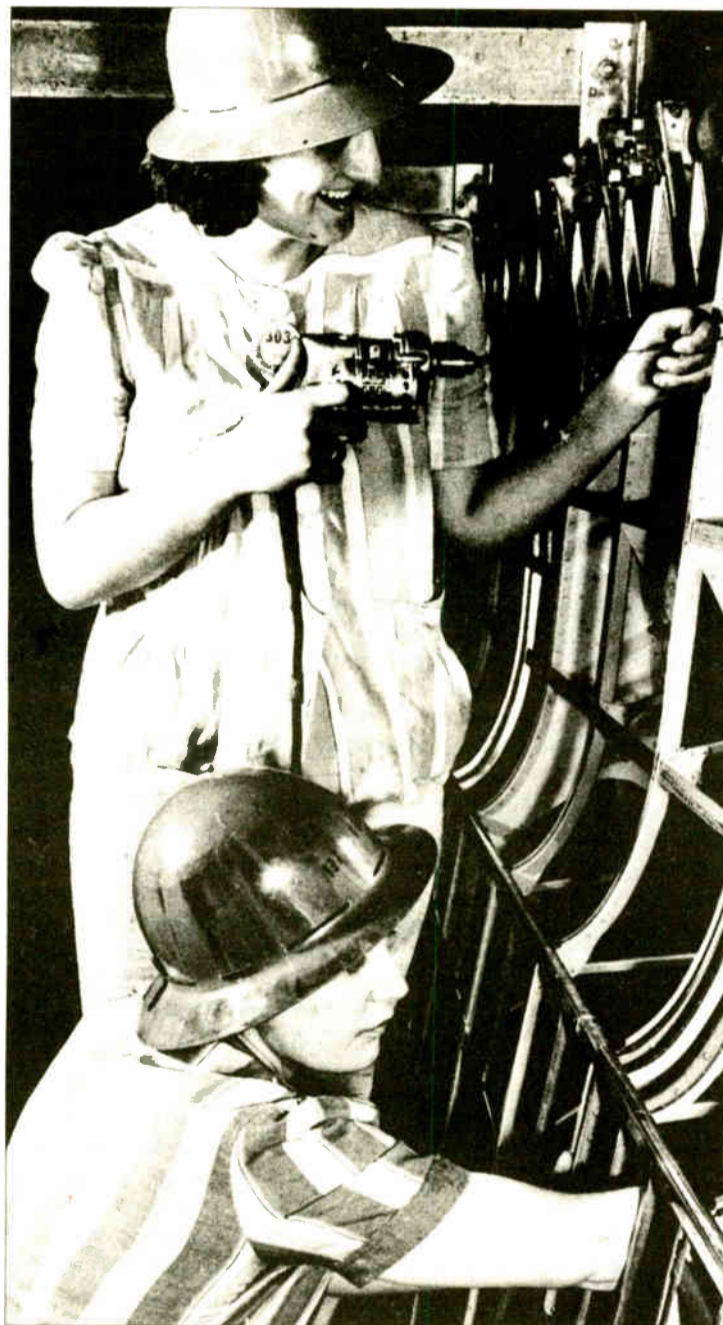
Some tubes of questionable quality now carry historically well-known brand names. Some of the prestigious American names which earned fine reputations years ago by the quality manufacturing they represented, are now used by distributors on low quality tubes. Re-branding is so common among distributors that when I was at EIMAC (Varian) we had to engrave our logo into the tube to prevent distributors

from brand switching.

Make sure you are buying a manufacturer's brand, not a distributor's brand. If the tube hasn't been re-branded, you will know what you're buying. Make certain that the brand name went on the tube at the factory, not in the distributor's back room. A reputable manufacturer will stand behind his branded product.

Everyone knows that the life continued on page 51 ►

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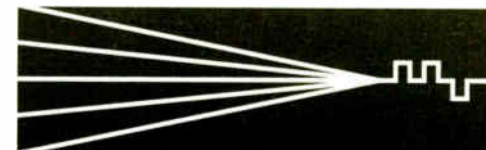
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Radio Observations, Coast to Coast

by George Riggins

LONG BEACH, Calif. We, my significant other and I, took a trip soon after the spring NAB Convention. We drove a new Detroit-designed product assembled in Lorain, Ohio. The factory-installed AM/FM cassette player seems to have



better sensitivity than the last two premium off-shore designed and produced sound systems. We were able to hear stations in locations where previously there had been no discernable signals, either AM or FM. The selectivity is still not up to what an average communications receiver exhibits.

Space available

On our ocean-to-ocean jaunt in June, we found several counties where the FCC has not yet granted franchises. At least one of the counties does not have any incorporated towns or cities. In fact, the largest center of activity was the County Courthouse Complex. We found another county with two incorporated towns, but no franchises.

I wonder just why the commission has not diluted the market to the point that there are still a few franchisees who are able to have a fairly good marketing area without too much competition.

Made in the U.S.

Dick Meyers of Marathon Products Company, Charlton, Mass., called a few weeks ago to discuss the disappearance of back-lubricated recording tape from the marketplace. The conversation got around to our rather recent acquisitions of new Detroit designed products.

It seems that Dick's luxury name plate vehicle has a trunk-mounted CD

player/changer. For his listening pleasure, both a daughter and daughter-in-law furnished him with some new CDs. One CD from each source has the same selections but was pressed on different labels. One was a cheapie and the other was a recognized label. Before peeking, take a guess as to which one sounded better to Dick. If you chose the cheapie, you were correct.

We decided that the cheapie was pressed without the added expense of "re-engineering" the original masters. The expensive label must have been "doctored" to fit the listening desires by a person who did not have the opportuni-

ty to hear the original "Big Bands" in the flesh as both Dick and I did back in the '30s. Yes, there was a difference in what the current producer heard on the masters and what can be heard on the recordings of today. We would like to hear what we think we remember from back then without added enhancements.

As I was listening to background music in one restaurant, I came to the realization that the music was getting on my nerves. The music was of the vintage I prefer but was still irritating. It was then that I took notice of the instrumentation. All the music was being generated by a keyboard type of instrument. Square waves (digital) being recorded as square waves (digital) on a CD. The CD was then being reproduced with a

continued on page 54 ►

INSIGHT ON RULES

Some Operator Questions Unanswered by Congress

by Harold Hallikainen

SAN LUIS OBISPO, Calif. It is my understanding that Congress has recently amended the Communications Act of 1934.

Previously, section 318 required the "actual operation of all transmitting apparatus in any radio station for which a station license is required by this Act shall be carried on only by a person holding an operator's license issued hereunder."

The section goes on to allow the commission to waive or modify this provision for any station except those where licensed operators are required by international agreement or for safety purposes, or for broadcast stations and stations operating as common carriers below 30 MHz.

The prohibition against operating broadcast stations without licensed operators includes an exception for those "primarily engaged in the function of rebroadcasting the signals of broadcast stations." This relatively recent amendment was added to allow for television and radio translators.

Section 318 also allows the commission to make special regulations governing the granting of licenses for the use of automatic radio devices.

Cleared for automation

The first part of this section seems to require licensed operators for various classes of stations. For other classes of stations, perhaps Congress intended to allow unlicensed operators, but at least some operators.

The final portion, permitting the FCC to make regulations governing automatic radio devices seems to apply to stations where there is no operator, licensed or otherwise. However, the previous prohibition on unlicensed operators at broadcast stations would seem to block stations from airing with no operators.

In any case, it appears Congress has cleared the way for the FCC to allow totally automated stations.

Several concerns come to mind. The operator's primary duties are to monitor the transmitter for proper operation and to shut down the station on request of the FCC.

Should the FCC require stations without operators to have something similar to ATS? Should various parameters be automatically monitored, adjust and shut down the transmitter if it is found to be causing interference? What parameters should be monitored?

Modulation and carrier frequency should be monitored to prevent interference. This contrasts with the current regulations which do not require routine monitoring of modulation or frequency, but merely require us to stay on frequency and not overmodulate.

The whole concern here is occupied bandwidth. Perhaps a monitor could be

built that is a "synchronous receiver" with the local oscillator at the carrier frequency of the station.

The output of the receiver would be the sum of the various components of the radiated signal frequency shifted so the carrier lands at 0 Hz. Components 100 kHz above and below carrier would come out of this receiver at 100 kHz. The receiver could then have filters to split the output to an on-channel component and an outside-channel component.

The outside-channel component signal could go through a preemphasis filter corresponding to the required attenuation the radiated signal is required to have as we move away from carrier, including harmonics. The box would then finally do an in-band/out-of-band comparison and give you a number to indicate whether you should stay on the air.

How can the FCC reach the station and shut it down if there is no one there? One way might be to use the procedure in Rule 74.1234(a), which permits unattended operation of FM translators and boosters (some of which run up to 20 kW effective radiated power).

The rule requires the transmitter or an on/off control to be reachable "promptly" at all hours and in all seasons. The FCC is to be supplied with the name, address and phone number of a person or persons to contact should the station need to be shut down.

STL news

So, how do you like your new STL? The July 1 deadline for installation of FCC type-certified studio-to-transmitter links has passed. As mentioned previously, the FCC is considering allowing stations to use their old, non-certified STLs in emergencies on a non-interference basis, pending repair of the approved STL.

The commission is considering a change in Rule 74.550 to say: "Equipment which has not been type approved under the equipment authorization program and which was in service prior to July 1, 1993, may be used after July 1, 1993, solely for temporary uses necessary to restore or maintain regular service provided by approved equipment, because the main or primary unit has failed or requires servicing." Such use would be limited to 720 hours per year.

□□□

Harold Hallikainen is president of Hallikainen and Friends, a manufacturer of transmitter control and telemetry systems. He also teaches electronics at Cuesta College in San Luis Obispo and is getting better at Contra dancing. He can be reached at 805-541-0200. He can also be reached on internet at ap621@cleveland.freenet.edu.

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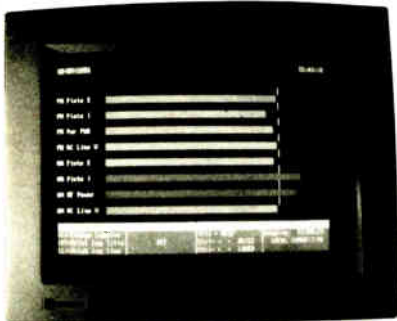


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Completing Your Stereo Remote Link

Part II of II

by Jack Layton

PITTSBURGH Stereo-remote signals should be well on their way to the studio via 450 MHz following the procedures in the first installment of this series (RW, Aug. 25).

This time, we'll take a look at what must be done to grab the UHF left and right stereo signals out of the air and send them on to the input on the console, based on the RPU system at KDKA(AM) Pittsburgh.

Putting it together

This system incorporates two RPU receive sites with two TFT-8889 RPU receivers at each location. (There is nothing special about these receivers. RPU receivers from other manufacturers would probably work just as well.)

Both sites are equipped with an Antenna Specialists omni-directional

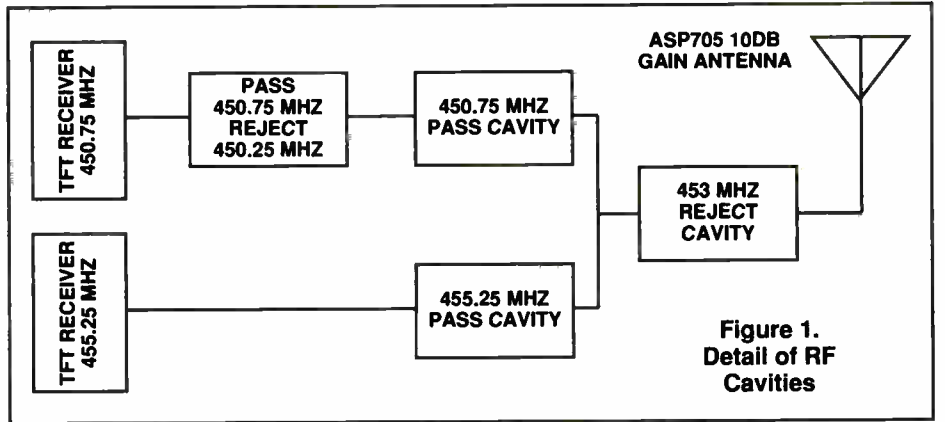


Figure 1. Detail of RF Cavities

ASP705 gain antenna. Site No. 1 is on the roof of the center city office building, where the studio is located. The antenna is about 300 feet above street level.

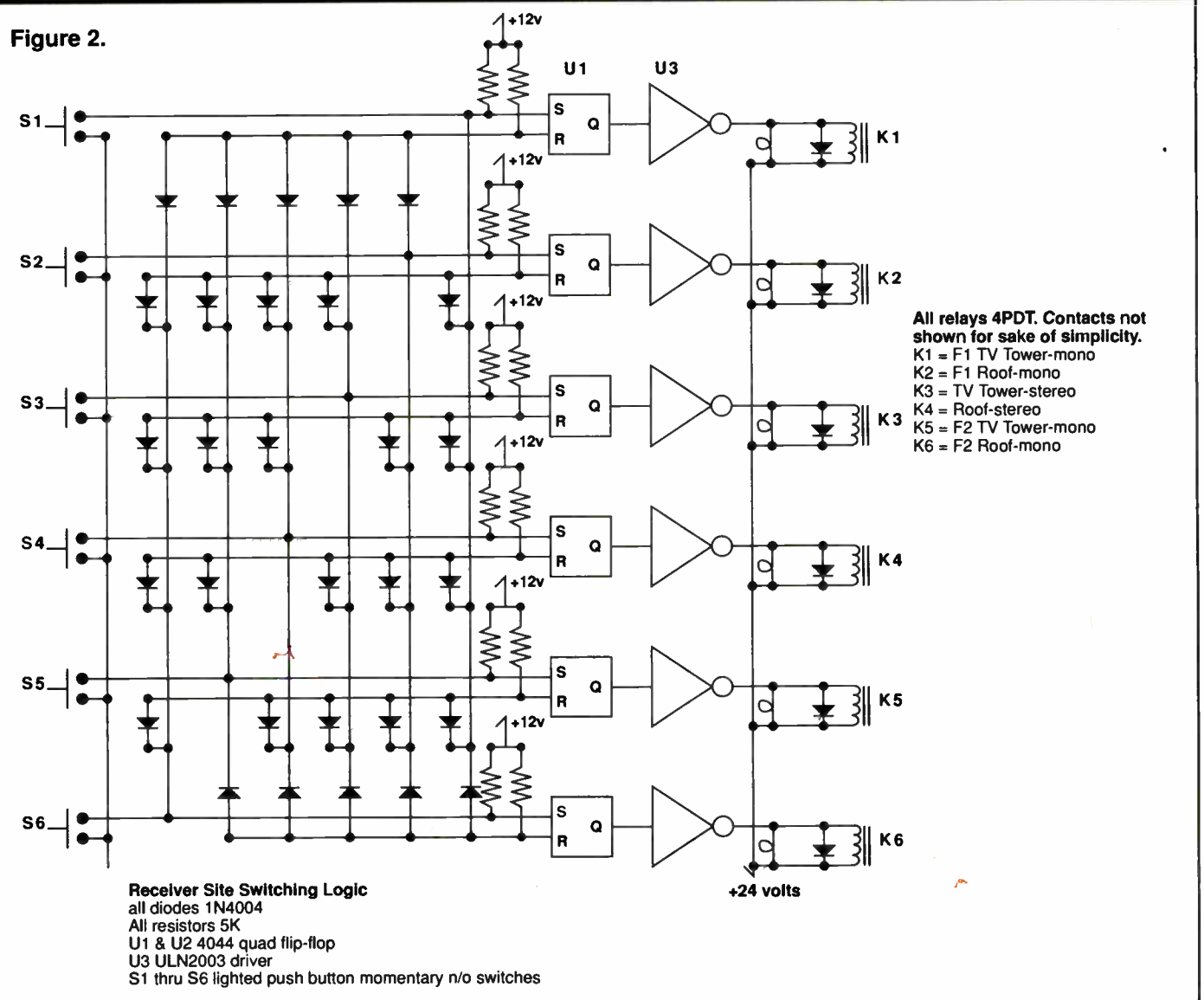
It's great for doing remotes from in among the tall buildings in the downtown area. The remote crew is always close enough to the receive site so that there is plenty of signal to pick up.

Interference is not particularly bad because there are no nearby UHF transmitters.

Foam dielectric RG8 is used for the feedline. A coaxial T splits the antenna feed in two. Each receiver has a Celwave band pass cavity in front of it. Audio is brought down to the second floor of the building on dedicated pairs.

continued on page 54 ▶

Figure 2.



All relays 4PDT. Contacts not shown for sake of simplicity.
K1 = F1 TV Tower-mono
K2 = F1 Roof-mono
K3 = TV Tower-stereo
K4 = Roof-stereo
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- Gary Greth, CE, KLON, Long Beach, CA.

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World Radio History

PLCs Cut Corners to Save Time and Money

► continued from page 41

the relay sockets and other components. Next, add your time to these costs. Your project could cost close to \$500 just to get the parts and mount them on a chassis.

Some PLCs, depending on options, can cost as little as \$250. They can be programmed directly from a computer or from a hand-held programming panel, which costs about \$150. The options vary in price based on the project's requirements.

Keep in mind that once you have made the investment in the programming tools, you can use these same tools in projects to follow. You only have to purchase another controller.

Now that you know what a PLC is,

ments as relays. Some relays are configured for momentary operation and others are configured as latching relays. Timers are configured as relays that

Push one button to start DAT and CD players for a simple program automation system. Push another to switch transmitters.

close for a programmed duration. How all these "silicon" relays behave depends on how you program the PLC.

Programming is fairly simple once you have drawn a ladder diagram of your

The three components shown in this figure are a normally open input, "X." This is the typical input. Close the contacts and the state of that input changes.

The logical inverse of the "X" is "ANI X." This is a normally closed input. It is held closed in the software.

The third symbol indicates a typical output. Figure 2 shows a basic arrangement where closure of an input, in this case "X1," causes the output relay, "Y1."

This is how easy it is to work with a PLC.

Real world

Broadcast engineers can use PLCs whenever automation of an operation is specified. If the need calls for a single operation of a switch to set off a series of events then, a PLC is a natural.

Push one button to start DAT and CD players for a simple program automation system. Push a single button to switch transmitters. A single button

replaces all the relays in your AM phasor control system. It can insure that all tower-house and phasor contactors are properly seated before the transmitter is turned back on after a pattern change.

Wouldn't it be nice if the next time your main transmitter failed, all the jock or master-control operator would have to do is push one button to take the main transmitter off the air and automatically switch the auxiliary transmitter into the antenna?

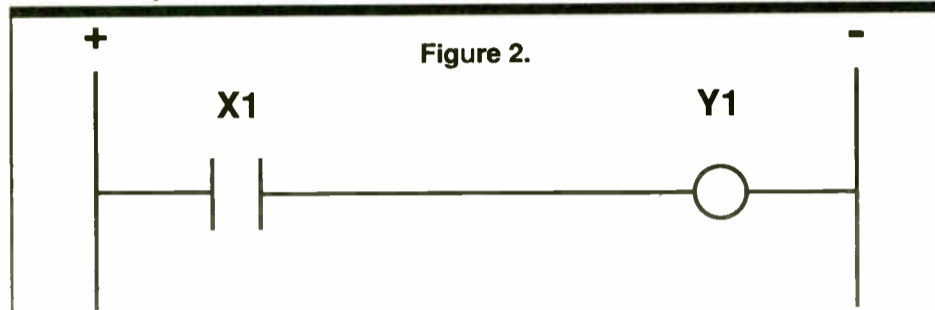
Sound like a job for a toggle switch or a latching relay? Consider this: When the button that commands the system to switch transmitters is pressed, a "plates-off" command is sent to both transmitters as a precaution. After a brief pause, the coaxial switch is rotated and the interlocks to both transmitters are disabled.

Once the coaxial switch properly seats in the auxiliary position, the interlocks are enabled. Feedback from the coaxial switch tells the PLC to turn the "plates on" to the transmitter connected to the antenna.

All this from one button.

□ □ □

Richard Mertz is former director of engineering for United Broadcasting and senior engineer at Jules Cohen & Associates, P.C. He can be reached at 1725 DeSales St., N.W., Suite 600, Washington, D.C. 20036.



here's how it works. The microcontroller inside emulates relays, timers and counters. While all the devices inside the box are solid state, the PLC manufacturers refer to the different ele-

design. What is a ladder diagram? Remember the control circuits depicted on the schematics for your RCA 20E or your Gates 5H? If you don't, look at Figure 1.

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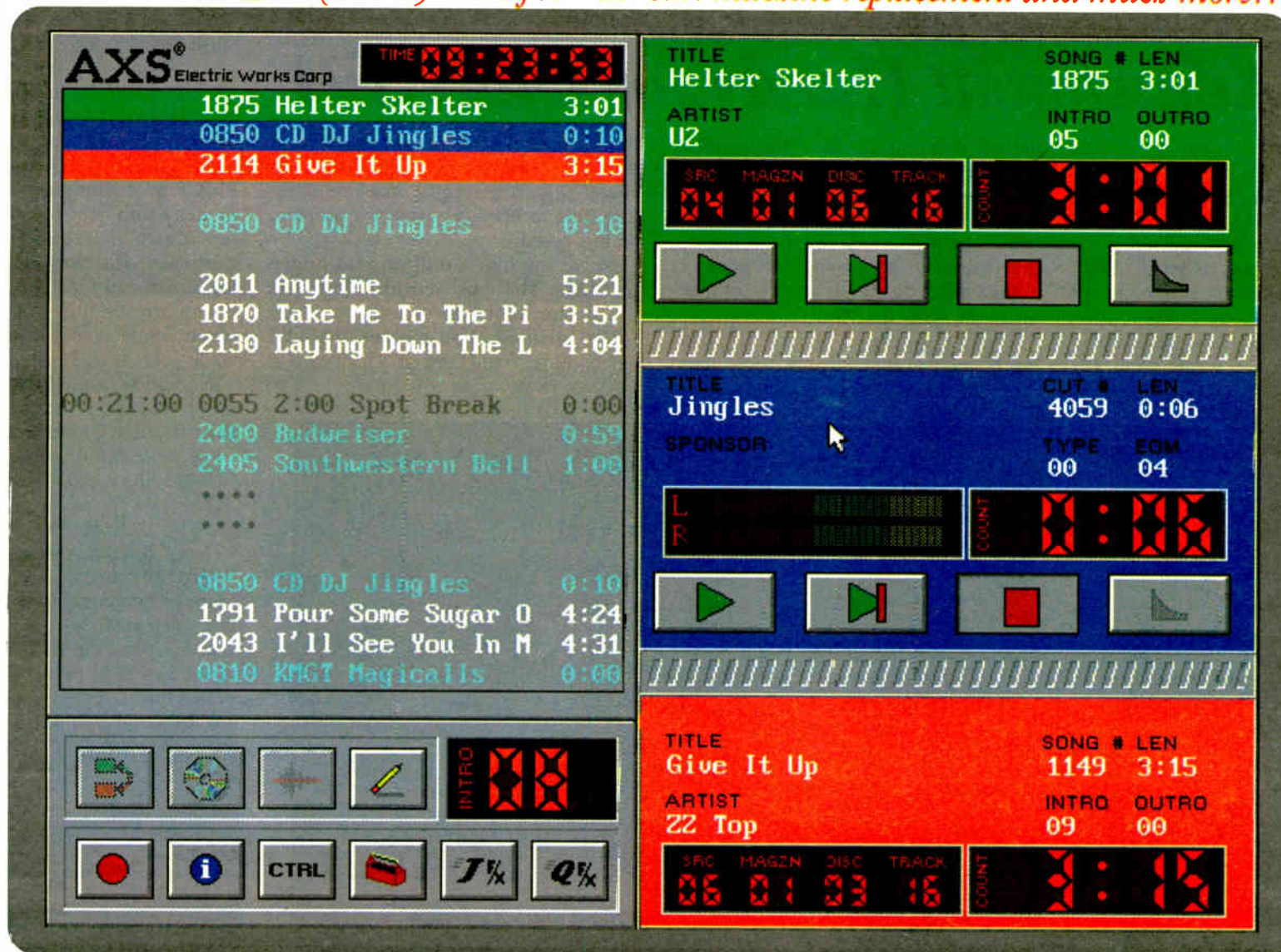
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WORKBENCH

Easy Adjustment Handy for Otari SRL

by John Bisset

FALLS CHURCH, Va. Here's a tip that will be useful if you maintain any number of Otari MX-5050 machines.

The standard reference level (SRL) pots, located on the bottom circuit board can only be adjusted by removing the cover. Steve Phillips of the Public Broadcasting Service wrote in to say

that he'd simplified the adjustment by drilling two holes in the panel. The holes were positioned over VR106 and VR206, the left and right SRL pots. When the SRL needs to be touched up, the ordeal of removing the panel is eliminated. You simply stick your greenie in the holes drilled in the cover.

If you maintain a lot of Otari machines, you may already know about

the bridge rectifier problems. Several bridge rectifiers and fuses are on the power side. If a specific machine function fails to operate, suspect a problem on this board.

We've run into a rash of dead bridge rectifiers. The most recent failure was the bridge that controlled the pinch roller solenoid. You'd press "PLAY" and nothing would happen. This board is

hinged, which makes for easy access.

★ ★ ★

While we're on the subject of equipment repairs, if you own any Studer CD or tape players, you'll want to know about Phil Blyveis' Audio Advantage. Phil's new company specializes in Studer equipment repairs. (It's located just down the road from Studer in Nashville.) His rates are reasonable and the turnaround time is excellent. In fact, if you are sending in a CD player for repair, replacement units are available while yours is being serviced.

In addition to the Studer line, Phil has most recently added service on Panasonic DAT machines.

For more information, contact Phil at 615-742-3834; or circle **Reader Service 217**.

★ ★ ★

Gregg Buickel, operations manager at WQRL(FM) Benton, Ill., uses his 40-watt Marti for remotes, but doesn't have a station van for affixing the RPU antenna.

In the past, the RPU mast was duct-taped to a light pole, telephone pole or even a tree. Gregg saw a collapsible mast and stand that you drive a car tire over to



Using scrap metal, a station can fabricate an RPU antenna mast support that will simplify remote setup.

hold it in place. He thought his RPU troubles were over until he saw the price. The complete system was over \$1,000.

It was time for some brainstorming. A friend of the sports director welded scrap metal together to form a base for an RPU mast. The mast was actually a series of Radio Shack TV antenna poles that sell for \$6 each. Since the poles nest into each other, removing the mast and transporting it in a car is easy.

The particulars for the do-it-yourself mast support are not simple. Find a heavy piece of flat metal, about 1x2 feet. Weld on a six-inch section of pipe as a pole sleeve. Check the antenna mast pipe sections you'll be using to insure a good fit.

Gregg suggests you find a good welder to do the work. A sloppy weld could cause the mast to fall over in a strong wind. Gregg's welder assured him that the poles will bend before the weld breaks.

The completed mast support is shown in the photo above. The biggest advantage this support offers is the ability to set up an RPU shot anywhere you can drive your car.

Contact Gregg Buickel at 618-435-8100.

□ □ □

John Bisset is a principal with Multiphase Consulting, a contract engineering and projects company. He can be reached at 703-379-1665.

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Choosing the Best Tube

► continued from page 43

of a well-designed and processed tube typically exceeds the warranty, so why is warranty important? It is just one of the many ways to judge your purchase value. Make certain that the manufacturer has an established warranty on the tube you are planning to purchase, and have that confirmed in writing, from the manufacturer. It is the experienced manufacturer who knows the quality of his tube.

Manufacturers will stand behind their warranty. Some equipment manufacturers, who have transmitter designs which they believe enhance tube life, offer a better warranty than the tube manufacturer. That is good, healthy business, but beware of the distributor who makes no contribution to quality and who warrants tubes beyond that warranted by the manufacturer. Find out who the manufacturer is, where he is located and insist on seeing his warranty in writing. Remember, a warranty is only as good as the people who offer it and a warranty is a good indicator of how the manufacturer feels about the quality of his product.

A good way to judge tube purchase value is to divide the price you pay by the warranty hours. This gives an answer in dollars per hour which, after all, is the bottom line if the service is good and you only change tubes rarely. Most tube companies offer a warranty with a period during which you receive 100 percent adjustment, and after that fixed period, the adjustment

is prorated to the end of the warranty period. Therefore, a more accurate "value formula" is to divide the cost of the tube by the number of hours of 100 percent adjustment plus one-half the number of hours prorated. Thus the value of a \$550 tube warranted for 10,000 hours of which 1,000 hours are not prorated and the remaining hours are prorated is as follows:

Use this "Value Formula" the next time

$$\text{Value} = \frac{\$550}{1,000 + 1/2 \ 9000} = \frac{\$550}{5,500} = \$0.10 \text{ per hour}$$

you make a tube purchase decision. It will help you make the right decision.

Beware of shelf life limitations. Most responsible station engineers and managers like to carry a spare tube on the shelf near the transmitter to minimize down time in the event of a failure. The problem is that for each day that goes by you are penalized. After a period, like two years, the value of your tube suddenly goes to zero; yes, zero. Your warranty is no longer valid. You can't get a replacement even if the tube was manufactured with a defect.

Insist on a warranty that doesn't start ticking away until you put the tube in the socket. It's only fair, and it does not penalize you for doing what a responsible engineer or manager should do, carry a spare for an emergency. In addition, John Bisset brings up another very important point in his article; make sure

that if the product you bought is not satisfactory, you can get a replacement or dollar credit at your option. Too many warranties are written so that adjustment is made at the option of the seller.

John's comment on price, "The best solution is not always the cheapest," is certainly true. And it is especially true when applied to power tubes. Usually "you get what you pay for," but there are some special circumstances in the currently confused power tube industry that make it possible to buy exceptionally high quality tubes at prices far below

those currently prevailing.

The present power tube market is confused by cross arrangements which have weakened competition. When there is not enough competition in a market, business managers pay more attention to their businesses in competitive markets.

Lack of management attention and lack of investment in modern tube manufacturing equipment cause costs to increase resulting in the skyrocketing tube prices we have experienced in recent years. The current lack of power tube ads is a barometer of management's reluctance to invest. When did you last see a power tube ad by a major manufacturer or distributor? It's been a long time. As we develop healthy competition in the industry, you will begin to see power tube advertising again.

John Bisset makes a good point regarding rebuilding. You have probably already investigated rebuilt tubes and

many broadcasters have had very good luck with them. If you decide to go that route, pick a well-known rebuilder because even the best rebuilt tubes often are not as consistent as new ones.

Buy direct from the rebuilder. Make certain that each time you buy, rebuilt or new, your decision is guided by the people and technical capability of the company from whom you buy and by the value formula (above). Compute the best value in dollars per hour. For the same dollars per hour, a long life tube is always better than a low price alternative.

Follow the golden rules outlined above and do your part to bring healthy competition back into the power industry.

Author's note: Svetlana is a 104-year-old company and has an excellent reputation in Russia for quality and reliability. Because the joint stock company is new, our only experience with western type Svetlana tubes has been with the recently introduced ceramic types. Svetlana's 4CX350A has an excellent track record here in the U.S. for quality and long life. Further, the 4CX15,000A, 5CX1500A, and 5CX1500B are now in American broadcast transmitters operating to full specifications. Soon there will be a full spectrum of power tubes made by Svetlana in Russia, for the radio broadcast industry.

□□□

George Badger is vice president and director of marketing for Svetlana for the U.S. and world markets outside of Russia. He has over 25 years experience in the design and marketing of power grid and other types of electron devices.



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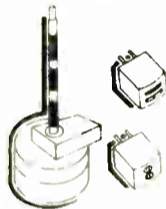
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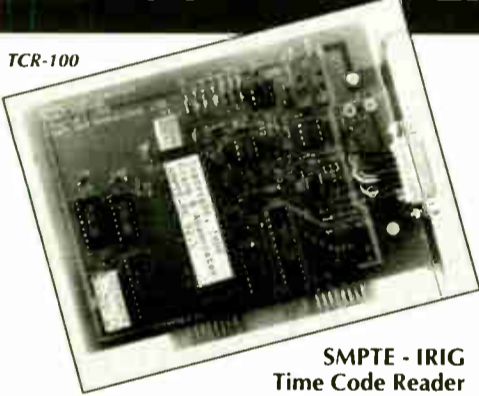
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READER SERVICE NO. 80

Final Stereo Remote Set-up Steps

► continued from page 46

Site No. 2 is about five miles east of downtown Pittsburgh. The Antenna Specialists 10 dB gain antenna is side mounted about 500 feet up on a self supporting television tower. The feedline is 7/8 inch Heliac. Many other facilities are co-located on this tower including two TV stations, several amateur radio repeaters, a National Oceanic and Atmospheric Administration weather transmitter, low-band and high-band VHF two-way transmitters and several UHF two-way transmitters.

The antenna for KDKA's own 60-watt,

way of a pair of 8 kHz equalized telephone lines. Obviously, these lines are routed through the same carrier and cable system to be phase correct for stereo.

Figure 1 details the cavity arrangement.

Four receiver outputs appear on a jack field in the studio. This enables the receive sites to be used separately by patching. Certain special events require simultaneous audio from two different locations. The stereo receive system, with the aid of patch cords, can be broken down into two mono systems.

lar telephone or a Motorola Radius two-way radio in the vehicle. This operates on 450.25 MHz, just 500 kHz removed from one of the RPU transmitters.

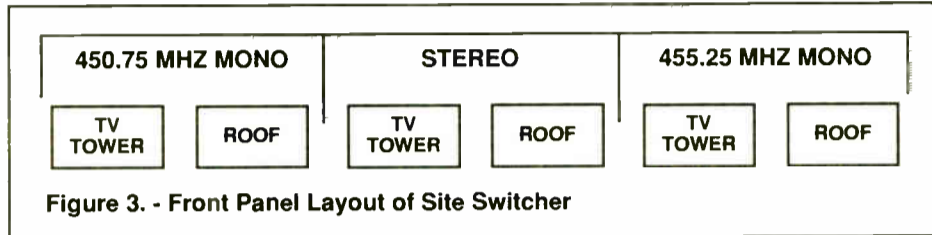
A Celwave band-pass/band-reject cavity in the two-way feedline, along with a vertical separation of 30 feet between the two-way and RPU antennas, limits the desensing of the Radius transceiver to an acceptable level while the RPU transmitter is in operation.

This stereo RPU system has been in

operation for about two years. It works well, provides mono redundancy in the event of a transmitter failure and sounds great on the air as delivered to the listener by either of two C-QUAM equipped MW-50-C 50,000-watt transmitters.

□ □ □

Jack Layton is the former chief engineer of KDKA(AM) Pittsburgh. He is now the owner of Layton Technical Services, a firm specializing in the planning and construction of radio studio and transmitter facilities, special projects and directional antenna field work. Layton can be reached at 412-942-4054.



two-way newsroom dispatch base station, operating 500 kHz away from one of the RPU channels, is about 100 feet above the RPU receive antenna. The station's 450.25 MHz base station and a commercial two-way transmitter operating near 453 MHz is perhaps most troublesome.

Treating cavities

A Celwave PD1153 reject cavity, tuned to 453 MHz, is in the feedline from the antenna. A coaxial T splits the feed. A band-pass cavity is in the coax feed to the 455.25 MHz receiver.

Likewise, a band-pass cavity is in the feed to the 450.75 MHz receiver. A Celwave PD1155 band-pass/band-reject cavity is inserted in the feedline to the 450.75 MHz receiver to eliminate the desense problem from the 450.25 MHz base station. This provides about 25 dB of additional isolation.

The site is connected to the studio by

The jacks are half normalized into a switcher, which is engineered to make it as simple as possible for a producer/operator to bring in a remote. Six lighted buttons are arranged on the front panel of the switcher as detailed in Figure 3.

Stereo can be brought up from either receive site. Mono, from either frequency and from either site, can also be received. In the mono mode, the right and the left distribution amplifier bridging inputs are paralleled across the source. The DA outputs direct audio to each of the six studios.

(Figure 2 is a schematic for those interested in duplicating the switcher. The relay contacts have been omitted for the sake of simplicity.)

Non-technical operators have been trained to make signal-to-noise measurements at the studio location to aid in proper orientation of the yagi antenna on the mobile studio. Communication to and from the mobile studio is via cellu-

A Few Stops Along the Road

► continued from page 44

solid state device and amplified by a solid state device.

Tube power

I mentioned this to a young sound person from a rather large entertainment complex who replied, "Take the CD and use a tubed amplifier and it sounds good again." Heard that this is even being done in one or two screening rooms in the movie industry. One installation was described to me as using four large Altec speaker assemblies with a well-known but out-of-production tubed amplifier to drive the speakers. Two speaker assemblies for each channel.

I also hear that a well-known manufacturer recently made a limited run of tubed amplifiers. The price mentioned was well above two thousand dollars. I was told that a set of factory tubes was about a thousand dollars.

We spent a day with Larry Albert of Murray State College, Murray, Ky. Larry explained how he and others recreated the Stubblefield equipment and experiments. We were able to see where the equipment had been placed, and to see the area of reception that Larry was able to document. Yes, the equipment worked, but the area of coverage was less than the length of a football field. As Larry says, he was able to make a keg of nails talk, but did not get the coverage claimed by

Nathan Stubblefield.

For those of you doing research on early stations, Barry Mishkind has put together a set of data that is available on disk. There is still much missing data, and hopefully, as more people get involved, more of the early records will be shared with those of us interested in the beginnings of radio as we know it today. Please send the old records to one of us for preservation rather than making the trash can the repository of history.

A call from Bruce Harding, retired from Washington State College at Pullman, Wash., indicates that he is also interested in early radio history. There will be more about Bruce Harding after we receive a recently published book on early radio in the Northwest from him.

We will get back to the series about the early mathematicians and physicist next issue. We will start with Herman von Helmholtz, who contributed to the early theory and knowledge of hearing and conservation of energy.

□ □ □

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 310-598-7007.

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Want To Sell

Stanton 310 phono preamp, vgc, \$75/BO. J Rudisill, Audio Independence, POB 746, Aptos CA 95001. 408-684-0605.

McMartin B-200B phono EQ preamp. C Watkins, KLCE, Blackfoot, Idaho Falls ID. 208-785-1400.

Ramko SMA-1000E stereo mon amp (2), gd cond, BO. P Guello, KUWS, 1800 Grand Ave, Superior WI 54880. 715-394-8187.

McIntosh A-116-B pwr amp; Marantz 7 pre amp; Dynakit stereo 70 pwr amp; (2) Ampex 620 speaker amps. Kinura Records, Box 660236, Miami Springs FL 33166. 305-887-5329.

New 250 W solid state amp, \$1800. Call for details. Bill Hoffman, 518-583-9490.

Want To Buy

Looking for schematic of Eclipse Series ESS-500 A-542 power amp. Mail copy to R. Strange, 5208 W Acapulco Ln, Glendale AZ 85306.

Crown D-75; Gentner SPH-3, 3A or 4 phone interface, must be in gd cond. D Koehn, KKPR, 403 E 25th St, Kearney NE 68847. 308-236-9900.

WANTED:

Pultec EQ's; Fairchild, Teletronix, dbx, UREI, Sontec Limiters. Neumann, Telefunken, AKG and RCA mics. MacIntosh or Marantz Gear; Lang, Neve and API gear. Misc old tubes and guitars.

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ANTENNAS & TOWERS

Want To Sell

1983 Utility 30" face 280' hollow rod galvanized steel tower avail for no cost, you take down & remove. R Simmons, KRGT-FM, POB 50124, Austin TX 78763. 512-476-5200.

Cablewave CC300-50J, 3" 100', new, on spool, \$15/ft. S Wodlinger, WIXI, 3337 Tamiami Trail N, Naples FL 33940. 813-262-1000.

ERI FMH-10AC 10 bay antenna, CP, tuned to 105.5, \$22,000. S Wodlinger, WIXI FM, 813-262-1000.

Motorola 6073A base station antenna, 150-159 MHz, \$200 plus shpg; Cushcraft BR-4, 42-50 MHz, base station antenna, \$50 plug shpg; DB Products DB264, base station antenna, tuned to 155.625 MHz, \$200 plug shpg. W Martin, KZPX, HCR1 Box 286D, Merrifield MN 56465. 218-765-3333.

Windcharger 200 100' of 45G tower, also includes guy wires, 300', \$2500/BO. J Kessler, WOBZ TV, POB 220, Livingston KY 40445. 606-843-2209.

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Marti 160 MHz 4-folded element beam antenna. C Watkins, KLCE, Blackfoot, Idaho Falls ID. 208-785-1400.

Rohn SA 25G-224 side arms (2), gd cond, \$25 plus shpg; Rohn 25G (2) 10' section, damaged bottom 6", makes gd base section; Andrew flanges, gas pass for 1-5/8" Helix, new in box, \$125 ea/BO; 20' Pirod tower section built for 12' satellite dish, 42" face w/5-1/2" OD pipe at top; 6-bay high power ERI/Harris FM C-6, ring stud, 97.1 MHz; ERI/Harris FM C-2A 2-bay, maximum 5 kW input, ring stud, on 94.3, field tunable down to approx 91.5. D Carver, 107 S Main, Brookfield MO 64628. 816-258-7458.

Large spool for 3" waveguide, new, \$500. S Wodlinger, WIXI, 3337 Tamiami Trail N, Naples FL 33940. 813-262-1000.

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| *RTU-1 remote controlled tuner | \$495 |
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Andrew EW 63A waveguide w/ends, 2 new rolls, 75' & 140' in boxes, BO/trade. M Kestler, KAWZ, 241 Main Ave W Box 271, Twin Falls ID 83303. 208-733-3133.

Phelps-Dodge 3-bay tuned to 107.1, avail early August, \$1200. D Sports, WCLA, POB 427, Claxton GA 30417. 912-739-3035.

Jampro JA4-B "V" type HP FM antennas, 4 bays on 94.5 w/1-5/8" feed divider, 2 bays on 89.9, no interbay cables, \$250 per bay/BO. M Benson, KWTY, 916-893-8737.

ERI FMH12AC antenna parts for miter cut antenna; Myat or Phillips 3-1/8" rigid line, 10 lengths of 20'. T Wortmann, WJAG, 309 Broasel, Norfolk NC 68701. 402-371-0780.

Helix 500', 1-5/8". L Kilday, WYZK, POB 5406, Valdosta GA 31603. 912-333-0755.

Andrew HJ9-50 5" cable, 500' w/connectors on spool in Midwest, 1/2 new price. R Henry, WPIO, 505 Josephine St, Titusville FL 32796. 407-267-3000.

Rohn 55 300' tower, ERI 3-bay antenna tuned to 96.7, Cablewave 300' Helix, all for \$11,000; ERI GPCP 8-bay antenna, needs work, \$4000. M Howard, WYZK, POB 5406, Valdosta GA 31603. 912-333-0755.

Andrew 5" Helix w/connectors, 500' on spool, BO. J Rosebuck, 515-280-1350.

Gates FM-4A cycloid 4-bay HP FM antenna, 91.3 MHz, 10 kW, BO. P Guello, KUWS, 1800 Grand Ave, Superior WI 54880. 715-394-8187.

Dielectric, 50 kW 3" motorized coax switched, like new, \$3500. 800-833-6629.

Want To Buy

Self-supporting towers, (3) 320', solid steel construction. A Schultz, Douglas Bdcg Inc, 415-978-5378 FAX 415-978-5380.

Andrew 7/8" Helix, 400-600' and clamps. J Viele, WHOT, 161 Fox St, Hubbard OH 44425. 216-783-1000.

AUDIO PRODUCTION

Want To Sell

Fairchild Conax 600; Nagra-III w/neo pilot. Kinura Records, Box 660236, Miami Springs FL 33166. 305-887-5329.

UREI 537 27-band graphic EQ's (3), \$200 ea; Eventide BD 955 bdct delay, 6.4 sec, 15 kHz, \$1000; C Scherer, WDOK, One Radio Ln, Cleveland OH 44114. 216-696-0123.

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Shure FP-31 3 chnl mono mixer w/case in gd cond, BO. I Raider, Raider Prod, 1006 Stoneham Dr, W Chester PA 19302. 215-889-9565.

dbx 155 4 chnl encode/decode type I NR (2), \$250 ea/\$400 both. P Cibley, Cibley Music, 138 E 38 St, NY NY 10016. 212-986-2219.

ADC 48 patchbay phone jack. D Nelson, 619-758-0888.

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AUTOMATION EQUIP

Want To Sell

SMC Carousels (5), sterep and (2) 48-tray Instacarts, make offer. John Lackness, KAYD-FM, 409-833-9421.

Schafer 903 automation system, A-1 cond, on-air, avail late August, 3 mono IGM 48 Instacarts, (6) ITC-750 stereo tapes, Extel logger, full boat system in 5 racks, BO. V Killion, KRVN, POB 880, Lexington NE 68850. 308-324-6717.

Microprobe Satmaster automated computer, mint cond, BO. J Kesler, WOBZ TV, POB 220, Livingston KY 40445. 606-843-2209.

SMC (3) Carousels, Brain, keyboard, (2) cart time announce, (2) racks & misc, \$2500/BO. S Nestor, KMGK, Box 215, Glenwood MN 56334. 612-634-5358.

Schafer 902 w/3 near new Carousels, set to receive AM only, BO. M Zwerling, KSCO, 2300 Portola Dr, Santa Cruz CA 95067. 408-475-1080.

TM Century Ultimate Digital Studio for live-assist or total walkaway operation, w/UDS software, 8 Pioneer PD-Tm1 18-disk CD players, 360 Systems DigiCart w/200 MB hard drive plus all interface cards, cables & manuals, entire system can be operated by any 386 computer, currently on-air in Cleveland, MS, selling due to upgrade. L Fuss, WDTL, POB 1438, Cleveland MS 38732. 601-846-0927.

ABC Radio Networks tone decoders (2) 2 digit LED readout w/reset button, \$100 ea. C Scherer, WDOK, One Radio Ln, Cleveland OH 44114. 216-696-0123.

SMC MSP-12 automation system w/3 Carousels, 3 carts, DAS-12 audio switcher, screen, operational w/all wiring, power packs, racks & manuals, \$6500. M Jarvis, KORC, POB 1419, Waldport OR 97394. 503-563-5100.

Microprobe 100MP 24 event programmer w/25 Hz tone generator, \$600. T Parks, WOWU, POB 592, Kankakee IL 60901. 815-939-5089.

SMC automation controller, works, MSP unit. B Ladd, WNRP, 108-1/2 E Main, Bellevue OH 44811. 419-483-2511.

SMC 350 w/452 Carousels (4) w/452 MSP-1 programmer, (3) audio card, A Series cart player in racks, will sell all or separate, BO. J Baine, KKMO, POB 1277, Tacoma WA 98401. 206-922-3345.

SMC Carousel 350 stereo w/oak grain cabinet, vgc, \$400. D Koehn, KKPR, 403 E 25th St, Keamey NE 68847. 308-236-9900.

Schafer 800-T automation controller, will accept up to 12 audio sources, \$1500/BO. J Bahr, WVIS, Box 487, Frederiksted, St Croix VI 00840. 809-773-2220.

CART MACHINES

Want To Sell

ITC Delta I stereo PB, new hds & in excellent cond, low use, \$2500 both/BO. C Gulielmetti, Edgewater Co, 232 C St, S San Francisco CA 94080. 415-589-3313.

Denon DN-950FA CD cart player, \$695; Fidelipac CTR112 stereo (5), \$1250 ea plus shpg. B Lord, Lord Bdcgt, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

ITC R/P mono, \$600; Audi-Cord mono/play only, \$250; ITC mono/play only, \$350; ITC stereo SP 969 play only, \$400. J Randall, John Randall Broadcasting/Recording, 7276 Lakeside Dr, Indianapolis IN 46278. 317-299-0093.

BE 5300 PB triple deck, works, with manual & connectors, mono single tone, \$800. B Oostenburg, KCKY, POB 6, Coolidge AZ 85228. 602-723-5448.

Sparta BP-22B portable cart players (2), one in attache case; UMC Beaucart II mono cart machine. C Watkins, KLCE, Blackfoot, Idaho Falls ID. 208-785-1400.

ITC RP-829-0003-000, mono R/P w/triple cue, excel cond, \$325; Tapeaster 700P stereo play only, excel cond, \$275. W Martin, KZPX, HCR1 Box 286D, Merrifield MN 56465. 218-765-3333.

CART MACHINES:

For Sale: \$395 & UP
Repairs: \$100 per deck + parts
Recondition: \$150 per deck + parts. Call Mark @ 619-598-3311

ITC triple deck play units (2), one record unit, less than 2 yrs old, like new, \$5000/all. K Paul, WKXD, 259 S Willow Ave, Cookeville TN 38501. 615-528-6064.

Tapecaster 700P stereo player w/150 Hz decode, works fine w/manual, \$100. B Tidwell, WAFT, POB 338, Valdosta GA 31603.

Audicord TDS Series dual deck stereo play only w/connectors & manual, \$300. T Parks, WOWU, POB 592, Kankakee IL 60901. 815-939-5089.

BE Dura-Trak 90 stereo cart player, \$1000/BO. C Stainaker, KDDK, POB 100, Little Rock AR 72203. 501-372-7740.

Carousels, (4) 250s plus one RS-50 random selector, working when removed, \$400 plus pkg/shpg. J McAulay, KAPL, 10207 Ave R-12 East, Litterlock CA 93543. 619-247-1111.



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Gates CPR-2, CAR-2 stereo cart machine (2) w/one external recording amp, rack mount, BO; Gates 6702, 6708 stereo cart machines (2) w/one external recdng amp, gd cond, BO. P Guello, KUWS, 1800 Grand Ave, Superior WI 54880. 715-394-8187.

ITC Delta players with tones & fast cue, good condition, mono (4), \$675; ITC Delta recorder, good condition, mono, \$1100. K O'Malley, WTKR, 720 Boush St, Norfolk VA 23510. 804-446-1328.

Tapecaster XP5 stereo PB w/new heads, \$500/BO. J Bahr, WVIS, POB 487, Frederiksted, St Croix VI 00840. 809-773-2220.

Spolmaster 505/BS stereo R/P lever type w/new heads, \$850/BO. J Bahr, WVIS, POB 487, Frederiksted, St Croix VI 00840. 809-773-2220.

Pacific Recorder Micro-Maxx, with standard heads & speeds, rack-mountable metal casing, manuals & power cords, like new, \$1500/pair. K Rosato, Sound Broadcasting, 914-645-1626.

Tapecaster X700 RP & 700 RP, all in gd cond, X700RP @ \$495, 700RP @ \$395. A.D. Ishkanian, 804-752-6942.

BE 5300C tripledeck, stereo, PB, mint less than 50 hours, BO. R Kaufman, Pams Productions, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

Want To Buy

Audio, cntrl and tone cds for UMC cartridge PB's and R/P that nd repairs. B Hoisington, WKH Engr, 904-678-8943.

Tapecasters X700S & 700 in poor condition. A.D. Ishkanian, 804-752-6942.

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ITC 770 (6) R-R decks, excel cond, in use, \$450 or \$2500/all. R Klotz, KCNQ, POB 3434, Lake Isabelle CA 93240. 619-379-5636.

Ampex 351 FT (3) unmounted w/book, \$200 ea/BO; Magnecord PT-6 w/7.5 & 15 capstans, needs TLC w/book, BO; Extension arm set to run 10.5" reels on PT6, BO. D Carver, 107 S Main, Brookfield MO 64628. 816-258-7458.

Tascam 58-OB, 1/2" 8-trk, mint cond, low usage, +4 and -10 in/out, connects for SMPTE lockup w/video, \$3000. Wirwind Prod, 10356 W Warren Ave, Dearborn MI 48126. 313-584-9201.

Nakamichi CR1A cass deck recently gone through by Nakamichi, \$175 + shpg. P Trembley, 23915 Via Rosa Linda, Valencia CA 91355. 805-254-5213.



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Telex Magnecord 1022 2-trk R/P & 4-trk play w/rack, gd cond, \$200 plus shpg. W Martin, KZPX, HCR1 Box 286D, Merrifield MN 56465. 218-765-3333.

Pioneer 1050 stereo R-R, RW 102 OL, \$300. J Randall, J Randall Bdcgt/Recdng, 7276 Lakeside Dr, Indianapolis IN 46278. 317-299-0093.

Scully 280 mon R/P w/spare cards; Ampex mono tube-type R/P for 350. C Watkins, KLCE, Blackfoot, Idaho Falls ID. 208-785-1400.

Ampex ATR-800 4-trk R-R, needs repair, BO. J Harvill or T Rusk, KSSN, POB 96, Little Rock AR 72203. 501-227-9696.

Otari ARS-1000 (3) PB stereo, gd cond, \$500 ea; Revox PR-99 PB stereo, \$900. D Burton, WXCW, 9244 W Fort Island Trail, Crystal River FL 34429. 904-795-9595.

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Scully 280B 4 trk 1/2" servo motor, var speed 7.5-15 ips, \$1050; Teac 5 8x4x2 mixer, \$795 or both for \$1600. A Graves, Graves Recdng Svc, POB 5469, Eugene OR 97405. 503-345-3991.

Otari MX 5050 MK-III-8 excel cond w/cables & roll-around stand, \$2995. S St John, St John Prod, POB 641448, Kenner LA 70064. 504-464-8881.

Ampex 602 mono w/622 speaker/amp, \$350; Ampex 351-2 stereo 7.5-15 ips, new heads, \$950. A Graves, Graves Recdng Svc, POB 5469, Eugene OR 97405. 503-345-3991.

Otari MX 5050 FT, gd cond, remote, manual, \$650 plus shpg. J Rudisill, Audio Independence, POB 746, Aptos CA 95001. 408-684-0605.

Otari MX-5050 8 trk, low hrs, vgc w/cables & all manuals, \$1500/BO plus S/H. S Mahaffey, Mahaf Prod, 3592 N Delsea dr #12, Vineland NJ 08360. 609-692-3439.

Otari 1000 (2), mint cond, \$500 ea/BO. J Kesler, WOBZ TV, POB 220, Livingston KY 40445. 606-843-2209.

Telex Copier 1 & Copier 2, mono cassette, 16 speed, \$150. P Russell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

Metrotech/Scully 400L 4-trk logger w/rec amp/monitor, \$125. G Hoppe, WVVA, 1010 2nd St N, Sauk Rapids MN 56379. 612-252-6200. Ampex-440C

MCI JH-110B reel, play only, low chassis, (2) BO; MCI JH-110B reel, R/P, low chassis, (2) BO; MCI JH-110B reel, play only, tall chassis (2), BO; Ampex 2 trk ATR-100, BO; Inovonics electronics for mono repro, \$200; Otari MX5050BQII 1/4" 4 trk, excel cond, \$2000. C Scherer, WDOK, One Radio Ln, Cleveland OH 44114. 216-696-0123.

EMPLOYMENT

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Ownership is goal, until then let me prove myself as your GM, BS in mktg, 14 yrs sales/mgmt experience with major markets. Gene, 912-985-2057, eves EST.

CE w/big prod voice, over 15 yrs hands-on engr exper seeks CE position w/prod or air shift in a competitive top 100 market. G Morgan, 704-563-8676.

Nine Years audio production w/semester on-air seeking pos, will relocate, all offers considered. Andrew, 2529 W Cactus #3351, Phoenix AZ 85029. 602-331-3096.

HELP WANTED

SALES ENGINEER for growing manufacturer. Only applicants with AM Radio/TV transmitting and sales experience considered. Excellent salary and commission. Resumes and salary history to Human Resources, PO Box 8026, Greenville NC 27835.

GM for Florida medium or large market, 29 years exper in sales, programming & engineering, turnarounds or start ups, avail immed. 813-849-3477.

Exper PD/GM with impressive 20 year track record, successful programming background with start-ups & turnarounds. WHB/KSLQ/WTNT/WEJT/Cromwell Group. Chip Douglas Mosley, 217-774-2956.

Trained individual seeks entry-level employment in radio, willing to relocate, not afraid of hard work & willing to start out on ground floor. Doug, 405-527-6066.

Experienced radio personality seeks FT position, 8 yrs as DJ & reporter, team player, nice guy, nice voice, solo or sidekick, NE or SE. Peter, 349 Franklin Rd, Denville NJ 07834. 201-361-1634.

Are you looking for someone with several years experience in on/off air prod/promo/traffic/computer automated programming, then call Meg, 603-434-7928.

Bright, energetic hardworker eager to start at your rock, C&W or news-talk station in any capacity, will relocate. Jason, 405-364-2535.

HELP WANTED

Program Director/Coordinator. For radio prod house focusing on West Indian format, develop, write & research proposals for radio programs. Determine feasibility, length & time of bdcets. Select specific topics according to stations' program needs. Originate, coordinate & approve ideas for new int'l features. Confer w/station directors to purchase programming & solve prod problems. Utilize knowledge in preparing spec features for the West Indian community. Supervise seven employees. Must have M.S. in Mass Comm +2 yrs. exp. in job or 2 yrs exp. as Producer/Director. Must have writing & comm skills. Exp. must include prod of specific West Indian features. \$24,045/year. 40 hrs/wk. M-F 9AM-5PM. Send resume to Job Service of Florida, 2660 W. Oakland Pk. Boulevard, St. Lauderdale, FL 33311-1347. Attn: Job Order #FL 0883145.

FIRST CLASS ENGINEER

Must have experience in AM, FM, Microwave, Satellite & current FCC rules & regs. Send resume and salary requirements to:
Phillip Robillard—WYLD Radio
2228 Gravier St.
New Orleans, LA 70119.

Colonial Broadcasting is accepting applications for asst engineer. Candidates must have bdcet technical exper or related electronic training. Knowledge of computers desirable. Send resume: WLWI AM/FM, Larry Wilkins/ POB 499, Montgomery, AL 36103-4999. Phone number: 205-240-9274.

Chief Engineer/CHR morning announcer wanted. Rocky Mountain, University city Combo. 801-752-5141.

WGNI-WMNX
seeks a chief engineer for (2) 100 KW FM's in Coastal Wilmington, North Carolina. Minimum 10 years hands-on experience, S.B.E. Certification is a PLUS... Experience with state of the art analog and digital equipment and high-powered Continental and Harris transmitters. Computer literate and able to upgrade studios to total digital in the future. Great community, and a VERY STABLE company. Send resume and references to:
Terry Jordan
Director of Engineering
Cape Fear Broadcasting Co.
PO Box 35297
Fayetteville, NC 28303-5297.
EOE

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Four Seasons Communications, located in suburban Washington, DC, is seeking a qualified Chief Engineer for its Richmond, Virginia stand alone FM, WMBX. The successful candidate will have strong FM transmitter & studio maintenance skills & good communications skills. He or she will be self-motivated & hands-on; in short, a results-oriented engineer. FCC General Class Radiotelephone Permit or SBE Certification preferred. If you want to be part of a thriving team, & work in a well-equipped radio station, send your resume & salary requirements to:
Chip Fetrow
Director of Engineering, WXTR
5210 Auth Road
Marlow Heights, MD 20746
or FAX to 301-899-6011. EOE.

ABOUT OUR 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 2 issues of Radio World. Contact information will be provided, but if a blind box number is required, there is a \$10 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
Attn: Simone Mullins

CASSETTE & R-R...WTS

2 trk w/rec elect, low hrs after rebuild w/manual, \$450; Ampex 350 2 trk play w/tube elect, \$150, Inovonics avail at \$50 ea; Schafer RPU-8 25 Hz encoder & remote control for Ampex 440 w/manual, \$75. B Tidwell, WAFT, POB 338, Valdosta GA 31603.

Ampex 350, excel cond; Crown 800, 7.5 & 15 ips, excel cond; Uher 4400 3 speed, gd cond; Roberts recorder 3.75 & 7.5 ips plus 8-trk R/P, dual R/P in both modes. F Reagan, Special Bdct Srvs, 203 Westville Ave Ext, Danbury CT 06811. 203-743-7433.

Marantz field recorder, vari-speed, batt operated AC/DC, rarely used, \$200. R Edwards, Spinner, 1750-30th St #222, Boulder CO 80301. 719-630-1452.

REVOX PARTS/SERVICE

Cassette-CD-Open reel
Rebuilt A77s, \$800
Capstan resurfacing, ALL BRANDS.
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30 Music Sq. W. #156
Nashville, TN 37203 (615) 244-6892

Ampex 350/440 parts transport & electronics parts, some new, most used, in super condition, motors, headstacs, guides, etc, also parts for Scully 280s & complete Inovonics electronics for 350s & 440s, all reasonably priced; Ampex MM 1100 16-trk 15/30 ips in superb cond, very little use, heads gd, all electronics have been checked out, has updates, counter, MDA fans, AC stabilizer card, mods, BO; Scully 280 1/2" 4-trk, vgc, 7 1/2/15 ips, \$750. 415-469-0136.

Tascam 38 1/2" 8-trk open reel machine w/8 chnl of dbx Type I encode/decode NR, \$1500, w/o dbx, \$1300. P Cibley, Cibley Music, 138 E 38 St, NY NY 10016. 212-986-2219.

Tascam 42B (6) R/R w/rollaround frames; (3) Otari MX5050 B11, (6) Dynamax CRT-10 cart machines; (2) Tascam T-2640MS cassette duplicator & slave; (3) Dynamax ESD-10 eraser splice-finder, BO. J Phillips, WZOM, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

Otari Mark II-IV 1/2" 4-track, multi-track, mint, less than 50 hours, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

16 trk 2", \$3450; Otari 1" 8 trk, \$2450; 5050 III-8, \$1950; Ampex ATR800 mono, \$750; Tascam 25-2, \$750; Tascam 52 mint, \$1200; MCI Locator III, \$1195; Ampex AG350 solid st electr, \$100/ch. W Gunn, 619-320-0728.

Scully 280 1/2" 4-trk. D Nelson, 619-758-0888.

Ampex 440 B 1/2" 4-track in original console, exc cond, \$1350. M Tait Tait Recording Svc, 1347 S Capitol St SW, Washington DC 20003. 202-488-3905.

Recorder heads, used Scully mono & 2 trk, \$25-50, ATR100's, 3M M79-16 & 8's, Otari 1/2" 8 trks, \$495. W Gunn, 619-320-0728.

Want To Buy

Revox PR99 prefer MKII or III, must be in gd cond. D Koehn, KKPR, 403 E 25th St, Kearney NE 68847. 308-236-9900.

Scully '100' recorders, record/play amplifiers, 8, 16, 24 track heads. Sequoia Electronics, 4646 Hounds-haven Way, San Jose CA 95111. 408-363-1646.

Need extender cord for Magnecord 1021-1022 or 1024. C Smith, KREK, POB 1280, Bristow OK 74010. 918-367-5501.

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

CD's/PLAYERS

Want To Sell

Magnavox 16 bit dual D/A convert CD players (2), \$100 ea. J Randall, J Randall Bdctg/Recdg, 7276 Lakeside Dr, Indianapolis IN 46278. 317-299-0093.

COMPUTERS

Want To Sell

Heathkit H-89, \$60; Texas Instruments 700 printer, \$50. T Wortmann, WJAG, 309 Broasel, Norfolk NC 68701. 402-371-0780.

Want To Buy

NEC P6 24 pin dot matrix printer w/8 internal fonts & 5 new unused ribbons, \$125. P Cibley, Cibley Music, 138 E 38 St, NY NY 10016. 212-986-2219.

Amstrad PCW-9512 word processors (2), \$150 ea. G Arroyo, 407-830-0800.

CONSOLES

Want To Sell

Ramko DC5AR 5 channel mixers, 14 available, very good condition, \$225 each. 916-334-9449.

GE 8-pot mono tube type, huge; McMartin BR-400 4-pot mono remote mixer; McMartin B-502 stereo console; Sparta AS-30 5-pot stereo console. C Watkins, KLCE, Blackfoot, Idaho Falls ID. 208-785-1400.

Gates M5133 Gateway console, \$100/BO. C Creager Sr, WTBI, POB 837, Pickens SC 29671. 803-878-0348.

Radio Systems RS12 (2), excel cond w/preamps & wiring, \$3000 ea plus shpg; McMartin B502 5-chnl stereo mixing console/news board, \$450. J Randall, John Randall Bdctg/Recdg, 7276 Lakeside Dr, Indianapolis IN 46278. 317-299-0093.

Ramko DC-55 5 chnl stereo mixer board, 2 inputs per mixer except #5 which offers 5 inputs, \$350. KSUE, 3015 Johnstonville Rd, Susanville CA 96130. 916-257-2121.

Tascam M-30 8x4 w/submix, gd cond, \$425. G Kintz, WLG1, Rt 2 Box 69, Hemingway SC 29554.

Allen & Heath Scepter rackmount console, 12x20x2x1, sweep EQ, high quality rackmount w/many features, \$1700/BO. M Ravain, Trinity Christian Music Ministries, POB 2479, Flagler Beach FL 32136. 904-439-3671.

Collins 212P-2 8 mixer audio console service manual & parts. L Douglas, KKPC, 900 W Orman, Pueblo CO 81004. 719-549-3472.

Pacific Recorders Ct-2, Tl-2, TT-3 console interface units, stereo carts (2) 3 inputs ea, stereo reels (2) one input ea & TT, 2 inputs, \$150 ea/\$600 all/BO. C Gulielmetti, Edgewater Co, 232 C St, S San Francisco CA 94080. 415-589-3313.

Sparta A-15 mono 5 pot board w/remote type DJ set up, space for board & 2 TT's, \$200. B Oostenburg, KCKY, POB 6, Coolidge AZ 85228. 602-723-5448.

Altec 1567A mixer, exc cond, \$75; RCA BC-3C 8 pot mono, needs work with book, \$200/BO; Gatesway (2) 8 pot mono, both need work with book, \$200 ea/BO; Harris Ambassador 5 pot mono, meter missing, otherwise appears OK, \$200/BO. D Carver, 107 S Main, Brookfield MO 64628. 816-258-7458.

Shure FP-32 stereo location mixer, 3 pannable balanced mic or line inputs, 2 stereo outputs, tone gen, lo-cut filters, lit VU meters, slate mic, AB pwr & modified for 48V phantom pwr, reliable, batt pwr & suitable for ENG, EFP & radio remotes, \$625. D Brown, 813-895-9595.

Pacific Recorders LS-4 audio mixer/switcher; Pacific Recorders LS-10 monitor switcher, cue amplifier; (8) Audiometrics stereo distribution amplifier, 8x2 or 16x1, BO. J Phillips, WZOM, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

Ampex AM-10 mixers (2). Kinura Records, Box 660236, Miami Springs FL 33166. 305-887-5329.

Radio Shack Realistic DJ mixer, 8 inputs, 4 outputs, great for beginner musicians, \$70 plus shpg. D Pulwers, Dave's Price Audio Prod, 310 N Howard St #103, Alexandria VA 22304. 703-751-9346.

Ramko 5-chnl stereo mixer brd Mo#DC-55, 2 inputs per mixer except #5 which offers 5 inputs, \$325. R Chambers, 916-257-2121.

LPB Signature II S-20 30 inputs, stereo, 10-chnl former air board, upgraded studio, works great, BO. K Lincoln, WIZN, POB 1067, Burlington VT 05402. 802-860-2440.

BE 8-M100-A 8 chnl, 16 input board, very clean, never on-air, used in off-line video edit suite w/manual, \$800. A Dunkin, WAGA TV, 1551 Briarcliff Rd, Atlanta GA 30306. 404-491-0580.

ASI M52C w/15 inputs, 4 outputs, plus 2 lines & two speaker outputs. F Reagan, Special Bdct Srvs, 203 Westville Ave Ext, Danbury CT 06811. 743-7433.

Harris Stereo 80 solid state audio 8 mixer, 11 inputs w/tech manual & matching shelf, \$900. J Hall, WNDA, 2407 9th Ave SW, Huntsville AL 35805. 205-539-9643.

BE 45-50 stereo 4 console, 12 input, just removed from service, \$400. T Parks, WOWU, POB 592, Kankakee IL 60901. 815-939-5089.

Consoles, \$500 & up. Call Mark at 619-758-0888.

Want To Buy

Manual for Ramsa WR-8616 audio mixer. J LaMond, WYRK, 500 Rand Bldg, Buffalo NY 14203. 716-852-7444.

Harris M-90 or Auditorics 110 series console w/wo studio cabinetry & patching capability, will pick-up, any comb of modules considered. D Doelitzsch, WDDD, Marion IL. 618-997-8123.

Arrakis 10 to 12 channel slider console, must be in good condition. D Koehn, KKPR, 403 E 25th St, Kearney NE 68847. 308-236-9900.

DISCO & SOUND EQUIPMENT

Want To Sell

EV Delta-Max 15 concert speakers (pair) w/controller, mint cond, \$3000/BO. M Ravain, Trinity Christian Music Ministries, POB 2479, Flagler Beach FL 32136. 904-439-3671.

dbx 150 Type I NR, 2 chnl, good condition, \$150/BO. J Rudisill, Audio Independence, POB 746, Aptos CA 95001. 408-684-0605.

Lexicon 224 reverb version 4.4, perfect shape, \$1875; Sennheiser Infrared Stereo wireless headphones & xmtr, \$225. Rick, Super Duper Audio Duplicating, 503-228-2222.

Fostex 3180 stereo reverb unit, rack mtable, 3 sec delay time, 24 MS, pre-delay time, will swap for UREI Cooper Time Cube Mdl 920-16. J Roper, Imperial Sound, 383 N Studio St, Terre Haute IN 47803. 617-877-2663.

Excel quality mobile DJ syst incl JBL, Crest, Technics gear, plus music, call for equip list. J Hunter, KBRE, POB 858, Cedar City UT 84720. 801-586-5273.

Micro Trak mobile dual turntable unit remote console with 2 Russco Studio Pro Mdl B turntables, Micro Trak 6455B console, mono 5 pot, 8 input, fold out legs with equipment shelf, \$300. G Hoppe, WVVA, 1010 2nd St N, Sauk Rapids MN 56379. 612-252-6200.

UREI 539 1/3 oct EQ (4), \$395/each; dbx 20/20 real time analyzer/automatic equalizer, new, \$595; UREI 815C studio monitors, 3 woofers per cabinet, new, \$3500. Rick, Super Duper Audio Duplicating, 503-228-2222.

Want To Buy

Speakers needed, Altec, Tannoy, JBL. John, 708-391-8828.

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SALE/LEASE BACKS, Sell your equipment to Carpenter for CASH. Carpenter LEASES your equipment back to you. You WRITE OFF the monthly payments and put the CASH to work. Carpenter & Associates, Voice 501-868-5023 Fax 501-868-5401.

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Comm FM has space to lease on own 300' tower. 24 hr emerg. power, security, limited access, comp. rates, #1 location for your paging system, two-way/RPTR operation. For sight info/pricing while prime while space is still available.
Call A. Wasilewski, Yakima WA
509-248-1460

LIMITERS

Want To Sell

Air Corp Pro Announcer 500 mic compressor/EQ, exc cond, \$450/BO. M Osborne, WKSQ, POB 9494, Ellsworth ME 04605. 207-667-7573.

Harris/Gates M-6543 FM mono limiter w/manual, \$75. T Rosen, KBCC, 1129 Acacia Ave, Bakersfield CA 93305. 805-871-6094.

Gates M6467 stereo top end limiter, great condition, \$200 plus UPS. G Kirby, Gray Fox Video, 13613 US 36, Marysville OH 43040. 614-261-8871.

dbx 164 stereo one knob limiter, \$150. T Parks, WOWU, POB 592, Kankakee IL 60901. 815-939-5089.

Orban 8000A Optimod, good condition, BO. P Guello, KUWS, 1800 Grand Ave, Superior WI 54880. 715-394-8187.

Aphex 250 type III aural exciter, new condition, '93 mdl, all papers, invoice, manual etc, original carton, \$695. J Masters Ying, Ariel, 140A Bellevue Ave #5, Newport RI 02840. 401-846-9743.

Want To Buy

Composite clipper, any make. B Ladd, WNRP, 108-1/2 E Main, Bellevue OH 44811. 419-483-2511.

Compression limiting device for lw pwr AM mono travelers info radio service in useable condition. 813-933-6009.

BUY-SELL-TRADE OPTIMOD 8000 & 8100 414-482-2638

Extender card for Harris MSP 100 servicing needed urgently; also looking for FM limiter modules for same. J Fink, WLAD, 198 Main St, Danbury CT 06810. 203-792-4266.

MICROPHONES

Want To Sell

EV RE 10, \$100; Audio Technica AT 802, \$100; (3) mic stands, \$20 ea. J Randall, John Randall Broadcasting/Recording, 7276 Lakeside Dr, Indianapolis IN 46278. 317-299-0093.

Neumann U-89's (2) with shock mts, cases, mint condition, \$3000/pr or \$1600 ea. Whirlwind Prod, 10356 W Warren Ave, Dearborn MI 48126. 313-584-9201.

EV DS 35; (2) EV RE 16; EV RE 20; Shure SM-5B studio, \$150 ea or \$600/all or BO. R Edwards, Spinner, 1750-30th St #222, Boulder CO 80301. 719-630-1452.

Altec mics (2) with power supplies. F Reagan, Special Broadcast Services, 203 Westville Ave Ext, Danbury CT 06811. 743-7433.

AKG 451-E (2) w/batt supply; (2) AKG C-60 w/AC supply. Kinura Records, Box 660236, Miami Springs FL 33166. 305-887-5329.

Audio Technica 811 bi-directional mic, new, BO; Gitzo 14' fishpole, internally wired with AT mic mount, Best Offer; I Raider, Raider Productions, 1006 Stoneham Dr, W Chester PA 19382. 215-889-9565.

Sennheiser 441, new w/all papers & response curves, \$450. R Payne, 313-786-1767.

AKG 414's, \$695, original D12 like the Beatles used, \$295, Sony ECM54, \$150, Beyer M500 like new, \$300, Demeter 4-channel tube DI rack mt like new, \$875. W Gunn, 619-320-0728.

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



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Falls Church, VA 22041

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| Audio Production (Other) | Leasing | Tapes, Carts & Reels |
| Brokers | Limiters | Tax Deductable Equipment |
| Business Opportunities | Microphones | Test Equipment |
| Cart Machines | Miscellaneous | Transmitter/Exciters |
| Cassette & R-R Recorders | Monitors | Tubes |
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MICROPHONES...WTS

Gefell Neumann UM57 tube mics, New capsules for SM2 & many others, New AC701 tubes for Neumann mics, \$275. W Gunn, 619-320-0728.

Want To Buy

Mics needed, AKG, Shure, John, 708-391-8828.

CBS or NBC call-ltr plate & antique floor mic stand for RCA 44 mic. M Harrington, POB 7619, Little Rock AR 72217. 501-223-9056.

77-DX's, 44-BX's, KU-3A's On-Air lights. Top price paid. Fast response. Bill Bryant Mgmt, 2601 Hillsboro Rd. G12, Nashville TN 37212. 615-269-6131.

RCA 77DXs/44BXs ribbon, chrome/TV grey, gd cond, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

MISCELLANEOUS

Want To Sell

Anvil rack cases (1) 16 space 18" deep, \$250; (2) 5 space 14" deep, \$135. G Kintz, WLGI, Rt 2 Box 69, Hemingway SC 29554.

Key Industries T-10,000 phase master, 1 in at 230, 3 out at 230, \$1500. R Allen, KLAD, POB 339, Klamath Falls OR 97601. 503-882-8833.

Rotron Blowers for Elcom, Harris, CCA, CSI, McMartin, rebuilt & new. Goodrich Enterprises Inc. 11435 Manderson St Omaha, NE 68164 402 493 1886 FAX 402 493 6821

Dictaphone Time-Master 116300 w/smashed mic; Dictaphone Time-Master 116025 trans w/pedal. C Watkins, KLCE, Blackfoot, Idaho Falls ID. 208-785-1400.

ComDial solid-state telephone syst, perfect for RF environ, 4 wire analog syst w/plenty of bells & whistles, 5 yrs old, great cond, cap of 24 extensions x 8 lines, 17 extensions currently, interfaces easily to bdct, \$2000. D Doelitzsch, WDDD, Marion IL. 618-997-8123.

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Superior Electric Stabaline pwr conditioner, handles up to 8 amps, \$135; JBL ceiling spkrs, housing & volume controls (2), 433 ea; Lil Miss Moffat 48 volt phantom pwr sply (2), \$22 ea; 11 1/4" long frm patch cords, various lgths, \$4 ea; (2) 6' rk rails + other sizes, all items + shpg. B Lord, Lord Bdctg, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

Switch, 3 pole enclosed, 400 amp (3), gd cond, \$100 ea/BO; RCA equip racks (3) 6', gd cond; WE 50B recorder coupler, appears OK; relay (12) P&B KRP11AN, 2 pole, double throw, coil 120 VAC, octal base, unused, \$2.50 ea/BO; Relay (12) P&B KRP14AG, 3 pole, double throw, coil 120 VAC, 11 pin octal style base, unused, \$2.50 ea/BO. D Carver, 107 S Main, Brookfield MO 64628. 816-258-7458.

Switchcraft 36 point balanced patch bay. T Parks, WOWU, POB 592, Kankakee IL 60901. 815-939-5089.

R-R racks (2) to fit a Otari MX 5050, gd cond w/wheels, \$200/BO. J Roberts, Illinois News Network, 430 W Erie #505, Chicago IL 60610. 312-943-6363.

Radio sales training tapes, 30 topics covered on 16 VHS tapes, exc cond, current, \$2500. R Trumbo, 800-397-4146.

Altec 15095 input transformers, 150/600 ohm inputs, 15 K ohm outputs, 8 pin octal base, (4), \$15/ea; Altec 1579A RIAA equalized solid state amp for magnetic phono pickup, input 47K ohm output 600 ohm sensitivity 5 mV for 70 mV @ 1kHz, power 12V @ 11 mA, 5 pin octal base, \$25. S Lawson, KAK Prod, 928 Hyland Dr, Santa Rosa CA 95404. 707-528-4055.

Clark Cortez motor & travel studio. F Reagan, Special Bdct Svcs, 203 Westville Ave Ext, Danbury CT 06811. 743-7433.

Power Transformers, 440VAC/220VAC, 3 phase, 50 and 75 KVA, \$1500 each. 800-833-6629.

INVENTORY REDUCTION SALE! Over 500 item list (fax or mail). Call Mark at 619-758-0888.

ESE MasterClock w/WWV rcvr; (7) analog slave clock displays, (4) ESE digital slave clock displays; (2) S2 position Switchcraft patch bays, BO; (4) Valley 400 mic processors; (3) Conex UM-33 monitor switchers; dbx 160X compressor-limiter; Orban 672A equalizer, BO. J Phillips, WZOM, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

Want To Buy

Pre-50's Bell System bakelite or metal telephones & ringer boxes. J Newman, Box 1211, Newport RI 02840. 401-847-0455.

45 RPM record shucks (protective sleeves). C Frodsham, KVSF, POB 7, E Highway 24, Beloit KS 67420. 913-738-2206.

Radio transformers by Chicago, UTC, Triad, Peerless, Freed, Sola, send list. J Gangwer, 942 32nd St, Richmond CA 94804. 415-644-2363.

Ampex tube recorders and mixers. W Gunn, 619-320-0728.

Jazz record collections, 10" LP/12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, Nyny 10003. 212-674-3060.

MONITORS

Want To Sell

TFT 760 EBS system w/AM rcvr, works but needs work, \$250/BO. D Carver, 107 S Main, Brookfield MO 64628. 816-258-7458.

McMartin TBM-3000A freq mon, needs neons, \$50. B Tidwell, WAFT, POB 338, Valdosta GA 31603.

McMartin TBM-4500A FM stereo mod mon, BO. P Guello, KUWS, 1800 Grand Ave, Superior WI 54880. 715-394-8187.

Harris AM stereo STM-1 mod monitor, lk new, BO. J Bains, KKMO, POB 1277, Tacoma WA 98401. 206-922-3345.

Rust SFM-19 deviation monitor for 19 kHz, BO; Indesys FM mod mon, BO; Collins FM mod mon for parts, BO. C Scherer, WDOK, One Radio Ln, Cleveland OH 44114. 216-696-0123.

Belar RF amp tuned to 106.1 MHz to drive Belar FMM1 & FMM2 monitors, \$400. J Bahr, WVIS, POB 487, Frederickstad, St Croix VI 00840. 809-773-2220.

Want To Buy

AM modulation monitor, used, but in gd wrkg order; studio xmtr link, mono or composite 2-chnl str. R Chambers, 916-257-2121.

McMartin (buy & sell) any model. C Goodrich, 11435 Manderson, Omaha NE 68164. 402-493-1886 or fax 402-493-6821.

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Marti RPT 40 dual frequency; TFT 7610; Moseley TCS-2. D Nelson, 619-758-0888.

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Moseley 505/L xtr, upgradable & good for back up, \$2600 plus shipping. J Bahr, WVIS, POB 487, Frederiksted, St Croix VI 00840. 809-773-2220.

Gentner digital phone hybrid I, good condition, \$650; Hewlett Packard audio osc & various AC voltmeters. K O'Malley, WTKR, 720 Boush St, Norfolk VA 23510. 804-446-1328.

TFT 7601 wireless remote control with 110 kHz SCA return in fair condition, \$1500/Best Offer plus shipping. J Bahr, WVIS, Box 487, Frederiksted, St Croix VI 00840. 809-773-2220.

TFT 9200 STL syst (2) 9200/9205 tuned to 944.875 & 945.025, new in factory sealed cartons, \$5600. G Levites, WEVD, 770 Broadway, NY NY 10003. 212-777-7900.

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Satcue 400 satellite programming switcher. C Watkins, KLCE, Blackfoot, Idaho Falls ID. 208-785-1400.

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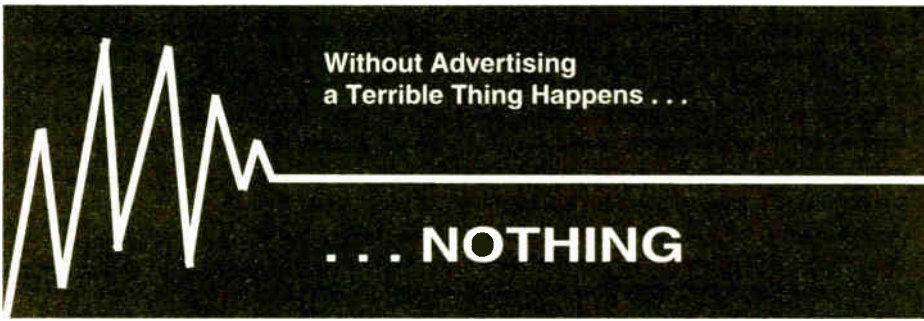
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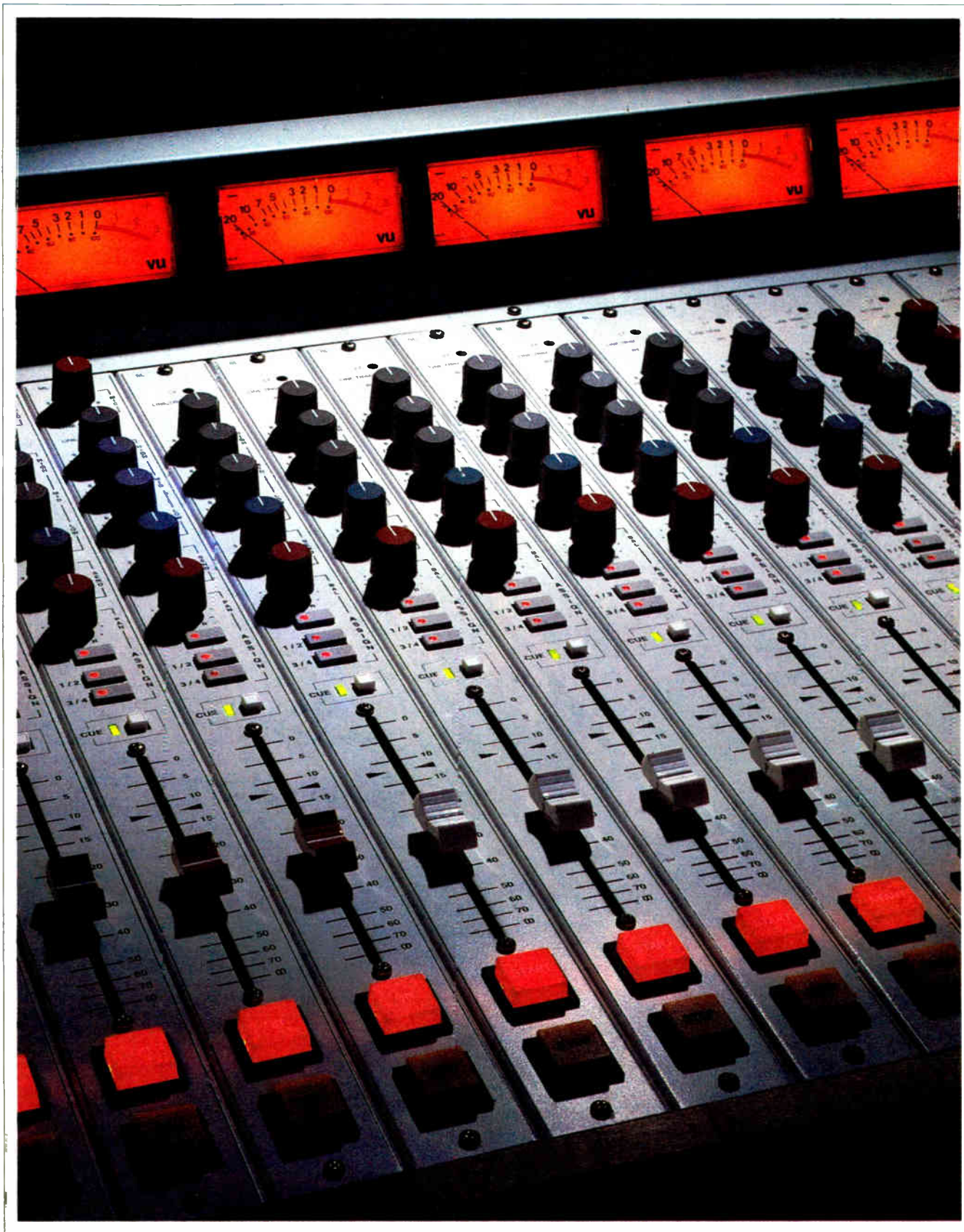
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