

## NAB, EIA Battle Over RDS Standard

by John Gatski

**WASHINGTON** The NAB has angered the audio industry and some of its own members by its announcement last month that it would withhold support for the nearly completed Radio Data System (RDS) standard unless it included AM.

The Electronic Industries Association (EIA), however, has announced that it will approve the FM RDS standard on its own if NAB will not support the standard that the NRSC (National Radio Systems Committee) has been working on for more than a year.

RDS is considered a desirable new technology for radio. It is a broadcaster-encoded data stream located on a 57 kHz

subcarrier that provides numerous capabilities including text display, format scanning and automatic traffic report alerting.

The NAB's announcement was considered a blow to the standard process that had been ongoing for more than a year by the NRSC's RDS (or radio broadcast data system, as it has been referred to in the U.S.) subcommittee, a standards making organization comprised of consumer audio industry and NAB members.

Without NAB support, there was doubt that enough support could be mustered for the standard through the NRSC. The standard was scheduled to be voted on by the full NRSC at the NAB convention in Las Vegas.

According to sources, Delco officials ini-

tially were so angry at the NAB announcement that the company considered pulling out of the AMAX program, a voluntary industry standard for improved AM receiver quality that was pushed by NAB and EIA last year. Delco was one of the first companies to produce AMAX quality car radios.

### AMAX support in danger

In a statement released two weeks after the NAB announcement, Delco made no mention of AMAX, but generally reiterated its support for the RDS standard. "We are confident that RDS standard work, now nearing completion, will be concluded promptly," the release said.

Gerry Lebow, of Sage Alerting—a proponent of RDS in the U.S.—said he was amazed that the NAB made the announcement and hoped the organization would reconsider its position.

Denon spokesman Ken Furst said he hoped a compromise could be reached to get the NAB to support the FM standard, but also satisfy its desire for an AM provision.

In responding to the NAB, EIA Consumer Electronics Group VP Gary Shapiro said, "We are disappointed with this eleventh hour reversal by NAB. The NRSC . . . has agreed with virtually every important aspect of the standard. We believe FM broadcasters who recognize the profit potential of RDS will join us in finishing the sole task which needs

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## AM Freeze Lifted by FCC; No Word on Expanded Band

by Alex Zavlstovich

**WASHINGTON** The AM freeze has been lifted, and the FCC's revised AM technical rules are in effect.

In a public notice issued at the end of March, the FCC announced that the lifting of the freeze and implementation of the new rules would take place starting midnight, April 19. A filing window for requests to move to the expanded AM band (1605 kHz to 1705 kHz) will be announced at a later date, according to the notice.

FCC spokespersons would not comment on whether the rules were modified in any way based on petitions for reconsideration filed after the new rules—described in Mass Media Docket 87-267—were unanimously adopted by the Commissioners on Sept. 26, 1991.

Bill Hassinger, the Mass Media Bureau's assistant chief for engineering, said the Commission intends to issue a memorandum opinion and order regarding the petitions for reconsideration. He would not speculate on when the memorandum was to be released.

Prior to the release of the public notice, Hassinger had said there would be "no drastic changes in the Commission's position" based on the petitions for reconsideration. He added that "nothing looks fatal," and that he believed there would be "no major reversals."

### Expanded band concerns

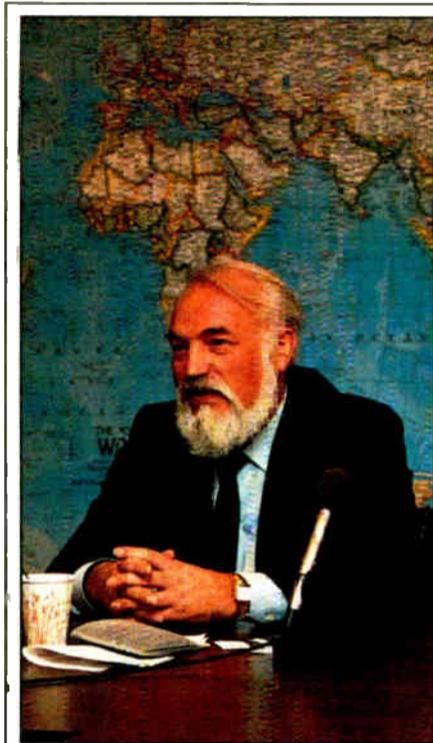
As might be expected, a number of the petitions for reconsideration addressed the FCC's plans for migration of stations to the expanded AM band of 1605 kHz to 1705 kHz. Among them was a filing submitted by Edward Burkhardt, president of Burkhardt Monitoring Service.

In his petition, Burkhardt reminded the Commission that the expanded band is

shared with 48 radio navigation stations—primarily fishing markers in international waters. He maintained that the transmitters produce nighttime signals as strong as 1 mV.

The Burkhardt petition suggests that the FCC advise all applicants that the expanded band is shared and stations on it may be subject to interference. The petition also urges that sale or distribution of fishing

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### East Meets West:

Anatoly Tupikin, director general of the Russian Federation, discusses radio's future in Eastern Europe. For details, see pp. 7-10.

## EIA Sets DAR Tests for 1993

**WASHINGTON** The Electronic Industries Association's (EIA) digital audio radio (DAR) subcommittee tentatively has scheduled systems testing to begin in April 1993.

Also of note, the subcommittee has indicated that "satellite interests" should be included in the subcommittee's voting and systems selection procedures. Other interests will include radio broadcast equipment manufacturers, radio broadcast networks, radio broadcast stations or groups, receiver manufacturers and IC manufacturers.

Based on the EIA's timetable, DAR (or DAB) systems proponents will be solicited this spring and will have to present formal descriptions by December. The tentative schedule then calls for receipt of equipment and actual testing by April 1993.

One reason for the testing phase to begin in April 1993 is related to international concerns, according to EIA.

"If at all possible, this should allow for the test results and the system selected to be presented before the meetings of the CCIR at the end of 1993," the EIA said.

In a post-meeting press release, the EIA also made reference to a "greater liaison" with Canada and Mexico on their respective DAB plans. The recent World Administrative Radio Conference (WARC) de-

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# NEWSWATCH

## Fines Called Unfair

**WASHINGTON** The NAB has asked federal regulators to suspend all fines against broadcasters who do not keep an "outdated" government manual in their file.

The NAB said the fine is not fair because the document, "The Public and Broadcasting—A Procedural Manual" contains outmoded rules that are no longer applicable, such as the Fairness Doctrine and three-year licensing terms.

Several stations have reported heavy fines by the FCC for not having the manual in its file.

## Waiver Granted to Duhamel

**SPEARFISH, S.D.** Duhamel Broadcasting Enterprises has been granted a waiver of the one-to-a-market rule and allotted a license for KEZV-FM.

The FCC approved the transfer of the license from United Radio Group Inc. to Duhamel Broadcasting, which already owned KOTA(AM) and KOTA-TV. The one-to-a-market waiver was granted because Duhamel's acquisition of KEZV was said to "yield increased public service benefits including economies of scale, cost savings, along with programming and service benefits."

## New FCC Committee Formed

**WASHINGTON** The FCC's recently established Small Business Advisory Committee will provide expert advice and recommendations on small business issues, including minority and women participation issues.

The Commission also has made available the report, "Communications and Minority Enterprises in the 1990s."

Additional information on the Small Business Advisory Committee can be obtained by calling 202-632-6390. Additional information on the conference report can be obtained by calling 202-632-7260.

## Sat Dish Law Overruled

**DEERFIELD, N.Y.** The FCC has preempted a satellite dish zoning law

passed last year by the city of Deerfield.

The law had been opposed by the NAB because it was considered too restrictive.

The Commission said it overruled the Deerfield ordinance because "it discriminates against satellite earth stations, does not have a reasonable and clearly defined health, safety or aesthetic objective, and unreasonably restricts reception of satellite delivered signals."

## "Hard Look"

### Nixes Applications

**OXNARD, Calif.** The FCC has dismissed three applications under its recently implemented "hard look policy" for reinstatement of applications for a new FM allocation in Oxnard.

The Commission denied the applications of Oxnard Broadcasting Inc., Borchart FM Broadcasting Company and IST Broadcasting Inc.

The rejection was based on applications' information that violated the antenna height and power provisions of an international agreement with Mexico.

## Italy Schedules DAB Tests

**ROME, Italy** RAI, the Italian government-run radio and TV network, has announced it will start DAB experiments in early 1993.

According to the network, the experiments will be conducted in the Val d' Aosta region. The test will use the Eureka 147 system in the upper VHF band. European channels are 7 MHz wide, which means they will be capable of carrying 16 DAB audio channels.

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# EIA, NAB Battle Over RDS Standard

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completion—the defining of the station format codes.

## A separate AM standard

Shapiro noted that the EIA is ready to work with the NAB on pursuing a separate digital data system similar to RDS for AM, but the RDS FM standard should move forward as planned.

The EIA has been involved in voluntary standard approval processes on its own before, including MTS TV stereo and the ongoing digital audio broadcasting receiver standard.

In response, NAB Executive VP of Operations John Abel issued a prepared statement stating that the EIA was mistaken in its impression that the NAB reversed itself on the RDS standard.

"Once again, EIA is factually wrong," Abel's statement said. "The NAB has never reversed itself on RBDS. As a broadcast organization, it has always been our position and our job to represent the interests of AM radio, particularly on RBDS, and we will always defend their interests vigorously. It is wrong to assert AM should be considered later when technology to accommodate AM today is readily advisable."

The RDS standard work for FM had been mostly patterned after the European standard. The NRSC subcommittee's reasoning was that since FM was farther along, the FM standard would be adopted first, and an AM standard would be devel-

oped later as newer technologies were developed to make it work on AM.

The NAB's objection to the nearly written NRSC standard was prompted, the association said, by AM stations that felt that including a news/talk format scanning category without AM was a disservice to the band, since that is primarily the format of many AMs.

This concern intensified in late 1991 when the NAB formed an RDS task force to review the standards work of the NRSC subcommittee. The task force recommended in March that the FCC withhold support for the NRSC standard.

NAB Staff Engineer for Technical Regulatory Affairs John Marino said that NAB objections regarding AM were aired at the NRSC RDS subcommittee meetings, but the receiver manufacturers seemed intent on quickly approving an FM standard.

## AM concerns unanswered

"This whole technology was being driven by receiver manufacturers. Basically, they were on a very fast track to get this introduced," Marino said. "It looked like there was very little concern for what broadcasters wanted. All they said they wanted from us was a list of formats that they could put into this thing. The AM issue was brought up many, many times . . . it was sort of just brushed aside."

Marino said that receiver company representatives on the subcommittee must have believed the standard adequately covered AM in terms of flexibility to later

write in a specific provision for AM, such as ID Logic. ID Logic is a receiver technology that allows stations to be programmed into the receiver by format.

With regard to RDS-like technologies for AM, NRSC RDS Subcommittee Co-Chairman Almon Clegg said there is no similar technology that is broadcaster driven.

Marino, however, said there are technologies such as ID Logic that give AM radios a format scanning capability. ID Logic, however, is based on a chip that is built into receivers; it is not a broadcast technology.

The EIA rejected NAB's claims that receiver company interests tried to rush the FM standard over the objections of AM interests. In fact, an EIA official said that broadcasting representatives at an early RDS subcommittee endorsed adoption of an AM standard at a later time.

A memo, dated March 14, 1991, was addressed to the RDS subcommittee by broadcast consultant Richard Burden and Associates. In it, Burden said that a similar service should be considered for AM, but "there is no intent here to place any impediment to the introduction of RBDS to FM broadcast service. Rather, it is felt that the motorist is better served if RBDS is available to both mediums. Therefore, I propose that this subgroup move to consider a similar AM service at an appropriate time in the future."

# DAR Testing Set for 1993

► continued from page 1  
cision to allot satellite DAB spectrum also was discussed at the DAR subcommittee's March meeting.

Subcommittee Chairman Randall Brunts, who is employed by Delco, said the EIA is looking at the U.S. standards process from a global perspective.

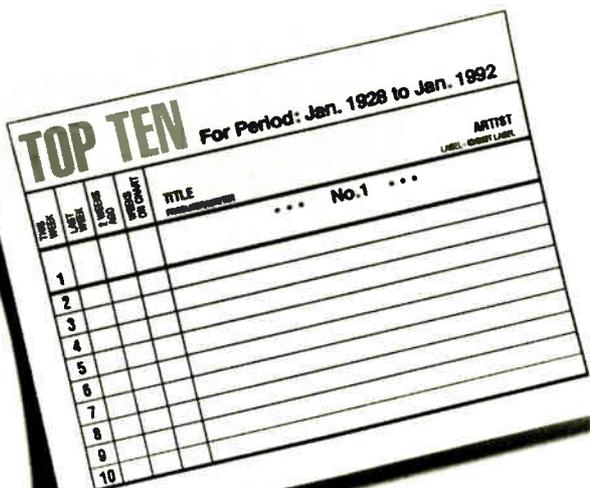
"Basically, there is a very strong desire to have the largest market area possible for a particular DAR standard," Brunts said. "Obviously, the ideal goal . . . is to have a worldwide standard, including not only the systems, but the spectrum allocation."

The DAR subcommittee's testing schedule is sooner than previously discussed, according to Paul Donahue, VP of Engineering for Gannett Radio, which is working on the USA Digital in-band DAB system.

Donahue said the testing phase appears to have been moved up from a formerly discussed October 1993 timetable.

Stanford Telecom's Systems Group Chief Engineer Lloyd Englebrecht also said the testing schedule is probably too early.

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# Just Looking for a Straight Answer

by Alex Zavistovlch

**WASHINGTON** Have you ever noticed how hard it can be sometimes to get a straight answer to a simple question? I have: right after I asked the folks at the FCC about the new AM technical rules.

All I wanted to know was whether the petitions for reconsideration that were filed against the rules would have any effect. All anyone would tell me was that the Commission would issue a Memorandum Opinion and Order on the petitions sometime soon, and then everybody would know. Gee, thanks.

I understand that the FCC has had some problems with leaks lately, but this is a little bit different. I mean, the rules are already in effect (as of April 19), and yet nothing's been said about petitions for reconsideration. What's that all about?

Chances are that the FCC will have some tidy way to dismiss all the points raised in the petitions in a couple of paragraphs. Which is a shame, really, because some good points were raised.

First, there was pretty widespread opposition to the "ratchet" clause (a 10 percent cutback in power for voluntary facility modifications). That's probably going to hit the oldest stations the hardest, because they're the ones that'll have to replace their antenna systems before long. Not what I'd call much incentive to improve.

Also, I was surprised to learn that the expanded AM band may not be the haven from interference that we all thought it would. Turns out that the 1605 kHz to 1705 kHz frequency range is also shared by off-shore fishing markers, some of which put out a pretty respectable signal. Sorry, Charlie, but it's possible that stations in the expanded band may just trade off one kind of interference for another.

There also hasn't been any word yet about when the filing window for the expanded band will be opened. At least we know one thing: The AM freeze has

thawed ... and just in time for spring, too.

★★★

Every so often, I get a letter that asks why we cover digital audio broadcasting so extensively. After all, they say, DAB's still far off in the future; what's the big deal?



Well, even though it may not be implemented in any meaningful way until the end of this decade, the DAB ball is already in motion.

Canada predicts that experimental terrestrial stations will begin broadcasting in the L-band in the next year or two. The EIA has set a timetable to test systems by spring of next year. And Ron Strother expects that on-air testing of the LinCom in-band DAB system will begin in Los Angeles *this summer*.

There's more, too. How about Satellite CD Radio beaming down digital audio within the next few years? How about Afrispace signing up CNN to bring digital audio service to the African continent? How about Mexico, Australia and Brazil looking to launch their own experimental stations—maybe as early as a year from now?

Believe me, I know a lot of you are struggling just to keep your stations afloat today. But DAB isn't a pipe dream any more; there's a movement the world over to bring this technology into the mainstream as soon as possible. Things are moving faster than you might think.

★★★

From what I hear, there are some interesting stories to tell about the major con-

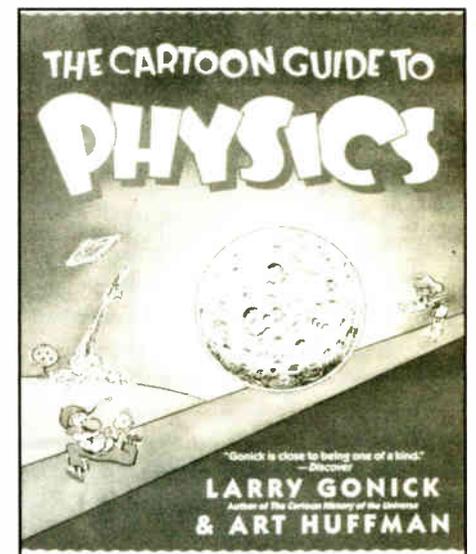
sulting engineering firms around town here in the nation's capital.

The rumor mill has it that the firm of du Treil, Lundin & Rackley may be planning to relocate its offices to Florida, to stave off the expense of keeping an office in downtown D.C. I've also heard that there's a shortage of engineers at Jules Cohen and Associate, and some differences of opinion as to direction in the ranks of Lahm, Suffa and Cavell.

What does this mean for the state of consulting engineering in radio? At this point, your guess is as good as mine, but it seems that after-effects of the recession are at work here. Less money to spend on consultants, high overhead costs, philosophical differences. This one could be a real pot-boiler. Time will tell.

★★★

While I was browsing in a bookstore in downtown D.C. the other day, I picked up what has to be the strangest reference book



College was never like this...

I've ever seen: "The Cartoon Guide to Physics," by Larry Gonick and Art Huffman (published by HarperPerennial, for a reasonable 10 bucks).

All I could think of was, "What a perfect gift for a GM." Gonick and Huffman have broken down the subject into two parts: Mechanics, and Electricity and Magnetism. The Electricity and Magnetism section features chapters on capacitors, series and parallel circuits, AC and DC, inductors and more, presented in an easy to understand style with plenty of cartoon illustrations to make the concepts more memorable.

Well, it's not a college-level physics text, of course, but it's certainly not disposable, either. There's enough information in the book to give a layman a decent grounding in some basic principles—and it's not intimidating to grapple with.

The book is, as the saying goes, entertaining and informative. And it covers more ground than you'd expect. There's even a brief section on relativity, but that's neither here nor there (sorry about that).

Who knows, this book may help cure the "MEGO" ("My Eyes Glaze Over") syndrome some managers suffer when talk turns to technical topics. At least he may learn that a negative charge isn't something that shows up on his credit card statement.

That's it for now. Tune in next time,

*Alex*

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## Thanks, Pilot Tone

Dear RW,

Thank you for a very favorable review regarding my new format, AMplitude II™ in the March 11 *Pilot Tone* column! I would have written sooner but, I hadn't seen the article! Somehow my issue was lost in the mail. A young lady in your office was nice enough to send one, though, and I am very pleased with what I read!

I did know it was out, however, because I received calls of congratulations, comments and inquiry from New Jersey, Georgia and Michigan . . . so far.

I think you provided an objective and open-minded look/listen to the demo and I hope it can spur some operators to believe that AM is not dead!

Also note that WBUX owner (Network Broadcasting—a division of AmQuip) has authorized removal of two hours of "kitchen table" talk programming in mid-day. We are now solid format from 5:30 a.m. - 6:00 p.m., Monday through Friday. The other hours are handled by NESE satellite programming. There is still a lot of localization on the weekend.

It says a lot when the "boss" likes what he hears. Thank you for your support . . . I'll keep you informed.

J.R. Russ, President  
J.R. Russ Programming & Research  
Philadelphia, Pa.

## Set standards for EBS use

Dear RW,

After reading several letters and articles about the problems with the EBS system, I felt compelled to write this letter in response.

It would appear to me that the biggest problem with the EBS is the fact that there are no guidelines set among the broadcasters on what constitutes the use of EBS. Remember, EBS stands for *Emergency Broadcast System*. Some of the stations will set the EBS tones for only the most severe weather emergencies, while other stations will set the EBS tones for any minor weather situation. By the way, there was

not a federal activation when we went to war this past year. Isn't that what the system was designed around in the first place?

I feel that the first step to the "revamping" of the EBS is setting some standards among the broadcasters on when it should be used and not "crying wolf" too often.

Jon C. Hartmeyer, CE  
WCLT Radio Inc.  
Newark, Ohio

## LMAs good for the industry

Dear RW,

I have continued to read with great interest various articles regarding Local Marketing Agreements (LMAs), and the controversy surrounding them. I would like to offer my opinion. I absolutely believe that these agreements serve to benefit all those involved in such agreements as well as the broadcast industry itself.

First of all, an LMA serves to provide or at least potentially provide newly found revenues to those involved in such an agreement. For the station whose programming is being simulcast as part of the agreement with another station, it provides increased signal coverage, and in doing so makes it possible for that station to target new advertisers. For the other station it may provide new revenues otherwise unavailable without such an agreement.

This is particularly true in light of the fact that the FCC has continued to issue licenses for new stations, even in markets where advertising dollars are already tight and it is questionable whether or not the market can support another station. This poses the immediate question in such cases as to whether a new licensee will be able to find revenue and survive in an already crowded market.

In such cases an LMA may benefit such a station. In signing an LMA for some period of time—be it two, three or five years—the new licensee may be able to earn income from the agreement, and during that same time raise additional funds adequate for such time as the agreement expires and that station decides to originate its own programming.

If both of the stations involved are able to profit, then doesn't such an agreement benefit both parties and the industry as a whole? If we improve the "health" of individual stations through LMAs, we do the same for the industry. I for one hope that LMAs are here to stay.

Aaron Brodbar, CE  
WKJY(FM)  
Garden City, N.Y.

## Hot for Rush

Dear RW,

Just got around to reading your "Was it Hot or Was it Not?" column in the 1992 Radio World Directory. There was an obvious typo, or you've let your personal political bent cloud reality. For you to say that Larry King is hot and Rush Limbaugh is not . . . that had to be an error!

From an AM radio point of view, Rush is doing more to gain listenership on the AM band than any of the FCC "fixes" of the past five years. Take a trip to nearby Laurel, Md. and check out the ratings dur-

## Don't Delay RDS Standard

The NAB's decision to forestall a domestic radio data system (RDS) standard unless it includes a provision for AM is an ill-conceived notion that will impede the growth of this new technology for broadcasters.

Central to the issue is the RDS format coding function, with which receivers would be able to automatically scan and lock onto stations carrying a particular type of programming. According to the NAB, AM broadcasters believe the inclusion of the news/talk format code in RDS will give FM broadcasters an unfair advantage.

The NAB claims that receiver manufacturers have attempted to steamroll the RDS standard despite the NAB's desire to include AM in the system. The association also has said that technology exists now to accommodate AM broadcasters.

That simply is not the case. RDS technology employs 57 kHz subcarriers to deliver the format coding messages to receivers. At present there is no way to use subcarriers satisfactorily in AM broadcasting.

Also, the NAB's own example of AM format tuning technology—ID Logic—is inconsistent with RDS; it is a receiver-based, rather than broadcast-based technology. ID Logic is not an equivalent system for AM, and would make no sense in an RDS standard.

As for the NAB's claim that receiver manufacturers have pushed for the RDS standard over broadcasters' misgivings, that also is not the case. From the outset, some broadcasters have expressed a desire not to stand in the way of RDS in the U.S. They have been willing to add a provision for AM to the RDS standard if or when a suitable technology is developed.

The NAB's delaying tactic so close to the adoption of an RDS standard has, however, stirred emotions in the receiver industry. Some companies even have considered withdrawing support of the AMAX certification for improved AM radios to show their displeasure with the NAB's decision.

For the time being, it must be conceded that RDS is an enhancement of FM service—an enhancement that could give at least a part of the broadcasting industry a much-needed shot in the arm. When suitable technology is developed for AM, it can be incorporated into the standard.

NAB should re-examine their position because further delays over RDS will only keep this valuable technology out of reach of U.S. broadcasters.

—RW

ing the three hours that Rush is on—there are many AMs who triple their own successful morning drive numbers. There are others who only show up in Arbitron during the hours he is on. Some old line AMs are #1 in 25-54 in Rush's daypart, and are #7 to 10 in 25-54 in the other dayparts. He is definitely hot.

This is not to say I think Larry King is cold. He's a real pro (I've enjoyed seeing him do his radio show at several NABs), especially on CNN . . . but that's TV. This fall we'll get a chance to see how Rush does on that medium.

Look at the quote you chose to put in bold print from your *Pilot Tone* column in the March 11 issue: "Anything that shakes up the old thinking in AM programming is worth a listen."

Thanks for adding humor and a programmer's side to RW. I enjoy your input and look forward semi-monthly to reading it—even the technical columns I don't understand.

Bryan McIntyre  
Raleigh, N.C.

P.S.: FYI, I was VP/GM of WPTF(AM), 50 kW at 680 kHz for six and a half years. It sold for \$5 million in August, 1991 and the new owners brought in their own management team. I'm now working for Capitol Broadcasting's Durham Bulls Baseball Team.

## Telephone bulletin boards

Dear RW,

It was interesting to read the Nancy Reist stories about the Whole Earth 'Lectronic Link and KALW's bulletin board service (RW, March 11). System supporters are to be commended. However, these services are limited to a small number of users equipped with a modem, computer and an interest in the topics. The vast majority of any station's audience will never be part of bulletin board services and in my way of thinking that is a lost opportunity.

So how do you have an "exchange" with

this huge group? Use the most common "modem": the telephone.

It amazes me that radio broadcasters don't take advantage of the powerful audience building, money making potential of the telephone systems that are now available.

Interactive systems that permit a station to provide weather, scores, new headlines, lottery numbers, movie listings, classified, top 10 lists, request lines, sponsor information, copy exchanges, promotions, on line merchandising and credit card sales, fax back information and voice mail and polling, all on the same system, are up and running right now. And to think, all of this information can be sponsored on-line as a value added service by station clients that are clambering for better targeting and accountability.

To date the only groups to use this technology on a large scale are newspaper publishers. They see it as a way to survive in the '90s. As a radio broadcaster for 20 years, it seems to me there's something wrong when publishers embrace an electronic opportunity and broadcasters look the other way.

Leased access to systems that can provide services to a thousand callers at once are at peanut prices.

We'd be happy to help you find one.

Alex Dunn  
Omni Communications  
Proctor, Vt.

## Clarification

In the March 25 issue of RW, Smarts Broadcast Systems was inadvertently omitted from the story "Computer Automation Technology Matures." The company manufactures the Smartcaster digital audio system, as well as the Smartcart CD-based digital audio "cart machine."

For more information, contact Dave Potratz at Smarts: 800-747-6278.

# Radio World

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**Next Issue of  
Radio World  
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# STATION OWNERS TAKE ACTION AND PROFIT

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# East Meets West in Radio Broadcasting

## U.S. Firms Give The Maximum

by **Lucla Cobo**

**MOSCOW** The flagship station of what eventually is targeted to become the premiere radio network of the Commonwealth of Independent States, Radio Maximum, is on the air and broadcasting out of Pushkin Square in Moscow.

Radio Maximum, operating on 103.7 MHz, is the first Russian-American commercial radio venture. The station is equally owned by Moscow News, an independent weekly newspaper, and WHS International Inc. The three equal American partners of WHS are: station and net-

work operator and syndicator Westwood One; equipment manufacturer and distributor Harris Corp.; and syndicator StoryFirst Communications.

Radio Maximum went on the air in late December with a ploy worthy of any U.S. broadcaster—10 days of all Beatles music. The station began regular programming on Jan. 1, with a limited broadcast schedule.

Alexander Kasparov, group program director, says the all-Beatles stunt created a buzz on the streets about the station. When the station switched to its format, a blend of American and European rock, the audience was primed.

"We are basically playing American and European music," Kasparov said. "Once in a while, we will throw in some strong Russian songs. But we have a strict format. We don't play every piece of music we get our hands on."

continued on page 8 ►

## Russian Radio Faces Challenges

By **Alan Carter**

**MOSCOW** Now that the euphoria over broadcasting without government censorship and totalitarian control has worn off, reality is setting in for the newly formed Commonwealth of Independent States (CIS).

Essentially, these people are trying to establish broadcasting networks and corporations with the stroke of a pen—a

monumental if not impossible task, even by Western standards.

Anatoly Tupikin, director general for Radio in the Russian Federation, all too clearly knows what is ahead as officials, many of whom are old party bosses, debate the transition. Equal time versus free speech. Advertising in a society that does not understand the concept. Revenue versus expenditures.

continued on page 10 ►

## Radio Vox Takes Off in Romania

by **Lucla Cobo**

**IASI, Romania** Two years after its inception, Radio Vox-T Stereo FM stands as proof that the embers of entrepreneurship can be rekindled in the former communist bloc countries.

The station is one of "eight or 10" independently-owned radio stations in Romania, and the only one in the geographical region known as Moldavia. The FM station (on 72.1 MHz) went on the air March 13, 1990.

Unlike the other "free" radio stations, Radio Vox-T, according to the station's 22-year old program director, Iulian Bulucea, is owned by a group of 20 students—mostly engineering students. "The idea for this radio station came about in February 1990," Bulucea said, "and after obtaining necessary approvals, we began broadcasting in March."

The group went on the air using what



Iulian Bulucea

Bulucea termed "laboratory test equipment"—two reel-to-reel tape recorders and a microphone. The station's main source of income is advertising, and show and event sponsorship.

Radio Vox-T ordered new equipment last year—a transmitter, an exciter and an

continued on page 10 ►

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# U.S. Firms Give Moscow the Maximum

► continued from page 7

The programming decisions are based on market research and radio experience, according to Kasparov, with help from the U.S. and European music charts.

The station began broadcasting with a limited six-and-half hours per day. In April, Radio Maximum expanded to 12 hours per day, 7 a.m. to 9 a.m., and then 3 p.m. to midnight. The station will continually increase its programming to 24 hours a day.

Radio Maximum programs news and public affairs, as well as request shows. "Moscow in the Morning," a daily English-language morning news magazine, airs in

the 7-9 a.m. broadcast slot. The target audience for "Moscow in the Morning" is the foreign community, as the program consists of local and world news, business news

on the younger, more affluent part of the population. "Our target audience is people under the age of 30, who are economically above average, and who also have an

## Radio Maximum went on the air in late December with 10 days of all Beatles music.

from the West, weather, sports, entertainment, culture and human interest stories.

### A select audience

Bert Kleinman, president of WHS International, said the radio station has its eye

education level above the average, and who are somewhat oriented towards the West."

Because Radio Maximum is on a "West Band" frequency (between 80-108 MHz) listeners must have a receiver capable of tuning in those frequencies. Said Klein-

man, "Part of it has to do with who has the receivers, but part of it is that we are a commercial venture and as such we want to sell commercials. People who want to buy commercials have products to sell to people who have money."

Audience research and listener surveys are in the nascent stages in Russia. Radio Maximum is gauging its success by the number of phone calls the station gets from listeners ("an overabundance"), from general perception, and from whether advertisers have heard about the station before the sales staff makes a sales pitch to them.

"We know that this is going to be a long haul," Kleinman said. "And we are in it for the long haul—but initial results have just been spectacular." Spectacular, he said, to the degree that many advertisers have called the station to try to buy spots without ever having heard a sales pitch.

Kleinman believes the advertisers on radio in Moscow are far more sophisticated than in other media. "There is a lot of radio advertising going on now," he said. "Many firms have realized that, because

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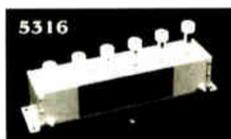


After

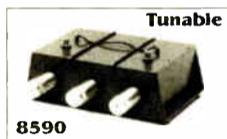


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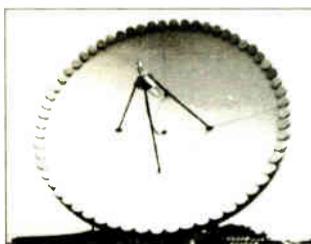
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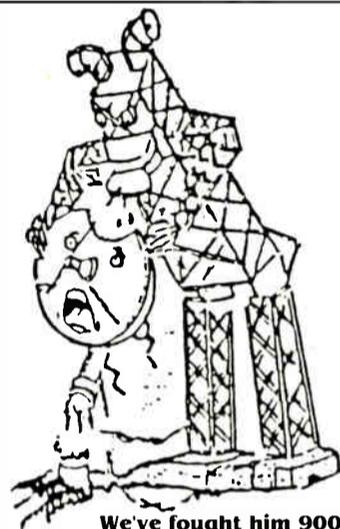
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Pictured left to right: Radio Maximum's director of English programming, Cami McCormick; Kleinman and Kasparov.

of the quick responsiveness of radio, it permits them to reach the audience they need very quickly."

### State of the art radio

And the station's audience is listening to music broadcast over some of the best equipment Harris Corp. has to offer. The studios are located in the Moscow News Building, and were constructed from the ground up by Harris. The company outfitted the studio with the latest digital and analog equipment, including CD and DAT equipment.

The non-Russian music library is comprised exclusively of TM Century Gold-Discs™ and TM Century's weekly Hit-Disc™ service.

As the station progresses, so too will the expertise of the group running Radio Maximum. Kleinman views the project as "one of the last radio frontiers in the world."

Radio Maximum, according to Kleinman, would like to be on the cutting edge of that frontier. "We have many, many more mountains to climb," he said. "But the initial results are very, very encouraging."

Down the road, the mountains include turning Radio Maximum into the "standard of quality and professionalism in that part of the world."

"From a purely business standpoint, we are looking to establish a network of radio stations in what once was the U.S.S.R.—a group which will be modeled on this radio station in Moscow," Kleinman said. "We are looking to develop the best and most professionally run radio station in Moscow, take that experience, and apply it to other markets around the former Soviet Union."

The venture partners expect to make money with the project, he added, but no one has set a specific dollar goal. The partners went in, he said, with the realization that the payoff could be a number of years down the road.



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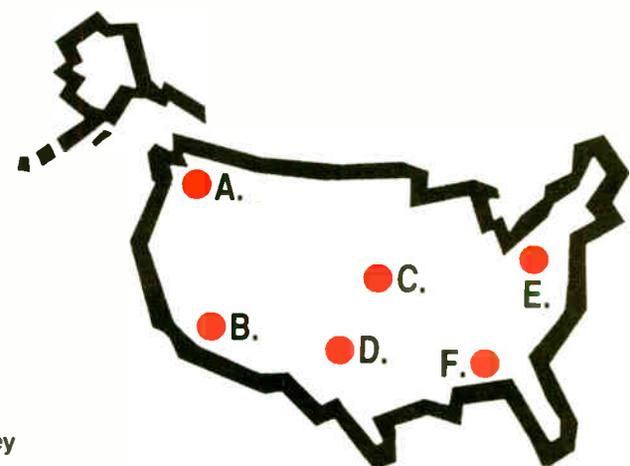
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# Fledgling Radio Vox Takes Off in Romania

► continued from page 7

antenna. The order was placed with the Electronic Research Institute in Romania, Bulucea said, but not all of the equipment has been delivered yet (total cost for the three pieces was roughly \$2,000 U.S.).

To date, although the station has made enough money to order equipment, it has not yet made enough money to pay the staff. The station continues to be staffed by volunteers, according to Bulucea.

"The problem is that no one gets paid at the radio station," he said, "We don't have enough money to pay our people, and

"We are somewhere between a college radio station and a commercial radio station."

**Radio Vox-T  
PD Iulian Bulucea**

we are searching for other sources of income."

As the retail and advertising base grows in Romania, however, so should the station. Even with its primitive equipment, it is on the air full-time. The station is heard for a radius of approximately 30 miles, according to Bulucea, and reaches roughly 300,000 listeners.

East Band receivers are widely available in Romania, Bulucea said, and the station is assigned to an "East Band" frequency. Allocations of FM stations on the East

Band are between 68 and 88 MHz. (West Band allocations are between 88 and 108 MHz). Radio Vox-T expects to be obliged to move to the West Band within five years.

Bulucea recently completed a "fact-finding and contact-making" trip to the U.S. He and his colleagues at Radio Vox-T have set their sights on the American way of broadcasting as the way to emulate. There is competition from the French, he said, as some of the other independents went on the air under the aegis of French investors. "We choose the American system," Bulucea said, "but we have to learn very much."

Radio Vox is programmed very differently from a U.S. radio station. The station tries to reach everybody, according to Bulucea. The mix is 70 percent youth-oriented music (American pop and rock and roll), plus 10 percent social problems and interviews, with the remaining a mix of news and entertainment programming.

"We are the only free radio station in that area," Bulucea said, "and we have to reach all people, all age groups." Currently Radio Vox-T sounds and is structured more like a college radio station, according to Bulucea. "We are somewhere between a college radio station and a commercial radio station. In one or two years, we will be a commercial radio station."

Part of Bulucea's mission in the U.S. was to look for investors for the station, or ideas for generating income. Bulucea is also looking for donations of any used broadcast equipment or programming sources.

The station uses mostly cassette tape decks, although it recently received a do-

nation of a CD player. If anyone is interested in donating to Radio Vox-T, they should contact Dr. Alice Johnson at the Case Western Reserve University at 216-368-6680, fax 216-368-8670.

"Our programming focus is on the U.S.A.," Bulucea said. "We are in desperate need of more programming—especially pop and rock libraries—they don't have to be new, or the most current ones, we will take anything."

The station would also like to retransmit

## Challenges for Russian Radio

► continued from page 7

"My country and my people are probably going through the hardest of times," he said. "I do believe we will overcome. I think it will be tough, and I think we will sustain some losses and casualties."

Tupikin was in Washington to attend the National Religious Broadcasters Association convention, where he discussed financial investments. Later, he explained that the old Soviet Union broadcast operations, including Gosteleradio, no longer exist.

The new All-Russian Television and Radio Co., part of what once was the Soviet broadcasting arm including Gosteleradio, must be self-supporting by the end of 1992, he explained—no more government funding.

The old broadcasting operation, the All-Russian Television and Radio Broadcasting

programming from VOA Europe, but the problem is that it has no satellite dish, he added.

The broadcast bug hit Bulucea in high school, he said. He began his career as a DJ, and hosts five different programs on Radio Vox-T, including: "Get Funky to the Beat," and "Top 33." He cited Prince as his favorite performer, and loves rhythm & blues and soul. The ages of Radio Vox-T staffers/owners span from 21 to 28. But only three of them are 27 or 28, Bulucea said, most of them are 22 or 23.

In addition, Bulucea said, over the coming months, Romania will see an increasing number of free stations go on the air.

Co. before the fall of the Soviet Union, will be divided into three separate entities with the property transferred to the new divisions.

All-Russian Television and Radio Co., named "Ostankino" after the section of Moscow in which the studios are located, covers the CIS.

A second operation is the Television and Radio Co. of Russia; it broadcasts domestically in the Russian Federation. The third entity, recently sanctioned by Russian President Boris Yeltsin, is the TV and Radio Co. of St. Petersburg. This latter company will be owned by the state and employees.

Ostankino also will be a joint-stock company, with 51 percent of the stock held by employees. The remaining will be sold to investors, both domestic and international.

Russia and the CIS are still in a state of economic and political unrest. But Tupikin said he has faith in the new system that is being established. "The democratic trend will prevail," he said, "and I think the investments will be safe."

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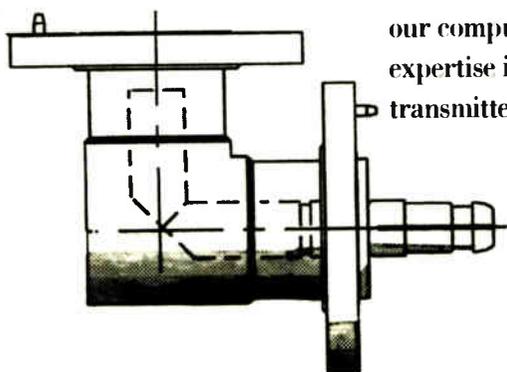
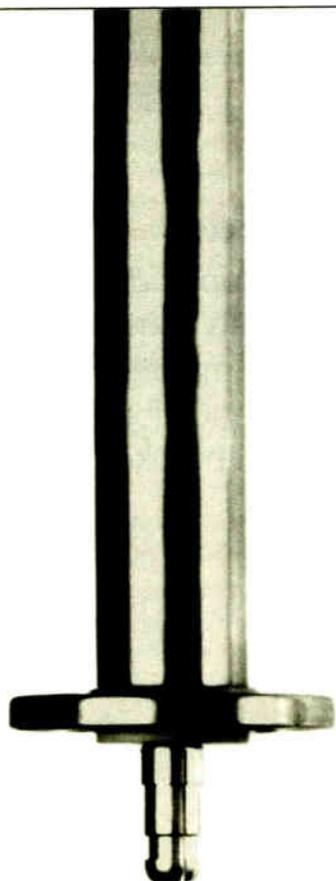
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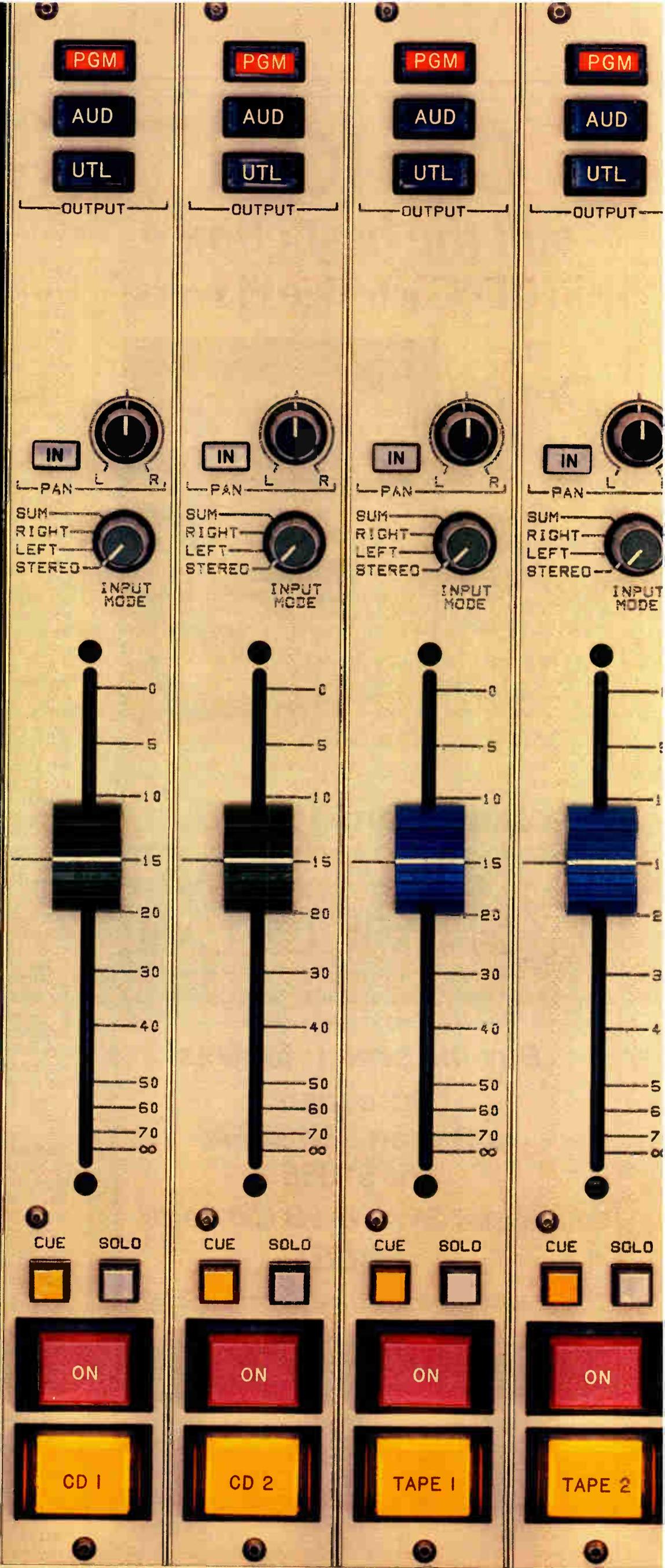
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## FCC Lifts AM Station Freeze

► continued from page 1

markers that operate in that band be made a federal offense.

Edward Schober, president of Radiotechniques, maintained that the FCC failed to consider three points regarding migration to the expanded band of existing stations.

All Class II-S and Class III-S stations enter the 25 percent exclusion RSS of some stations, he noted. In priority ranking of these stations for migration, some nighttime improvement factor credit must be assigned, according to Schober.

Schober also maintained that special consideration must be given to stations that immediately migrate to the expanded band and surrender their licenses. Stations that immediately cease operations "will alleviate interference immediately, not five years in the future," he maintained. Such stations therefore should be given first access to channels 1610 kHz and 1620 kHz, according to Schober.

Finally, the Schober filing pointed out that present stations on 1590 kHz and 1600 kHz "preclude new operations on 1610 kHz and 1620 kHz in those markets." He recommended that special consideration for migration be granted to those stations, as well.

A non-technical position regarding migration to the expanded band was put forward in a joint filing by the NAACP and the National Black Media Coalition (NAACP/NMBC). The filing contends that "at a minimum, some reasoned articulation and balancing of the needs of minorities vis a vis the needs of incumbents should have been contained in the Report and Order."

The filing proposed a system in which incumbents would be permitted a preference for the most desirable spots on the expanded band providing they sold their existing band stations to a minority broadcaster. Under the proposal, the minority broadcaster would then be eligible to receive its own spot on the expanded band.

The NAB responded to the NAACP/NMBC filing, saying that "while NAB shares many of the goals advanced by the NAACP, it is our view that AM interference-reduction is the paramount goal in the instant proceeding." Adoption of the NAACP/NMBC plan "would cut in half the interference-reduction potential of migrating AM licensees to the expanded band."

### Radiation ratchet rebuke

The consulting firm of du Treil, Lunding & Rackley (dLR) opposed the 10 percent reduction in radiation for stations planning facility upgrades—the so-called "ratchet" provision. The company said that the most viable AM stations have been on the air for decades. They also have the oldest facilities and will likely be forced to make changes to their aging antenna systems.

"It is unreasonable to require these stations to forego their radiation rights and reduce radiation by 10 percent, as a disproportionate number will be affected," dLR said. The rule will "dissuade AM stations from seeking improvement, as well as from potentially reaping helpful financial benefits through site relocation and diplexing."

The engineering firm of Lahm, Suffa & Cavell (LSC) also opposed the ratchet provision. "Service losses resulting from the application of this rule may outweigh service gains arising from interference reduc-

tion," the company said.

The consulting firm of Cohen, Dippell & Everist (CDE) also agreed that the ratchet provision should be modified. The firm also proposed to make the 1 mV/m contour the protected contour for AM, a position agreed to by dLR.

### TIS stations considered

One of the most contentious issues among the petitions for reconsideration was what should be done regarding Travelers Information Service (TIS) stations. The FCC had proposed that such stations be given secondary authorizations throughout the AM band.

In its petition, however, the NAB urged that "TIS stations should not be allowed free rein on the AM band." Maintaining that such stations have "no incentive to ... be significantly concerned over broadcast quality audio," the NAB requested that TIS stations continue to be assigned to 530 kHz and to make assignments on 1710 kHz.

The FCC's proposal also was opposed by the National Telecommunications and Information Administration (NTIA), but for different reasons. According to the NTIA, the FCC had overstepped its authority in its TIS decision. The filing urged "further coordination with NTIA on appropriate frequency allocations for future TIS operations."

NTIA said "specific nationwide frequency assignments in the AM broadcast band should be designated for TIS operations." There is a "continued and pressing need for dedicated frequencies to support the development of long-term solutions to highway safety and traffic problems," according to the filing.

Primary allocations for TIS stations was a position echoed in comments filed by the American Association of State Highway and Transportation Officials, and the Illinois and Maryland departments of transportation.

The CDE filing, however, called for tighter frequency tolerances for TIS stations, making them subject to the same technical standards as full service stations.

Two other key points were raised in petitions: radiation limits toward the Bahamas and the Dominican Republic, and the FCC's antenna efficiency requirements.

Regarding radiation limitations toward the Bahamas and the Dominican Republic, dLR believed the issue should be handled on a case-by-case basis. The firm cited an agreement from which the U.S. is attempting to extricate itself ("NARBA"), under which stations may not exceed levels produced by an omnidirectional antenna with transmitted power of 5 kW. To encourage station improvements affected by NARBA, a policy should be articulated by the FCC for the handling of power requests in excess of the 5 kW limit, dLR said.

LSC also was concerned that the present wording of NARBA "could be applied to require substantial radiation reductions by U.S. stations toward the Bahamas and the Dominican Republic in the event those stations make changes in facilities."

Also contended by dLR was the FCC's antenna efficiency requirements, which dLR said "will stifle implementation of practical antennas."

"A station, regardless of class, should be free to use a less tall or less efficient antenna when the price to be paid is only more transmitter power," according to dLR.

# Engineers Laud Speed of System One

by Pamela Watkins

**LOS ANGELES** When DSP (digital signal processing) and the new FASTtest software were added to Audio Precision's System One in 1991, standard tests could be performed in a half-second to a second, rather than in minutes.

During a recent Los Angeles SBE chapter meeting, Audio Precision demonstrated the capabilities of the system for use in broadcasting.

System One is a modular test set that was introduced in 1985 and has both analog and digital stimulus and measurement modules. With the DSP option added to System One, more audio testing programs are available, such as loudspeaker testing, spectrum analysis via FFT (Fast Fourier Transform) and the FASTtest module, said Mike Hogue, Audio Precision's Western Region manufacturing representative.

Since DSP is new and FASTtest software only recently added, they have not yet saturated the market, according to Audio Precision, but the products virtues are becoming well known—especially on the West Coast.

"The potential market is there," Hogue said, "DSP and the FASTtest have generated a great deal of excitement."

KCRW-FM CE John Huntley said his Santa Monica NPR station has benefited immensely from the System One. "The primary reason for our having Audio Precision over (any other product) is that it saves time," Huntley said.

Such tests as wow and flutter can quickly highlight problems with tape machines before they break down, he noted. Recently, KCRW added the DSP option to its studio

System One box. Huntley said, "I see the use of FASTtest in day-to-day testing of the machines. Anything that we can set up to do a very quick check on things will save us time. Granted we're non-commercial, but in most cases, it will save us money. FASTtest is just a better use of what resources we have. If it keeps our product and our quality up, then that's something worth chasing down."

To get the speed of the FASTtest, a station first needs System One. If the station already has the system, it must be retrofitted with the DSP option. The user just needs to send the System One box back to

the factory where the FASTtest software is added as part of the package.

The important aspect of FASTtest is the quick and easy way it tests signal tones without a significant interruption in programming, users of the systems noted. The old method of testing tones for distortion and noise usually occur late at night when the station could schedule an interruption in its on-air programming. In the past, each signal was tested sequentially, requiring seconds or minutes per test, which resulted in a significant amount of dead air. The number of seconds or minutes of dead air was deter-

mined by the number of signals tested.

However, with the advent of FASTtest, up to 100 signals (30 is common) can be generated and received at the same time, and analyzed at another time, resulting in a program interruption of only a half-second to a second.

"Instead of dwelling on a given tone for a half-second or one second, one test after another, the tester can now key in and send out all 30 signals simultaneously," said Tom Mitner, sales and marketing director of Audio Precision.

"FASTtest is somewhat musical—that is, it is no more unmusical than, say, a time tone. And you only have to interrupt the program for about a half-second or a second; then you can post the process, getting all the information for later analysis from the one signal."

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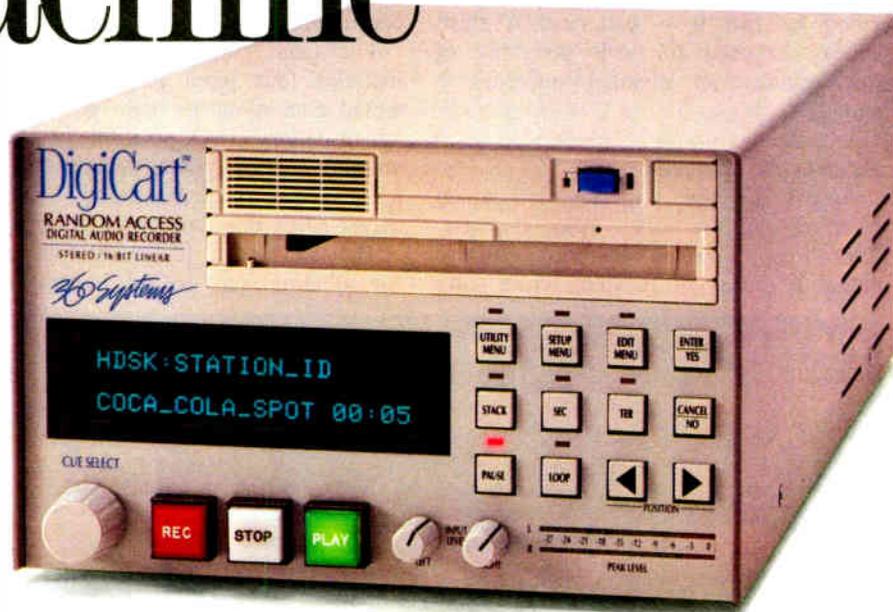
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# Tapes Outline Studio Skills

by Frank Beacham

**COLUMBIA, Mo.** Today, radio engineers are trained with the goal of bringing the best sound possible to the listener. But in an earlier age—when dramatic programming was radio's mainstay—one of the engineer's greatest skills was degrading sound quality in order to effectively tell a story.

In radio's "golden age," the engineer was like an actor, combining technical skills and creative talent to contribute to the storytelling process. A key task of the modern radio drama director is to re-train engineers to accept and encourage imperfect recordings that sound as if they were made away from a studio.

That observation and hundreds of others are highlighted and discussed in a new series of six audiocassettes on radio production from the Midwest Radio Theatre Workshop of Columbia, Missouri. Though these tapes focus on the production skills needed to make effective modern radio drama, the subject matter is universal and the knowledge is essential for anyone wanting to produce compelling radio programs or commercials.

Timeless observations and insights come from a parade of radio directors, producers and technical experts who have appeared over the past 10 years at the annual Midwest Radio Theatre Workshops. This best-of audiocassette series is broken down into six  
continued on page 14 ►

## STATION SKETCHES

# Souping Up the Ramko PM-42 Mixer

by Tom Vernon

**HARRISBURG, Pa.** In this month's *Station Sketches*, I'll peek under the cover of the Ramko PM-42 remote mixer. I'll look at some of its features, and discuss modifications that make it especially nifty.

This mixer is contained in a sturdy 2½"×5½"×7" aluminum case and weighs 2½ pounds. All front panel knobs are metal and secured with set-screws. Removal of two thumbscrews allows

the unit to be removed from the case for service and battery replacement.

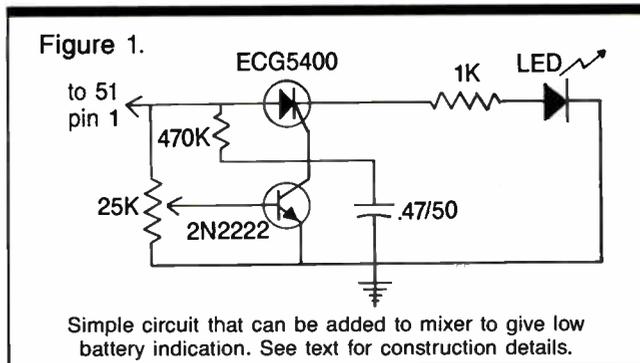
A belt clip and leather shoulder strap are provided with the PM-42, and a well-constructed all-leather carrying case is available as an option. Power is provided by two 9 V batteries. A third battery is used for A-B powering of microphones on channel numbers 1 and 2.

## Access to power

Access to the batteries is gained by removing the mixer from its case. Two fresh alkaline batteries provide about 10 hours of service, while fully

charged NiCads yield approximately 3½ hours. A switchable limiter will hold the output to +7 dBm, or may be switched out of the circuit.

A built-in intercom can be used simul-



aneously with the mixer. For remote talkback applications, the incoming source is routed into one of the mixer's four inputs. That input is then placed in cue, and the incoming signal mixes into the headphone amp for two-way communications.

The front panel is uncluttered, and includes four input pots, all with detented cue, a master gain pot with detented battery check position, headphone volume control, power switch, flashing LED power indicator, and a screwdriver-adjustable cue level control.

The VU meter has additional scales for alkaline and NiCad battery hours

left, and a tone switch. A 1 kHz line tone and 400 Hz slate tone (momentary) feed directly into the mixer bus, and are controlled by a master gain pot.

All input/output connectors are located on the rear panel. This includes the dual low impedance XLR output connectors, four input connectors, mic/line input switches for channels 1 and 2, and phone jacks for intercom in/out and

headphones.

The circuitry is contained on two double-sided PC boards, which are interconnected with a short section of ribbon cable. All ICs are mounted on sockets. Controls are PC-mounted AB mod pots, which may be opened up for a squirt of cleaner, should they become noisy.

## Conventional designs

Most of the circuits are a conventional opamp design, with LM 833s used as preamps and LF 353s in all other applications. Channels 1 and 2 are switch-selectable for dynamic, phantom

continued on next page ►

# Tapes Outline Studio Skills

► continued from page 13

tapes: Director as Producer; Getting Organized; Musical Integration; Special Voices and Accents; Writing for Radio; Directing: Working with Actors; and Acting for Radio.

Produced by Brian Price, the tapes include a wealth of hard to find information and advice for beginning and mid-level radio production personnel and aspiring sound artists. For example, the "Director as Producer" tape has an excellent section demonstrating the way various pieces of production equipment shape sound. The aural effects of gates, compressors, limiters, reverb, equalizers and stereo effects are effectively compared. Similarly, in the "Music Integration" tape, the uses of themes, stings, tags, bridges and other musical effects are explored.

By using a rapid-fire format of short, related sound bites from several speakers on a single subject, Price overcomes the unevenness in audio quality of conference recordings throughout the years. He creates a potent, plain-language presentation of important craft topics rarely discussed at commercial broadcast forums.

The enthusiastic speakers, which include such radio programming and production luminaries as David Ossman, Tom Lopez, Marjorie Van Haltern, Skip Pizzi, Jane Pipik and Norman Jayo, all emphasize the power and effect of the human voice on the medium of radio.

Tom Lopez, president of the ZBS Foun-

ation and one of America's top radio drama producers, noted his initial shock of hearing American street lingo after having lived in Europe for a while. "Americans speak like teenagers . . . with a lot of energy," Lopez said. "That's what we have in our radio, particularly commercial radio. We communicate with the energy of words."

With the knowledge that the emotional content of words is so important, Lopez urged radio writers to choose words for the way they sound and to harness that emotional energy in creating scripts for the medium. "The mistake of most young writers is that their characters say what they think," Lopez said. "I have yet to meet anyone who says what he really thinks."

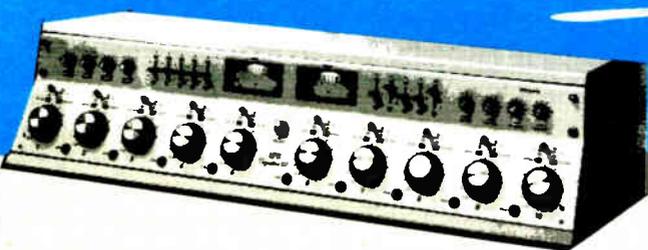
Marjorie Van Haltern, executive producer of the "Radio Stage" drama series on New York's WNYC, urged producers to treat radio as a "one-on-one" experience with the audience. "Even if it is a group of people in a room listening to radio, it's still a private experience," she said. "That carries with it certain privileges. It carries with it a certain kind of access to the psychology of the person listening."

The great artistic and technical challenges of radio are to use sound in innovative ways to tell a story, all the panelists agreed.

The tapes are \$9 each or \$44 for the entire set of six.

To order tapes or for workshop information, contact Diane Huneke at MRTW, 915 E. Broadway, Columbia, MO 65201; or phone 314-874-1139.

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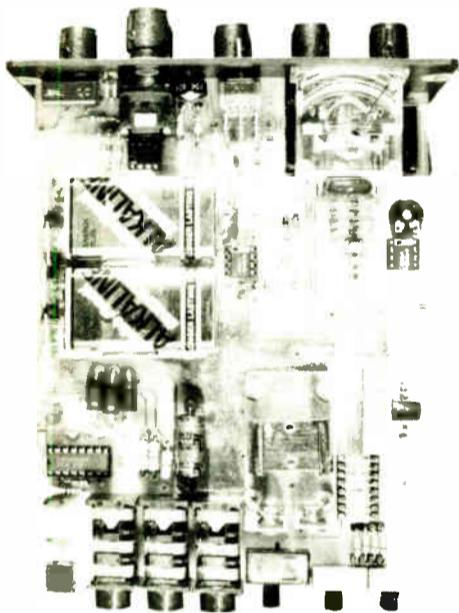
# Souping Up the Ramko PM-42 Remote Mixer

► continued from previous page  
or A-B type microphones. Input levels on all channels may be easily modified by changing the socket-mounted gain select resistors.

A CA 4049 is employed as a CMOS switching charger when the optional NiCad batteries are used. The Primus PM-42 comes with a 23-page instruction manual. Contained in it are specifications, drawings of the front and rear panels with numbered references to all features, a page of operating instructions, and drawings showing case removal and battery placement.

The schematic is clearly organized and includes component values and designations. Component location diagrams for the upper and lower PC boards are included, along with a parts list. The operating instructions are clearly written, but intended for engineering types. They would not be easily understood by non-technical personnel.

There is one fuzzy point—the manual



Upper PC board of Ramko Primus PM-42 mixer. Note IC and ceramic caps to the right of batteries may be easily dislodged when they're removed. See text for modifications to circuit board.

states that the NiCads should be recharged overnight. A call to Ramko reveals that the minimum recommended time is 14 hours.

## Premature failure

Our PM-42 was used for about six months for sports remotes. Early in the season we experienced some problems with premature battery failure during the games, and this was traced to the charger jack configuration.

Customer service via Ramko's 800 number for help with this problem was swift and courteous. Operator response to the mixer was positive, and once the charger problem was taken care of, we had no difficulties for the remainder of the season.

To test for RF susceptibility, the mixer was taken out to a 1 kW transmitter site and operated about 500 feet from the tower with 20 feet of microphone cord. Listening through headphones revealed no signs of interfering RF.

The PM-42 is a good mixer right out of the box, but a few simple modifications can

make it even better. All of these changes can be made in about four hours. The first modification that you should make is to the battery charger circuit. As it comes from the factory, the outer ring of the charger jack is positive.

Because the case is at ground potential,

**The PM-42 is a good mixer right out of the box, but a few simple modifications can make it even better.**

there's a possibility of short-circuiting the charger if paint gets worn off the hole in the rear of the chassis. Later production models of this mixer have a larger hole. A more substantial fix for the problem is to cut the foil traces to the charger jack and install jumper wires to reverse the polarity. Then, remember to change the polarity switch on the charger.

## Discourage tampering

Speaking of which, it's wise to cover up the polarity and voltage switches on this unit to discourage tampering by your station's knob twiddlers. If you're planning to run your mixer directly into the phone lines, it's necessary to provide some sort of DC isolation, because the PM-42's dual low impedance outputs are transformerless—100  $\mu$ F 50 V electrolytics in series with R83 and 87 will do nicely. Try to use non-polarized caps if you can find them.

Unless you possess a fair amount of mechanical dexterity, changing the batteries in the field can be a traumatic experience. Components near the battery clips are vulnerable to breakage when the batteries suddenly snap out of place, and the tone generator IC may also become dislodged.

C17 and 18 may be removed from the top of the board and soldered to the bottom. U3 may be soldered directly to the circuit board. The dual NiCad/Alkaline "battery hours left" markings above the VU scale are fairly accurate, but having to put the mixer "off air" by clicking down the master gain pot to check batteries is awkward.

My solution was to construct a low voltage indicator on a scrap of perf board, with the LED positioned to shine through the plastic VU meter case (see Figure 1).

Audio purists may find the presence of ceramic disc capacitors objectionable, but with the mixer's published specs, this would only be an issue if it were to be used for concert music broadcasts.

The two small thumbscrews which secure the mixer to the case can be easily lost. The mechanically inclined engineer may opt to remove the threaded rods from the case and install some sort of captive thumbscrews.

The PM-42 delivers features and reliable performance in a very small package. The modifications described here are a good jumping off point for tweaking it to perfection.

□ □ □

*Editor's note: After-market modifications to equipment may in some cases void a warranty. Consult with the manufacturer before attempting any such modifications.*

*Tom Vernon divides his time between consulting and completion of a Ph.D. He can be reached at 717-367-5595.*

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I would appreciate you passing my personal thanks on to Bill, and of course a very Happy New Year to you and everyone at Continental.

Best regards,  
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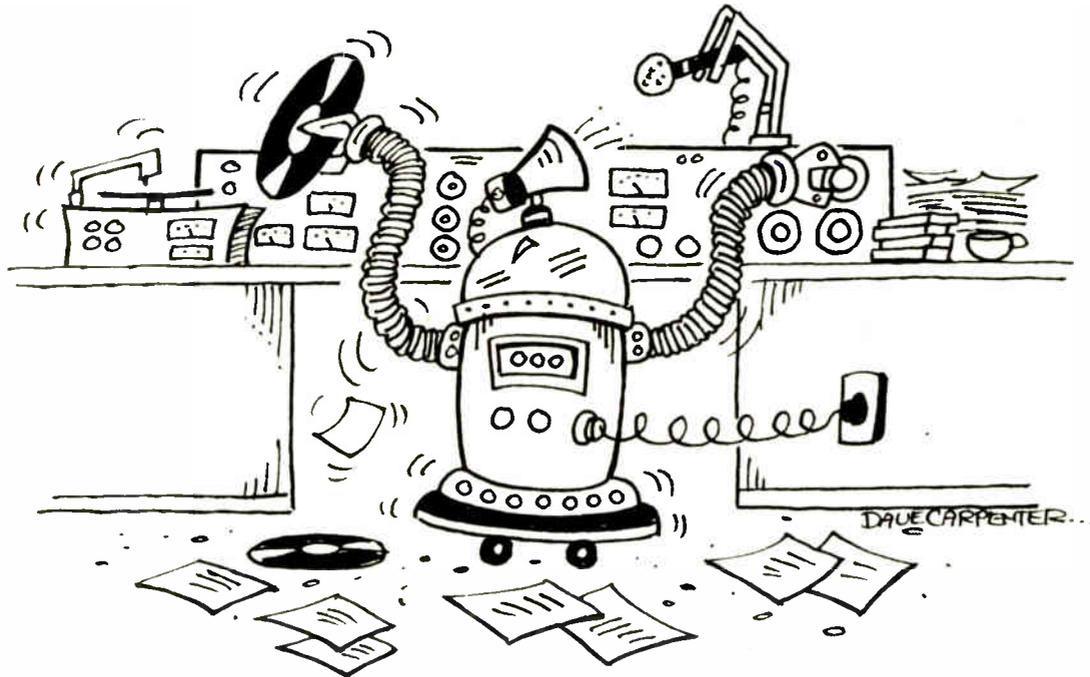
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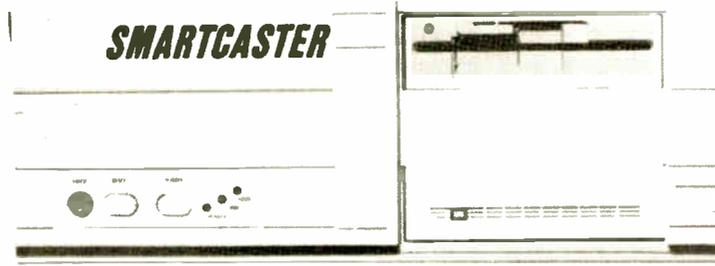
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World Radio History

## KEYBOARD CONNECTION

# WYSIWYG Software for High- and Low-End Use

by Barry Mishkind

**TUCSON, Ariz.** The computer industry continues to change faster than anyone thought possible. Just 15 years ago, the Radio Shack TRS-80 debuted amid applause and derision. For under \$1,000, you got the equivalent of a computer that 10 years earlier cost multi-millions of dollars: four kilobytes of RAM and tape cassette file storage.

Today, \$1,000 will get you a 80386SX computer with color monitor, two megabytes of RAM and a 40 megabyte hard drive. What a difference.

Software has been evolving equally quickly. That's especially true for word processors. The high end programs now handle everything from memos to desktop publishing of sales brochures. Competition is strong, and programs keep leapfrogging one another with newer and newer features.

Perhaps the foremost advance is in the display. Instead of merely showing the characters you've typed, it's now possible to see the exact fonts you've chosen and the way they'll look when printed on the page. This is known by the acronym "WYSIWYG," or "What You See Is What You Get."

Programs with WYSIWYG allow you to design forms and letters as you go, reducing the time it takes to go from idea to execution. This also cuts the learning curve, since you don't have to learn two programs to do a job.

The downside is higher cost. And to be sure, feature overkill can provide you with so many options that the result, many times, is confusion and wasted effort. Here are some hints on picking the best program for your use.

## DOS or GUI

The primary choice you must make is whether to buy a DOS program or a GUI program. DOS, or Disk Operating System, is the basic system any computer has in order to run. GUI (pronounced GOO-ee), or Graphical User Interface programs are more complex and require more horsepower from the computer. One of the most widely known GUIs is Microsoft Windows™, with its latest version, 3.1, released in March.

The major difference between the two is that with DOS, (using Word Perfect™ or WordStar™), you write using the standard character display that your computer has, and then "preview" the document to see how it will look when printed.

GUI word processors, like Microsoft Word For Windows™ or Lotus' Ami Pro™ generally give you a WYSIWYG view at all times. GUI programs require more memory in your system, and a lot more hard disk space. So, if your computer has only 640K RAM and a 10 megabyte (MB) hard drive, you'll either have to upgrade or use a DOS word processor.

## Not perfect yet

Recently, some makers have tried to bridge the gap and provide alternate versions of the same program. Unfortunately, the programs are being brought out so fast that virtually all have dis-

played annoying "bugs" or glitches.

To be sure, a GUI word processor isn't mandatory. Most people get along quite well without one, and produce perfect documents. Yet, if desktop publishing is your aim, not using a GUI processor is like running a race with a pebble in your shoe: You can do it, but it isn't fun.

It's hard to go wrong with any of the programs. Features like spell checker, thesaurus, mail merge, undo, etc. are standard. Some now bundle grammar checkers and/or support for modem and fax connections.

WordStar has been a favorite for years (many technical types grew up with it and won't learn anything else). Now in version 7, WordStar has virtually every feature you might desire for business documents.

Market leader Word Perfect is taught in many schools. With its 800 number customer support (complete with *live* disk jockeys who count down your waiting time while on hold), Word Perfect 5.1 has a well-deserved legion of loyal users.

Both now make a Windows version 1.0, with some interesting features designed to set them apart from the crowd. However, some users report the new features don't compensate for their comfort level with the older command structure, and they stay with the DOS version.

## Pick of the lot

Word for Windows and Ami Pro, both in version 2.0, are the pick of the GUI programs.

Ami Pro was the first word processor to provide customizable icons on the screen, a sort of visual macro that you click on to perform a short cut to any function you need. Graphics and layout handling are strong points. Ami Pro also has a superior style sheet feature, and E-mail integration.

For superior text editing, Word For Windows is the winner. Its "drag and drop" approach to editing shines as a really useful feature. If you're copying from other documents, the ability to open up to nine windows saves lots of time.

Word for Windows also has the best spell checker, and it seems to mate just a little better with Windows, especially when linking data with other programs like the Excel™ spreadsheet.

## Virus update

March 6 came and left a number of users without their hard drive files. While the media went crazy and has been accused of Michelangelo overkill, the problem of damage from viruses continues to worry people all over the world.

XTree Company has joined the providers of anti-viral software with two products, ViruSafe™ and AllSafe™, the latter including access control and security features. We'll be taking a more complete and updated look at viruses and anti-viral programs in this space next time.

□□□

Barry Mishkind, aka RW's "Eclectic Engineer," is a consultant in Tucson, Ariz. He can be reached at 602-296-3797, or 70631-116 on CompuServe, or "barry@coyote.datalog.com" on Internet.

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## PRODUCER'S FILE

# Take the Plunge into MIDI Technology

by Ty Ford

**BALTIMORE** "Who do they think they are? Who do they think I am?" I shouted at the windshield as my mother drove me back from my first day in seventh grade. We hadn't even started classes yet and I already had my first homework assignment. "How the hell do they expect me to do this?" I whined, holding up my first Latin book.

This sort of thing has happened to me a number of times since then, like 30 years later when I first started to work with computers. Sure I took the easy road and geared

up with Macintosh instead of DOS, but I have a bad short-term memory for things like colons and backslashes. This time, however, as I stumbled up the learning slope, I recognized my emotions for what they were: "learning anxiety."

## Catching on to MIDI

What's all of this got to do with production? Plenty, especially when it comes to Musical Instrument Digital Interface (MIDI). Although there has been a lot of progress among developers and manufacturers, there's still a lot of room for improvement. MIDI is growing like crab grass.

In addition to its use with keyboards and synthesizers, it's become a handy machine language for controlling lighting boards, sound systems and console automation. MIDI also can be used to trigger program and parameter changes in some of the more recent reverb and delay boxes.

If you already have something like the Eventide UltraHarmonizer with a sampler card, you can play, layer or pitch change your samples using the MIDI keyboard. Hear me now and believe me later, if you plan on doing production for a living, you better start getting into MIDI *now*.

This means guaranteeing that you will spend a certain amount of your time in what those of us who have made the commitment call "MIDI Hell," or at the very least, "MIDI Purgatory."

It's a long-term commitment. Hopefully

the market will chill out enough so that somebody will start writing macro programs that will make MIDI more friendly. Until then, there is no other way.

Before you make that commitment, you need to know what you'll need and how much

productions on separate disks.

After comparing prices, I bought the MMT-8 because it was relatively cheap and because the better MIDI software packages alone cost more than \$300, without the computer. If you have a spare computer lying around, you can get sequencer software and a MIDI interface box or card and use the computer as a sequencer.

At most radio station's bottom lines, which is that place where you and the person who signs the checks seldom agree, your request

**Learning MIDI is a lot like eating an elephant. Although the task sounds impossible at first, it can be done one bite (or byte) at a time.**

it will cost. Keyboards run from \$600 to \$3,000. The more expensive ones often include sequencers. A sequencer and a MIDI recorder are the same.

A MIDI recorder records performance data—like how hard, how fast and how long you depressed any of the keys on the keyboard, and what sound you were using at the time. The main advantage to MIDI is that very large compositions require very little disk space compared to the amount required by digital audio.

If you want to be able to record and play back MIDI music, you need a sequencer. If you like the price and sounds of a keyboard that doesn't have a built-in sequencer, you can always get a stand-alone sequencer. I use the Alesis MMT-8 (\$300) and have recently added a diskette drive (\$375) which lets me save MIDI data of my

for a bunch of gear that you don't really know how to operate, much less actually play, is not likely to get approved. Try working out a trade deal with a local music store.

## Make your own music

The real argument for MIDI toys is that you can create music and effects that are totally exclusive, and later develop a very sophisticated automation system for your studio. Even though I neither read nor write music, learning to play the synth wasn't as difficult as I had expected. OK, I've been playing guitar by ear since I was 16.

My keyboard knowledge was limited to knowing how to make all of the major, minor and seventh triad (three note) chords, but knowing them and being able to play them are two different things. I learned that as long as I stayed on the black keys (the pentatonic mode), everything sounded OK.

Staying on the white keys also works. It's when you mix the two that you really have to know what you're doing. I know this sounds overly simple, but trust me *it works*.

My first keyboard was a Roland Apha Juno I, a pretty low end (\$650) analog synth. I also got a Yamaha drum machine (\$400). Because I'm not a drummer, I chose a drum machine that had preset patterns.

At first, I just assembled the patterns to make the drum beds. As I learned, I used the

► continued on page 21

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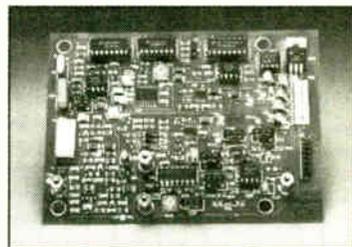
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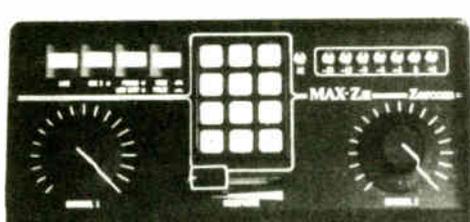
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# FROM THE TRENCHES

by Alan Peterson



## WLAD Gets New Studio

Dear Alex,

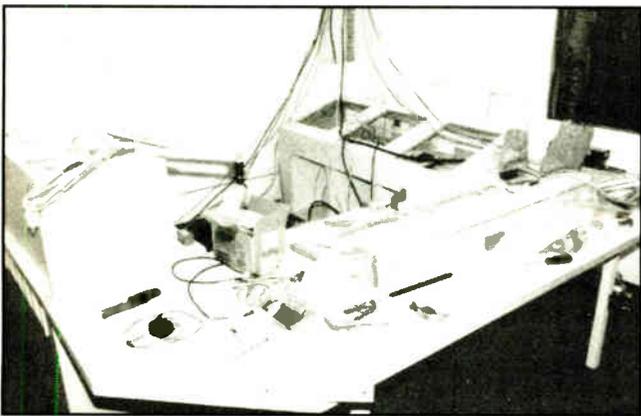
A couple of months back, when I wrote you about the volume pot on WLAD's main console (RW Feb. 19, "There's More to Loudness"), I recall telling you that we were pretty much set on the construction of our new studio. On paper it looked terrific. As I'll be telling you between now and late May,

and Business Radio Network, and tape-delays the Dr. Dean Edell show out of California, our old twelve-potter suddenly became quite small. Add to this the other demands of a full-service station (news, music, traffic, phoners), and the decision was made by the corporation to spring for the Pacific RMX-28.

Location was no hassle for our new AM studio—we had a fairly sizable conference studio just begging for conversion. The question became how to configure the new room.

Before one single cart was moved around, our CE Tom Osenkowsky (also an RW contributor) made a point of asking all the AM staff "How do you want it?" Alex, out of three other conversions I've been in on, this is the first time I got asked that question. And *what* a question to pose!

What a delight to hobnob with the whole airstaff and flesh out what we wanted in a studio instead of living with whatever got shipped to us. Almost immediately we all be-



Design-by-committee will make the new WLAD-AM studio friendly for talent and board ops ...

it's looking darn good in person, too.

To begin with, we found out just how quickly you can run out of inputs to a console. Since WLAD is an affiliate of both Mutual

## Take the Plunge into MIDI

► continued from page 18

feature that allows you to copy a preset drum part and add to it to make a new one. My final step with this first configuration was to create my own drum sequences.

One night, I plugged the drum machine "MIDI out" into the synthesizer "MIDI in" and played some drum sequences. My drum sequences not only "played" the drum sounds, but also the synthesizer. I then mixed the drum and synth audio to make some really neat beds.

### Train yourself

Using a drum machine with preset patterns is like doing music with training wheels. Many people actually think they have a good sense of timing, until they try to play a drum machine in real time. When you hear how "off" you are, you begin to appreciate the talent it takes to do the job right.

Fortunately for those of us who don't have crystal clock implants, there is quantization. Most sequencers have quantization programs that correct timing errors. You play a sloppy part, hit the quantizer button and *bingo-bongo* you're on time.

In the search for your first keyboard it's important to spend some time in a music store listening to sounds and finding out what various keyboards can do. Some keyboards play only one sound at a time.

Others, like the Roland U-20 (\$1,400) I am currently using, allow you to hear six different music parts plus drums, providing you record one sound at a time with a sequencer. Incidentally, I chose the U-20 because it was

relatively easy to work and had good sounds, especially the electric guitar and sax sounds. There were other more expensive keyboards that sounded a little better, but they were more difficult to use.

If you are proficient on guitar or woodwinds, there are interfaces that let you use guitar and wind-blown controllers to make MIDI sounds. One of the neatest products at this year's AES show in New York was a MIDI pickup that straps to your throat. As you speak, sing, grunt, hum or belch, it converts the impulses to a MIDI note number that can be connected to any MIDI sound, including drums.

Learning MIDI is a lot like eating an elephant. Although the task sounds impossible at first, it can be done one bite (or byte) at a time.

□□□

Ty Ford may be reached at his beta test site studio at 410-889-6201, via MCI Mail 347-6635 or America Online (Tford).

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gan imagining the layout of our dreams.

Our eventual design was based a lot on simplistic ergonomics (spread your arms out and say, "right here is good") and existing technical limitations. Since a pile of money went into the Pacific board, we were committed to getting the room done as we wanted, as inexpensively as we could without being cheap.

So rather than blow more cash on extra satellite coax, we placed the cabinetry for the Scientific Atlanta receiver to have the shortest possible run with the existing line.

We needed to widen one studio window



... although it took deft moments of diplomacy for everyone to agree on everything.

and shorten the other to improve line of sight all around. So we had a carpenter simply frame things up and we swapped panes (have you priced plate glass lately?).

AM host and talk moderator Pete Summers suggested guest positions within sightlines over the console. Until now, he's had to view in-studio guests peripherally or contort his head to talk with them. Wish I made the money his chiropractor does.

All of the cabinetry was made locally to Tom's specs, based on the decisions agreed upon by all the staff. Well, almost (see photo).

Again, much of the expense is being spared by the staff of WLAD, as we're all taking an active role in the construction. This way, it's done our way, and all of us take extra pride in being able to say it is our station.

Pete Summers loaded the studio walls with homemade cart/CD racks, part timer Ryan Carrington harnessed and terminated multicable between three studios and spent an evening wiring those tiny little bypass plugs Pacific boards use between stages. I'll be designing the acoustic treatment—the room dimensions are giving me a helluva boost at about

330 Hz—ick!) with some number 703 fiberglass panels and maybe a Helmholtz jobbie to pull down that emphasis I noted. Naturally the critical work is completely Tom's domain.

By the time this hits the presses, we may already be up and running. But next time out, I'll tell you more about the snags we're running into and some of the creative solutions the whole crew is pulling out of its collective hat. As it is, we can't wait to get in there. The RMX-28 is already handling audio and feeding it to our present on-air console. This is gonna be fun.

More from Sawdust City next time.

—Al

□□□

Having been married 10 years to a wood-working teacher, Al is used to the smell of contact cement and lacquer. Write him at WLAD, Danbury, Conn. 06776, once the fumes wear off.

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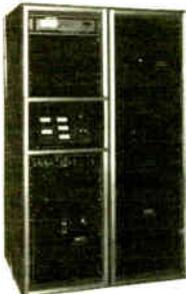
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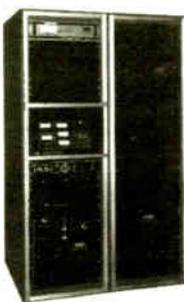


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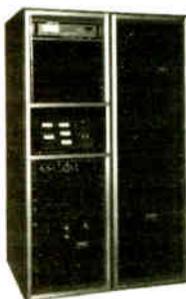


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## COLE'S LAW

# The FCC's Political Rules: What You'll Need to Know

by Harry Cole

**WASHINGTON** To paraphrase Mr. Zimmerman, the Bard of Hibbing, the political rules they are a-changin'. And, because we are in the middle of an election year, those changes are of more than routine interest.

I will try to highlight the most significant changes in the next couple of columns, but you need to lay your hands on the full text of the FCC's actions and familiarize yourself with *all* of the changes, right down to the nitty-gritty.

The importance of complying with the political rules cannot be overstated. As you may have heard, candidates in a number of states have initiated lawsuits against significant numbers of stations based on the claim that the stations failed to comply with the lowest unit rate rules.

### Lowest unit rate

After doing some investigating of its own, the FCC apparently concluded that industry compliance with those rules has, as a general matter, left much to be desired. While the Commission has recently asserted exclusive jurisdiction over claims of violations of the lowest unit rate rules, that will not necessarily be a good thing for broadcasters, especially in view of the Commission's expanded authority to issue fines and forfeitures. (Also, the FCC's assertion of exclusive jurisdiction is likely to be challenged in court.)

In any event, each and every licensee should recognize that the political broadcasting rules are the focus of much attention these days, and such attention is likely to result in increased enforcement activities. If you knew there was a good chance of running into a speed trap, wouldn't you make a point of first finding out what the speed limit was and then making sure you stayed within the limit?

With all of that in mind, here are some of the major changes recently effected in the political rules:

- **Redefinition of "use"**. The political rules don't come into play unless the spot to be aired constitutes a "use" of the station's facilities by the candidate. Under the old rules, a "use" was an appearance in which the candidate was actually recognizable.

### What's in a use?

Under the new rules, a "use" occurs when a program or commercial message (a) contains an actual appearance by the candidate and (b) "is controlled, approved or sponsored by the candidate or the candidate's authorized committee after the candidate becomes legally qualified."

This change in the definition of "use" has several obvious implications. First, it eliminates the need to worry about the airing of old musical recordings, movies, television appearances, etc. which were produced long before the candidate ever thought of running, and which the performer had little or no control over, in terms of content.

Be careful, though, in dealing with re-

cent appearances by candidates who are currently active performers, as they may be in a position to "control" the nature and content of their current performances.

Second, a spot put together by a political group supporting a political candidate, and which contains an appearance by the candidate, will only be a "use" if the candidate "controls, approves or sponsors" the spot. That means that, in order to qualify for the station's lowest unit rate, the control, approval or sponsorship by the candidate must be established.

Appropriate provision for this consideration should be made in the station's political time contracts, and the station's staff should be prepared to undertake additional

investigation in order to be sure of the candidate's position with respect to the spots.

Bear in mind that the definition of "use" entails more than just the lowest unit rate question.

The law prohibits stations from censoring a "use" in any way. Because the station cannot modify the content of a "use," the law also immunizes the station from any defamation liability in the event that a "use" contains libel or slander.

However, that immunity does *not* arise unless a "use" is involved. Because the recent trend of negative political advertising might increase the possibility of defamatory statements, it is all the more important for the station to determine, up front, whether the candidate does in fact "control, approve or sponsor" the spot so that it is an immunized "use."

### Also of note

- **Application of Lowest Unit Rate**. In addition to redefining "use," the Commission has also tinkered in a number of ways with the calculation and application of a station's "lowest unit rate." Because of space limitations, we'll save our discussion of the calculation changes for our next column.

For now, though, you should be aware that you cannot require a candidate to pay in cash earlier than one week prior to broadcast.

Further, if a candidate's agency or other political advertiser legally responsible for payment has an established credit history, and if the station would extend credit under such circumstances to regular, non-political advertisers, then such credit must also be extended to the political advertiser.

Here are some miscellaneous other items related to political advertising which you should know:

You *can* refuse to sell availabilities in the body of news programs if that is your station's policy. This refusal can apply to both federal and non-federal candidates.

You *cannot* reject a spot for failure to have the required sponsorship identification announcement in the required form. However, because you also are legally obligated to be sure that some such announcement is included in the spot, you may, on your own initiative, override or tag the ad to comply with the rule. Note that this is a very narrow exception to the general rule

continued on page 24 ►

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# WORKBENCH

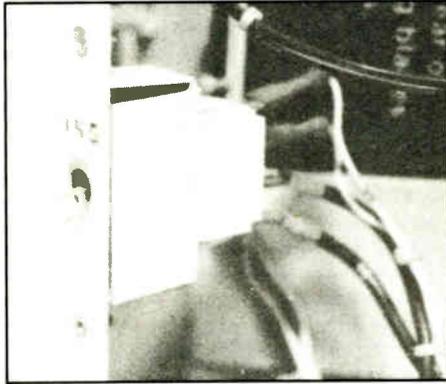
## Tweak an Old Transmitter for New Tricks

by John Bisset

**FALLS CHURCH, Va.** Who says you can't teach an old dog new tricks? That's the theme of Harris' transmitter workshops. Mike Serafini, former CE and now working with Voice of America, gives these technical sessions high points. In addition to the technical theory, some proven field suggestions are also offered. Figure 1 is an example.

The high voltage power supply (HVPS) enclosure side panels in a transmitter are interlocked for safety purposes. Yet we all know there are times that such interlocks must be carefully defeated.

Harris engineers found that an insulated



A simple spade lug can be used to close a switch.

spade lug was an ideal solution for use with the interlock switches used on their transmitters. The length of the lug is enough to depress the switch, and the "rim" of insulating plastic that surrounds the shank of the lug can be wedged in place to keep the switch contacts closed.

Use caution when defeating safety interlocks. Make it second-nature to check and double-check before applying the plate HV. After your test, remember that the defeated interlocks may mean the HV filter caps are still storing lethal voltages. Use the grounding stick liberally. If you aren't sure—don't.

Mike's need to get into the HVPS was to correct a power trim motor that wasn't working. Actually, the motor worked fine, but the coupling to the rheostat was slipping. If you encounter this problem, be advised that you need to loosen and slide down the limit switch collets. These collets cover up the two setscrews used to tighten the shaft assembly.

Afterward, adjustment of the raise/lower power control is required—with the HVPS cover off—to properly align the limit switches to the beginning and end of the rheostat. Mike Serafini can be reached at 301-721-5891.

★★★

Rich Egan from Z-93 in La Crosse, Wisc., faxed a note about our suggested use of "cup hooks" for routing wire in a budget studio (RW Feb. 19, 1992). Rich picked up another method of wire bundling from Pat Delaney at WKBH-AM-FM that he wanted to share.

Pat's method was to use Romex™ cable staples and pound one in every 18 inches or

so along the wiring path. You can then run either the wire through the loops provided by the cable staple, or run one wire tie around the cable and secure that tie to a second wire tie which is looped through the staple. Rich has found this method cheap, fast, and long-lasting. Rich Egan can be reached at WIZM(FM) in La Crosse, 608-782-1230.

When you think of wire ties, you probably think of Panduit. The latest Panduit catalog (complete with samples) is hot off the presses (see Figure 2). In it are the standard cable tie products, along with some new ideas for cable fasteners.

A copy of the new catalog is free for the asking. Circle Reader Service 73, and a copy will be sent to you.

★★★

Jim Wenstrom, former CE with Wynne Broadcasting, wrote to tell us his solution to carts and automation—standardize tape lengths. It seems that cue times were becoming a critical problem, based on the machines being used at Jim's station. The obvious solution to buy another Instacart™ or Carousel™ just wasn't financially possible at the time.

Since rapid cue-up was the problem, Jim established a standing rule that no cart would have more than 12 seconds of cue-up time. (In some cases, a 29-second spot, carted on a 40-second cart, wound with 50 seconds of tape, wreaked havoc on the system).

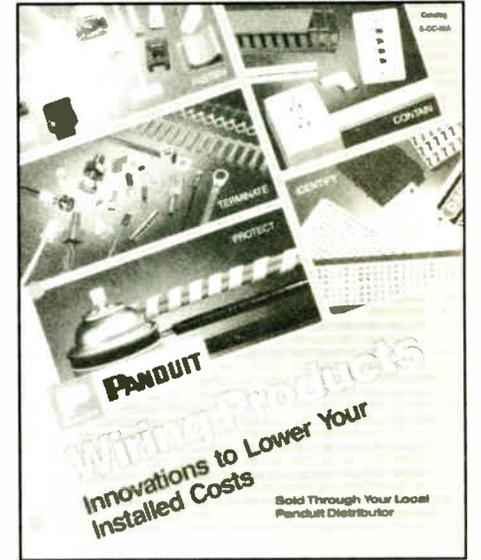
Now, whenever new carts come in, Jim times them and cuts out the excess tape so the cue-up times will be the same. He then uses an engraving pencil to etch the actual time on the side of the cart.

Jim also told us about a unique fix for a skipping CD player. For some reason, he placed his hand on the spinning spindle. It stopped skipping! He tried it again, and it didn't skip. After taking the spindle off,

cleaning it and the hub, the skipping returned. Whenever weight was added, the skipping stopped.

Being a firm believer in "whatever works," he searched for a weight to use. A small ferrite ring was attached to the spindle. It was better, but the CD still skipped occasionally. Figuring if a little weight helped, additional weight would help more, Jim coiled up some heavy plumber's solder and placed it inside the ferrite ring.

He tried the CD again, and there were no skips. He then tried several other CDs that



The latest catalog of wiring products from Panduit is free, and comes with some product samples.

had always skipped in this machine, and they all played without fault.

Jim's conclusion—that even in this day of modern digital technology, the old-time "dime on the tonearm" technology still applies.

□□□

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

## Playing by the Political Rules

► continued from page 22

that stations may not censor in any way the content of political announcements.

If, during the one-year period prior to the campaign, the station ever provided staff and services over the weekend to accommodate a last-minute request for regular, non-political advertisers, you must provide this same level of service to political candidates for federal office, upon their request, on the last weekend prior to the election.

As noted above, the importance of com-

plying with the political advertising rules cannot be overstated. In light of some initial apparent successes in some on-going litigation, candidates (and lawyers who seem intent on assisting candidates in such litigation) are likely to be exceedingly vigilant in their efforts to assure such compliance, and the best defense for a broadcaster is a continuing good faith effort to know the rules and obey them.

If you have not yet received—from your communications counsel, from the FCC or from any other source—copies of the Commission's several recent decisions on political advertising, you should get your hands on them immediately and study them carefully.

Summaries such as this column, while perhaps helpful, are by necessity only summaries—there is no substitute for the real thing, and (to mix advertising metaphors) ya gotta have it.

If you have any questions about any of these matters, you should contact your communications counsel right away.

□□□

Harry Cole is a partner in the Washington-based law firm of Bechtel & Cole, Chartered. He can be reached at 202-833-4190.

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Ronald Sweatte, Engineering Manager,  
KLBE, Seattle.

**“ Looks like you did it again; what a machine, and the manual is great! ”**

George Bisso, Director of  
Engineering, KMPS, Seattle.

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D I G I T A L

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Chip Morgan,  
Chip Morgan Broadcast Engineering.

**“ There are 8200 units in WQHT, New York and KPWR, Los Angeles. Both have exceeded our expectations. ”**

Terry Grieger, Vice President of Engineering,  
Emmis Broadcasting.

**“ During evaluation, we had it sounding like we wanted in 10-12 minutes. ”**

Jeff Gulick, Chief Engineer,  
WNCI, Columbus, Ohio.

Stations around the country are taking advantage of the power, potential and profitability of the OPTIMOD-FM 8200. Don't be the last in your market.

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## ENGINEERING MANAGER

# Workplace Personality Type Acceptance

*Assessing Employees' Character Traits Can Help You Maximize Staff Performance and Manage Effectively*

by John Cummuta

**DOWNERS GROVE, Ill.** Remember "The Odd Couple"? One was a neat-freak, while the other seemed bent on creating as much debris as humanly possible. Have you ever looked across the table at your spouse, or across a desk at a workmate, and wondered if you weren't re-enacting the same scenario?

It happens all the time, and it can be the source of unbelievable frustration ... at

least until you understand some of the dynamics of the odd relationship in which you find yourself.

People are as individual as snowflakes, but it is possible to herd them into several identifiable groupings, based on their personalities. And once these styles are understood, it becomes easier to know how to relate to someone of a different type than yours.

In fact, you can actually get to where you are effective with every different type of personality, and make dramatic gains in productivity all around.

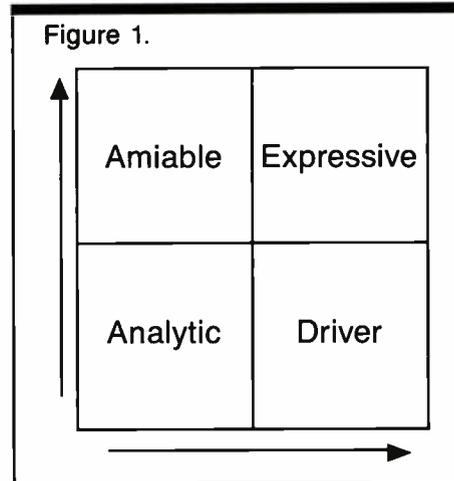
## Task master or people person?

There are several accepted ways of looking at the differences in human personalities, but the spectrum we'll examine in this article is the one I find most useful on a day-to-day basis. It looks at people based on their

one's inclination towards either other people or the task to be done. As we examine each quadrant of this diagram, you'll begin to see how different personality styles can work together well—or collide at freight-train speed.

Starting in the lower-left-hand corner

**None of these personality types is all good, or all bad. In fact, most people are composites of all four quadrants. We all usually do favor one type over the others.**



inclination to be more motivated by the task at hand or the people involved. You could say that we're looking at whether someone is a "people" person or a "task" person.

Before we begin, let me assure you that no one falls completely, 100 percent within any one of the categories I'll describe. People will begin to come to mind, however, who dramatically favor one type or another.

Look at Figure 1. The four personality styles I'll be discussing are variations of

of Figure 1, we find the analytic type. You probably won't be surprised to find that most engineering types fall somewhere in this quadrant. Analytics want the facts, ma'am. Sergeant Friday is an analytic.

These folks don't want to be flowered with visionary language like "doing it for old Wimp," or "We're going to be number one." They want you to tell them, preferably with measurable numbers, what it is you want them to do for you, and what you will do for them.

Analytics cannot be effectively motivated by vague or emotional language or gestures. In fact, if there is no data to hang a hat on, they will most likely feel very uncomfortable, and find you hard to trust.

## Perfection is an end

You might not be stunned to see that analytic types are low in the people orientation, but you might be surprised to find they are low on the task scale as well. For the pure analytic, getting the task done is not nearly as important as getting each and every step of the task done perfectly. This perfectionist tendency can seriously reduce overall productivity.

The next type on the scale is the amiable type. This type just want to be friends. They want to do everything as a group, and they get more out of the company

picnic than from their paycheck. They view every activity as a potential group activity, and the worst thing that could ever happen is disharmony. If the amiable thinks that someone in the group doesn't like him, he won't be able to sleep.

Now that we've described two of the styles, you can already see the potential for conflict. The analytic wants to be left alone to examine the facts, but the amiable wants to sit down next to him, talk about everything else but work, and

share doughnuts and coffee. This drives the analytic crazy; he will act unfriendly, and the amiable will pout.

The driver is General George Patton. Just roll right over the people, the task must be done at all costs. While a driver can accomplish remarkable things, the driver can also destroy a team or department. He will tend to disregard the people in the process and therefore produce high turnover and low morale. The hard-driving style can produce short-term gains, but usually at the expense of long-term pain.

Just imagine what happens to an amiable that has to work for or with a driver. The amiable will wilt like a rose in the desert. The driver usually disregards the amiable as a "fluff-ball."

The analytic can really frustrate a driver, because the driver sees the analytic as someone who understands the task at hand, but just can't get on track to make real progress.

Expressives are the visionaries. They want to get the task done, and they do care about the people, but this mix causes them to be semi-ineffective in both areas. Expressives talk in big, sweeping terms, with very few of the hard facts analytics need.

An expressive will always try to motivate the people, but he lacks the driver's relentless movement toward tightly-defined goals. So, while an expressive can accomplish a lot in spurts, he will generally make more noise than progress.

None of these personality types is all good, or all bad. In fact, most people are composites of all four quadrants. We all usually do favor one type over the others. What you want to do with this knowledge is simple: determine which personality type is dominant, then determine how that style can conflict with the styles of those you work for and those who work for you.

Keep this one rule in mind: You *must* communicate with people in *their* personality style to produce a favorable result. If you are an expressive type and your subordinates are analytic, hold down the colorful puffery and give them the idea in measurable terms. It will be a little work for you, but it will be a big help to them. It will also make you a better manager, because the result, (what you are being paid for) will be increased productivity.

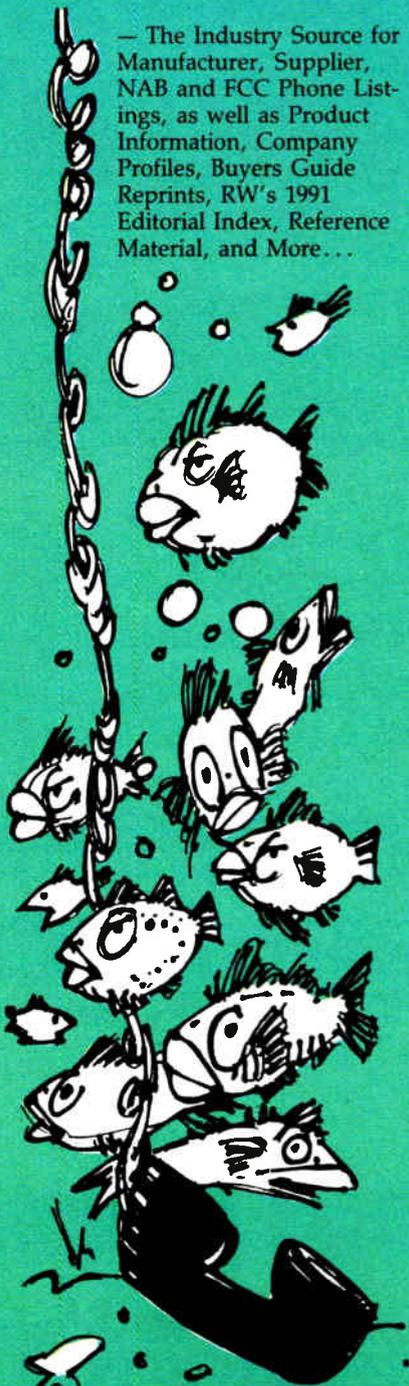
□□□

John Cummuta is an independent marketing and management consultant, and can be reached at 708-960-5999.

## Fishing For A Phone Number?

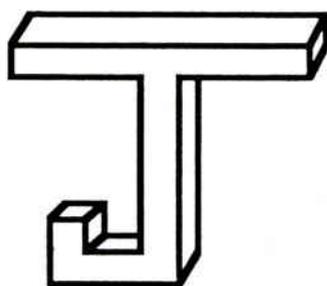
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# Answering Some Common Questions on Translators

by Howard L. Enstrom

**MOUNT DORA, Fla.** In my career, I've sometimes been called "the guru of translators"—a humorous perception that I guess is based on all my years of extolling the virtue of marvelous black boxes. Much of my life is wrapped up in two databases, some computers, a drafting table, engineering documents, file folders, and answering endless questions from a lot of earnest, nice folks.

In this month's column, I'd like to answer some of the more common questions I've encountered in my years as a "guru."

**Q:** I know that a non-commercial educational (NCE) station's application for a translator to operate on a reserved (NCE) channel is exempt from a filing fee. But what if it has to use a commercial channel?

**A:** Still no filing fee.

**Q:** What if an outside group or person is the applicant proposing a translator for our NCE station?

**A:** If its translator application proposes use of an NCE channel, no fee. If for a commercial channel, a fee.

**Q:** All translators for commercial stations must use commercial channels and their applications are subject to a fee, right?

**A:** That's right—get your checkbook out.

**Q:** I understand that neither commercial FM stations, nor persons associated or related, may be the licensee of a translator to expand the FM station's coverage. I also understand that the primary FM station's contribution toward the translator is limited to technical support. But may a legally qualified licensee of such a commercial translator air local announcements to solicit financial support from listeners?

**A:** Yes.

**Q:** What about "commercials" by advertisers?

**A:** Well, some promoters of translators have really exploited to the hilt the Commission's provision to permit a form of advertising in local announcements acknowledging financial support by businesses. Full-blown produced "spot" advertising, when sold to business "contributors" can vex full service stations in a community.

What the Commission regards as acceptable is stated in the Report and Order on MM Docket 88-140, released Dec. 4, 1990 (before the new rules became effective). Quoting a portion within:

"Admittedly, the advertising portion of the acceptable announcement causes some concern to broadcasters. However, translators must be able to raise operating funds. We believe that some information about contributors must be allowed in order to enable translators to encourage donations and, thus, provide the public with radio service . . . we do not wish to unnecessarily intrude upon the initiative of FM translator licensees who attempt to raise funds

within the given parameters. Therefore, we will maintain the existing language."

The "given parameters" referred to are (1) identification of the contributors, (2) size and nature of the contributions, and (3) advertising messages of these contributors.

I believe translators would do well to emulate the style of credits used by listener- and business-supported PBS stations—dignified acknowledgements with a brief recommendation of a business service or product. No frenzied hype.

**Q:** If local announcements on commercial translators may acknowledge support from businesses and private parties, what about NCE translators? Can similar acknowledgements be made about upcoming events by church, organization and community supporters?

**A:** I see no reason why not.

**Q:** Our group operates an NCE translator built with proceeds from a public fundraising. The system is all paid for, and costs little to operate, so we have little need to solicit any more funds. Except, we really should have a reserve fund, to cover losses or possible upgrading of our translator. Do FCC rules say anything about limits or how monies are to be accounted for?

**A:** There's nothing in the rules, but good record-keeping and accounting practice is always wise with public funds.

**Q:** One article referred to the "local announcement capability" of a translator. Is that the same as an ID module?

**A:** No. An ID module does not process voice audio. It automatically transmits the translator's call sign in Morse code.

**Q:** We have one of those, but why don't we ever hear it?

**A:** Because the coded ID is in AM modulated, and is not audible when listening with most FM radios.

**Q:** How, then, does local announcement capability work?

**A:** A module interfaces between the translator and whatever audio equipment, speech amplifier or playback reproduction equipment is being used. When activated by a control system, the VHF signal from the primary station is substituted with an FM modulated 10.7 MHz signal . . . the up-converter "sees" this signal as if it were a down-converted (10.7 MHz) primary signal.

**Q:** So it takes additional equipment, but what kind?

**A:** What do you want to do? Go out to the translator and press a switch to make the announcement, or do it from some remote location? Or, do you want announcements to be automatic, controlled by a time-switch to turn on a tape playback machine?

If so, be prepared to hear program material rudely interrupted, and power line outages to upset time settings.

continued on page 29 ►

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## ADVANCED TECHNOLOGY RAISES PERFORMANCE AND SMASHES PRICES!

Dramatic developments in IC technology have allowed us to design a series of consoles with fewer components, less manufacturing labor and higher performance than previously possible. The end results are significant price reductions for the features provided and a quality of sound reproduction unsurpassed by units costing thousands of dollars more. Plus, the double module shielding, extensive bypassing, instrumentation "STAR" grounding system and MOV protected outputs assure you of pure sound uncontaminated by outside interference.

## TAILORED TO YOUR OPERATORS...NOT OUR MACHINERY.

Our Director of Engineering didn't have just a hand in the design he had his whole arm in it. Before one PC board was laid out or pencil put to paper for any part of the metal structure, our Engineering Manager sat down and measured the most critical parts of the console's operation. The arm, the hand, the fingers and the operators line of sight. The arm had to rest comfortably when at the controls; the input and output select switches had to be reachable while simultaneously controlling the faders; the selectors had to be illuminated and clearly discernable at any angle; and the meters had to be properly angled for normal seated operation and clearly show the levels, even across the room. The final design is a layout that is exceptionally easy to control without operator strain or unusual manipulations. Science calls this ergonomics but we call it just plain common sense and a concern about you the user.

## FIELD PROVEN WORLD WIDE.

As you are reading this, the xL SERIES is proving itself in hundreds of stations just like yours. "No RF problems of any kind..."Our sound has noticeably improved since installing your boards..."Our people really enjoy the ease of operation..."Our console actually tested out better than your spec's..."The installation time saved was fantastic. We were on the air one day after receipt while it had taken five days to set up one of your competitors consoles".

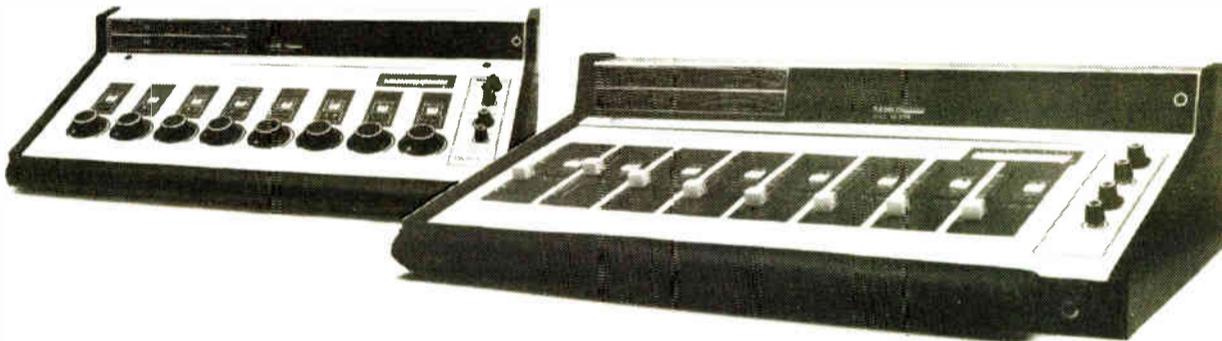
## ROCK SOLID CONSTRUCTION.

From the moment you put your hands on an xL console it will be evident that nothing has been skimmed upon to

bring you the finest sound possible and, construction unmatched by anything else in its price range. From the attractive exterior finish of carbide black, muted greys and white polyurethanes, thru the full one tenth inch thick aluminum control surface to the individually housed and shielded plug-in modules and bussing system. And, quiet switches that are guaranteed for 2 million operations, not the 50,000 other manufacturers provide.

## THE ULTIMATE INSURANCE POLICY!

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- High voltage solid state audio switching
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- Optional 9 input, programmable mix/minus buss with balanced out
- Unique internal decals & labels for complete installation without referring to the manual

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xL42S	4 mixer, dual channel	2,410
xL61S	6 mixer, single channel	2,515
xL62S	6 mixer, dual channel	2,830
xL81S	8 mixer, single channel	3,040
xL82S	8 mixer, dual channel	3,355
xL12'1S	12 mixer, single channel	4,043
xL12'2S	12 mixer, dual channel	4,358
RS4	2 mixer, 4 machine start/stop	263
RS8	4 mixer, 8 machine start/stop	325
RS12	6 mixer, 12 machine start/stop	415
MMB 1/9	9 input mix/minus buss, bal. out	184
SLF	Super long life linear faders(per mixer)	79

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# The Three Basics of DAB Transmission

by Steve Crowley

**WASHINGTON** Now that WARC 1992 is behind us, DAB interest will be on the rise. With all the different acronyms, trademarks and techniques, keeping track of DAB technology can be a full-time job. Then, just when you've figured out what's going on, a proponent changes its system.

One way to keep things clear is to remember the digital engineering fundamentals that apply to all systems. With that background, you have some guideposts. In-band or out-of-band, satellite or terrestrial, the same principles apply.

DAB transmission can be divided into three areas:

- **Source coding**—Conversion of the analog information into digital data, and reducing the amount of digital information to the minimum needed to represent subjectively similar audio.
- **Channel coding**—Adding and organizing digital information to help the data overcome propagation problems.
- **Modulation**—Translation of the digital data into a radio-frequency signal.

The first step in source coding is to convert the analog information to digital form. An analog-to-digital converter takes a "snap-

shot" of the analog information and outputs a binary (ones and zeros) stream of information as digital "words." A word is typically 16 bits long. The converter does this about 40 to 50 thousand times a second.

The next step in source coding is to reduce the amount of data as much as possible. This can be done several ways. One is to remove information that is not perceptible to the listener. This information can then be discarded as irrelevant.

Another way to reduce the amount of information is to compress the digital data to reduce its redundancy. For example, if a section of digital data has 20 binary zeros in a

row, the digital system might just send a shorter word that represents 20 binary zeros.

Now that the audio data is minimized, channel coding can add a relatively small amount of data that will allow the receiver to detect and correct errors. This data helps the receiver detect when there has been an error, and if so, what the correct data value should be. The data also can be interleaved in time to reduce the effects of errors occurring at any instant.

Now the data is ready for transmission. The ones and zeros of digital data can't be sent through the air, but radio-frequency (RF) signals can. An RF signal is made to

vary as a function of the data. Instead of data, the DAB transmitter sends analog symbols that represent the data.

The RF signal can be made to vary in amplitude, frequency, or phase to represent the data. The phase of an RF carrier, for example, can be varied among four states—0, 90, 180 and 270 degrees—to represent the digital data values 00, 01, 10, and 11.

Any DAB system must perform source coding, channel coding and modulation. Asking yourself—or a proponent—how these functions are done will help you understand any DAB system.

□ □ □

Steve Crowley is a consulting engineer with the Washington, D.C. firm of du Treil, Lundin & Rackley, Inc., 1019 19th Street, N.W., Suite 300, Washington, D.C. 20036. He can be reached at 202-223-6700, or by fax at 202-466-2042.

## FM Translator Basics: Q & A

► continued from page 27

For pre-recorded announcements, you need a studio-type cartridge machine for playback (also record) that has audio output sent to the translator by some means—locally, or via a linking circuit. This, plus a means to control the system.

Ordinary audio cassette players are useful only if operated manually because they don't reset themselves or rewind. Space limitations prevent describing all the ways to hook up equipment to make local announcements.

**Q:** Our translator was once off the air for over an hour, so I drove to the site. On the way, it came on again. Nobody was at the translator, but I think the two-way radio technician had unplugged our translator from the AC line. I made a "Do Not Unplug" sign and tied it to the cord.

What do the rules say about a translator being off the air? And what's this about a required sign at the site?

**A:** If the primary station had been off the air, the translator's muting became effective. Translators do not have to maintain operation on a prescribed time schedule, but they are expected to provide regular operation, without unwarranted interruptions.

If a translator is silent for 30 or more consecutive days without notice, the FCC could cancel the operating license. When a planned interruption is for 30 days or more, notify the Commission and secure approval.

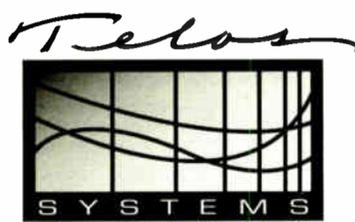
A sign is required at the site, showing the translator's call sign, name, address and telephone number of the licensee (or local representative), and name, address and location where the records are maintained.

□ □ □

Howard L. Enstrom is head of FM Technology Associates Inc., a consulting engineering and factory rep firm specializing in FM translators. FMTA's address is: 30925 Vista View, Mount Dora, Fla. 32757. Phone: 904-383-3682; fax: 904-383-4077.



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## AMPLIFIERS

### Want to Sell

**Crown Microtech 1000 (4)**, excel cond, \$590 ea. G Fern, Best Audio, POB 2366, Van Nuys CA 91404. 818-763-2378.

**Panasonic AGDA-100** audio dist, \$500. Roman, World Video, 10625 Scripps Ranch Blvd, San Diego CA 92131. 619-695-1045.

**SAE 31B** amp, 30 preamp, 3200 tuner, 50 wch w/dig readout analog tuner & preamp, \$285; Hafler DH110 preamp & DH330 rack mount dig tuner, all gd cond w/manuals. S Hofmann, Cameron Univ Theatre, 2800 W Gore Blvd, Lawton OK 73505. 405-561-2428.

**Dynaco ST70 (2)**, \$100 ea. J Parsons, 904-532-0192.

**Crown Micro-Tech 1200** stereo power, 320 wch 8 ohms, 495 Wch 4 ohms, 700 Wch 2 ohms, 1315 Wmono 4 ohms, xferable warranty, B Fisher, KPOK, POB 829, Bowman ND 58623. 701-523-3883.

**RCA BTE-15A w/2** SCA gener, extender board & book. 503-774-0459. 01C PPP CA, Altec tube mic pre's & tube amps & mixers; Langwin AM-16's, sale or trade. Tracy Eaves, 615-821-6099 (evenings before 10PM EST).

### Want to Buy

Any decent low/med W, single rack unit audio amp, \$100 max. P Wells, KJQY, 625 Broadway #1200, San Diego CA 92101. 619-238-1037.

Gates M5144 AM RF. S Todd, 612-483-9163.

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## ANTENNAS & TOWERS

### Want to Sell

Hughey Phillips 32" flasher beacon, \$600. H McDonald, BIG M Bst Srs, POB 807, Verdale WA 99037. 406-456-0768.

Andrew & Cablewave 3" EIA conn flanges, \$200 ea; 3" Andrew splice, \$275, all gd cond, \$550 all. B Magrill, Magrill Eng, Box 1010, Fairfield FL 32639.

**Rohn 5-20'** 65q sections, \$400 ea; HJ7-50A Heliax, 180', \$41'; Type N conn, \$100 set. Robert, 817-566-5036.

Line hangers (50); Phelps-Dodge CFM LP2, 2-bay circ polar w/radoms, in use tuned to 105.5. B Walters, WASE, POB 2087, Elizabethtown KY 42702. 502-769-1055.

**ERI FMH-10C** 10-bay tuned to 94.7, excel cond, \$10000. R Stratton, WXID, POB 679, Mayfield KY 42066. 502-247-5122.

**RCA BFC (12)** gd cond, \$1500. R Dees, 806-355-4554.

**Hughey & Phillips TI-2035** isolation xfomer, 3.5 Kva, \$1200; Kintronics Labs FM 7.5 Isocoupler, \$300. W Craig, WGOH, POB 311, Grayson KY 41143. 606-474-5144.

**ERI/Harris FML-3E** 3-bay FM C-P for 95.3 MHz, \$3000. P Jellison, WLW, 1111 St Gregory, Cincinnati OH 45202. 513-241-9597.

**DB OCX7/8** CP broad band FM, 1-9 bay, 2.5 kW per bay, \$650/bay. Allen, 404-325-7847.

**Moseley Isocoupler**, (1) 940-960 MHz, (1) 450-470 MHz, \$150 ea. D Tabor, WLCK, Box 158, Scottsville KY 42164.

**Prodelin 20'** fiberglass dish, geo-stationary, BO+s/h. T Johnson, 415-355-1020.

**ERI 12-bay FM** on 94.5 MHz. E Roskelley, KMRK, 4000 Rasco, Odessa TX 79764. 915-366-3711.

Collins 40 kW horiz only, 95.3 MHz, \$500+s/h. J Crawley, WMJL, POB 185, Campbellsville KY 42718. 502-465-5762.

**340'** and **140'** x54" towers with torque arms, 1-5/8 Heliax 500' and 200', Andrew microwave dishes and lines. 414-743-5320.

### Want to Buy

Dielectric 200K-73 strobe light parts. E Kain, WWL, 1450 Poydras St, N Orleans LA 70112. 304-593-2105.

**3-tower array** on 1290 kHz. L Martino, KMEN, 2001 Iowa Ave, Riverside CA 92507. 714-684-1991.

**ERI-Collins FML-3E** 3-bay, 1979, freq 95.9 or close, 1 5/8" fittings; G5CPM-3E, pole mount pref. D Rose, KAAA, 2534 Huata Pae Mtn Rd, Kingman AZ 86401. 602-753-2537.

**Harmonic filter** for 5 kW, any mfr; Phelps-Dodge 8 bays+, any cond, 100-108 MHz. Dick, WOYS, 1591 Boyle Rd, Hamilton OH 45013. 513-863-0774.

## AUDIO PRODUCTION

### Want to Sell

Valley Intl 400 proc. new, \$500. J Powers, KTBQ, POB 831508, Nacogdoches TX 75953. 409-560-6677.

dbx 150 (5) noise eliminator reduc system, \$140 ea. Roman, World Video, 10625 Scripps Ranch Blvd, San Diego CA 92131. 619-695-1045.

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**Sansui PC-X11** PCM encoder/decoder w/box & manual, excel cond, \$195. S Hofmann, Cameron Univ Theatre, 2800 W Gore Blvd, Lawton OK 73505. 405-561-2428.

**Audio Digital TC-2** digital delay unit w/o manual, \$950. D Peluso, KJUL, 2880 E Flamingo Rd Ste E, Las Vegas NV 89121. 702-732-2200.

**Urban 787A/SL** mic proc & slave unit w/mic amps, new, \$1300. J Salov, WHGR, 3431 W Houghton Lk Dr, Houghton Lk MI 48629. 517-740-1165.

**UREI 527-A (2)** mono 27 band graphic EQs, \$200 ea. B Heffley, WBMJ, POB 36-7000, San Juan PR 00936-7000. 809-724-1190.

**Numark CD-5020** dual CD, rack mountable, new, \$995; Symetrix TI-101 telephone interface, new, \$349. Steve, 401-783-0737.

dbx 142 bcd noise red system, new, \$300. J Gober, Auburn ETV, Auburn Univ, Auburn AL 36849. 205-887-9198.

Complete setup for talk, news & music, late, high quality equip, 14' x 30' 2-axle mobile studio, 5 yrs old w/AC & restroom. 503-774-0459.

**4CX 20000 D** rebuilt, \$1000. D Seavy, KROC, 122 SW 4th St, Rochester MN 55902. 507-286-1010.

### Want to Buy

**Impulse noise reduc units:** SAE 5000A, Burwen TNE 7000A & DNF 1201 A, all need svc info. R Zorn, WMHR, 4044 Makyes Rd, Syracuse NY 13215.

dbx 150X (2) 4-chnl of NR. J Laprad, Sunspots, Box 403, Worcester MA 01602. 508-755-0732.

## AUTOMATION EQUIP

### Want to Sell

IGM, excel cond, (5) Go-cart (24) stereo, (4) Otari ARS 1000DC P/B, (3) Fidelipac stereo cart P/B, auto rew w/racks, \$19500. B Walters, WASE, POB 2087, Elizabethtown KY 42702. 502-769-1055.

**IGM Instacart (4)** 48-tray stereo, excel cond, \$3500 ea. D Albanese, WEEI, 529 Main St #220, Boston MA 02129. 617-242-5900.

**SMC RP-1000** prog, POC3 clock & pwr supply w/manuals & DS20 switcher, \$500; Schafer 800 tube mdl in rack, 10 source, 20 position sequencer w/25 Hz detector, spare parts, working, \$500. E Stanley, KBTO, Box 12, Bottineau ND 58318. 701-228-2483.

**IGM Go-cart (2)** 24-tray, gd cond, BO. B Wynne, 503-882-4656.

**SMC Stereo-24 (2)** Carousel in indiv racks w/control & ABC decoder, I pay s/h. J Salov, WHGR, 3431 W Houghton Lk Dr, Houghton Lk MI 48629. 517-740-1165.

Instacart machines (2) 48-hole w/Sentry filing systems & IBM-PC hardware. 503-774-0459.

**Audiometrics AMCD5-1000A (4)** jukebox CD plyr, holds 100, control via RS-232 port, excel cond, \$2000. R Irwin, KSAC, 1021 2nd St, Sacramento CA 95814. 916-446-2294.

**Instacart Stereo 48** 48-tray w/Sentry interface, \$2600/w/ill trade for stereo console. R Davis KPIK, 108 Dewitt Henry Dr, Beebe AR 72012. 501-882-3331.

**350 RS Carousel**, \$400; Conex DS-25 sensor/filter, \$300; Wegener 1601 dual squelch card, \$100. R O'Kelly, 503-733-2217.

**BE Control 16** system w/14 source cards, cust interface panel, batt backup, keyboard, 2 video displays, download interface software, 6 Scully 270s, 4 Carousel 250s, IGM Go-Cart II-42, 4 Gates single play cart decks, manuals, spare parts; SMC DP1, keyboard, AS-15 switcher, MA-4 monitor amp, printer interface, 6 Carousel 350s, 4 Scully 270s, 2 SMC 722 dual play decks, 2 TS-25 tone sensors, 2 remote control units, 5 racks, manuals, spare parts, both in working cond, \$15000 ea. G Carter, 407-567-8366.

**Cetec 7000 w/4** ITC 750 R-R decks. (9) Audi- ofiles. (2) Beehive terminals, gd working cond. C McCarthy, 916-244-9700.

**BE 16** system for tape/sat, 3000 events software w/pwr supply, audio proc, main proc, remote control, CRT, printer, customer & sat interface, 10 audio cards, 6 interface cables, spare cards & parts, IGM 60 Cart II 78-tray, (2) IGM 60 Cart II 42-tray & IGM spare parts w/manuals, (4) Scully P/B decks, (4) BE racks, BO+s/h. D Brown, KVLE, POB 832, Gunnison CO 81230. 602-645-8181.

**Harris SC-90 (2)**, 1 for parts, 1 w/books, cables & 733 ARS system. R Redmond, 518-798-1031.

### Want to Buy

**Smartcaster** used Audisc/digital DJ. E Roskelley, KMRK, 4000 Rasco, Odessa TX 79764. 915-366-3711.

## CAMERAS (VIDEO)

### Want to Sell

**Sharp 700** 3-tube Saticon w/studio mon & controls; CCU XC701RP 150' multicore cable, \$2300. Roman, World Video, 10625 Scripps Ranch Blvd, San Diego CA 92131. 619-695-1045.

**Panasonic triple 7** 3-tube, less than 100 hrs, excel shape w/Anvil case, cables, great lens & batts, \$1600; JVC KY 2000 3-tube w/o lens, \$500. J Harsh, 913-672-3428.

**Hitachi FP 50-S (2)** w/CCU & cable working, \$3000 ea/BO+s/h. F Spinetta, KCEA, POB 2385, Alherten CA 94026. 415-321-6049.

**Kodak 8mm** Kodavision camcorder w/mdl 2020 cradle & chrg, soft case, \$120. P Rus-sell, Bowdoin College, Sills Hall, Brunswick ME 04011. 207-725-3066.

## CART MACHINES

### Want to Sell

**Spotmaster 2000 RP Mono**, in gd cond w/manual, \$450. G Gibbs, KMNS, POB 177, Sioux City IA 51102. 712-258-0628.

**Tapecaster 700 (2)** P/B, lever-release type. J Eck, KSAJ, POB 69, Abilene KS 67410. 913-263-1560.

**ITC Delta 1 (2)**, \$800 ea; Delta IV editor, \$500, all work gd. Roman, World Video, 10625 Scripps Ranch Blvd, San Diego CA 92131. 619-695-1045.

**ITC RP stereo**, 3 cue tones, gd cond, \$900. J Gober, Auburn ETV, Auburn Univ, Auburn AL 36849. 205-887-9198.

**BE Spotmaster 2000 (3)** mono P/B, \$300/3. B Walters, WASE, POB 2087, Elizabethtown KY 42702. 502-769-1055.

**Sparta cart-delay**, \$500. R Meyers, Benchmark Comm Corp, 4700 SW 75 Ave, Miami FL 33155. 305-264-5963.

**ITC R/P mono**. D Brown, WBZ, 49A Prairie Ave, Newton MA 02166. 617-332-9326.

**ITC WP (2)**, \$350 ea. R O'Kelly, 503-733-2217.

**ITC PD II** ITC-refurbished, tough, excel cond, \$500 ea. D Putman, VSA Radio Ntwk, 5376 Stewart Ln, San Angelo TX 76904. 915-944-1213.

**ITC 99B** stereo play units, new, \$2000 ea. J Addie, WFMT, 303 E Wacker Dr, Chicago IL 60601. 312-565-5033.

**BE 2100 R/P** mono w/tones, \$550. R Redmond, 518-798-1031.

**Audicord S-16** stereo play, looks gd, works perfect, \$300 ea. P Patton, WAPO, 29 W Main St, Jasper TN 37347. 615-942-5611.

### Want to Buy

**Cartridge II/Criterion 80** stereo R/P head-rest. S Todd, 612-483-9163.

## CASSETTE & REEL-TO-REEL RECORDERS

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**Revox B77**, \$300/BO. J Powers, KTBQ, POB 831508, Nacogdoches TX 75953. 409-560-6677.

**MCI JH-110B** w/BX elect, 14" reels in roll around cab, \$1200. P Wells, KJQY, 625 Broadway #1200, San Diego CA 92101. 619-238-1037.

**Tascam 44** 4-trk, \$1400; Otari MX5050 BQII, \$2200; Otari MX5050 BII 2-trk, \$1500, all in excel cond w/manuals, I pay s/h. J Salov, WHGR, 3431 W Houghton Lk Dr, Houghton Lk MI 48629. 517-740-1165.

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**MCI JH-110 (2)**, \$500 ea; (1) JH-110B, (1) JHB-110B w/inter controller & monitor panel, \$1500 ea/BO, all in floor consoles; Ampex 440's w/o cabinets, BO; Ampex 350 tape deck only, no amp. BO. J Socolof, KUII, 3500 Maple Ave Ste 1470, Dallas TX 75219. 214-526-2580.

**Revox PR-99 (4)** MK II 1/2-trk stereo play units w/25 Hz sensor, \$1100 ea. D Peluso, KJUL, 2880 E Flamingo Rd Ste E, Las Vegas NV 89121. 702-732-2200.

**RCA (2)** 2" transport components, capstan motor w/platforms & brakes, guides, pinch rollers, BO; (3) Mil-Spec road cases to carry recorders like Ampex 350 but can be used for many road applications, rugged, gd cond, \$50; Schafer logging rcdtr w/10 1/2 reels, 0.3 & 0.6 ips, 1/4-trk, 2-chnl, gd cond, \$200; Audiotronics AV123-4TS 1/4-trk, Infonics RR-1 (73M) full-trk, Infonics RR-2 (74M) 2-trk, all gd cond, \$200 ea. R Meyers, Benchmark Comm Corp, 4700 SW 75 Ave, Miami FL 33155. 305-264-5963.

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**Akai GX77**, \$300; Ampex ATR 700, \$800; TE-AC A3300 SX, \$350; TEAC A3340, \$800; Tel-ex 235, \$250; Akai D1800, 8-trk & R-R, \$80, all in gd cond. J Parsons, 904-532-0192.

**Ampex MM1000** 16-trk, 2" multitrack, runs, sounds great, 4 yrs old, \$6500. J Jacobsen, 213-962-9614.

**Tascam DA-50** DAT, gd cond w/remote control unit, \$1000+s/h. Henry Engrg, 503 Key Vista Dr, Sierra Madre CA 91024. 818-355-3656.

**Technics RS-686DS** stereo port cass w/case, AC adaptor, manual & built in mon speakers, \$175. S Hofmann, Cameron Univ Theatre, 2800 W Gore Blvd, Lawton OK 73505. 405-561-2428.

**Akai 280-D**, \$200. D Morris, WKUN, 204 W Spring St, Monroe GA 30655. 404-267-6558.

**Scully 280** parts. R Robinson, 203-269-4465.

**Otari MX 7308 1"** 8-trk, 15/30 ips, w/remote, \$3900; Studer/Revox PR99 2-trk, 7 1/2 & 15 ips, both w/low hrs, excel cond; Technics 1500RS 2-trk, 15, 7 1/2, & 3 3/4 ips + 1/4-trk PB head w/remote, \$950. L Wagner, ARN, POB 1788, Orlando FL 32802. 407-299-1299.

**Ampex 300/440** motors/parts, \$150 & under. L Wagner, ARN, POB 1788, Orlando FL 32802. 407-299-1299.

**Ampex ATR 700**, \$800. D Seavy, KROC, 122 SW 4th St, Rochester MN 55902. 507-286-1010.

**Tascam 38 (2)** 8-trk 1/2", 1 in very gd cond, \$1500. 1 mint, \$1700. R Messick, WKGR, 3223 Comm Pl #101, W Palm Bch FL 33407. 407-686-9505.

**Recordex 5-cass** duplicator, both sides w/reel deck, \$500. R O'Kelly, 503-733-2217.

**Revox A-77 (2)** w/wood cases, \$300 ea; 1 rack mount, \$200; 1 for parts, \$75. R O'Kelly, 503-733-2217.

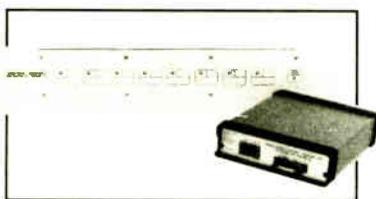
**Revox 278 1/2"** 8-trk, excel cond, \$3000; Tascam 32 2-trk, gd cond, \$800. J Rose, Digital Playroom, 20 Marion, Brookline MA 02146. 617-277-0041.

**TEAC V-347 (2)** stereo, std spd, LED lvl indicators, excel cond, \$55 ea. S Lawson, KAK Prods, 928 Hyland Dr, Santa Rosa CA 95404. 707-528-4055.

**Tascam 122-B** balanced & unbalanced XLR & RCA in/out, dbx encoder & decoder, control signal & remote conns, dual spd, Dolby NR & HX circuitry, rackmount w/manuals, great elect, nds mech adjustment & eject but- ton, \$250. R Williams, Kreuger Prods, 6333 Pacific #203, Stockton CA 95207. 209-461-2123.

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Scully 284B-8 8-trk 1", 3 3/4 to 30 ips, w/VS-76 variable spd module, less than 100 hrs & manuals; MCI JH110A 1/2", 9 yrs old, 7 1/2, 15, 30 ips, gd cond w/manuals, will ship, \$2500, 415-969-3030. T Sherry, Rcdg Cons, 1412 Clarita Ave. San Jose CA 95130. 408-244-3848.

Otari. 503-774-0459.

Technics RS1500 2-trk, \$985; Sony/MCI JH110C on roll around metal cabinet, \$2500+s/h, both excel cond. J Gelo 813-642-6899.

**Want to Buy**

Sony TC-D5M portable for parts. J O'Leary, 202-332-8377.

FX RCA MI 141100H manual/pinout for control connector. S Dorsey, WCWM, 173-7 Merrimac Terr, Williamsburg VA 22183. 804-229-1547.

Miniature: prof/consumer, small, colored, empty, 3-5" & 1 & 2" any color, red leader tape. J Morinelli, 215-789-2742.

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

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

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

**COMPUTERS**

**Want to Sell**

Amiga special effects & char gener w/dual disk drives, 1 RAM w/1 Super Gen Digital Creations+video software, \$1500. J Harsh, 913-672-3428.

**CONSOLES**

**Want to Sell**

Trident 65 32 in-16 out, new w/console base & wiring harness, \$10,000. J Diamond, Blue Diamond, Box 102C Chubbic Rd, Canonsburg PA 15317. 412-746-3455.

Ramko PC8MS 8-chnl, 8 input, excel cond w/manuals, \$2500. R Trumbo, KNLF, POB 117, Quincy CA 95971. 800-397-4146.

Autogram IC-10 10-chnl, 28 inputs, mint cond., \$6000/BO. J Powers, KTBO, POB 831508, Nacogdoches TX 75953. 409-560-6677.

MCI J11-618 bdct w/patch bay, 16 input non-auto, \$7250. B Petruzzi, A-Z Music, 5050 Tamarus #269, Las Vegas NV 89119. 702-736-2303.

Yamaha PM-2000 24-chnl, pwr supply, 2nd pwr supply avail w/manuals; 1516 & 916, all w/cases in excel cond. G Fern, Best Audio, POB 2366, Van Nuys CA 91404. 818-763-2378.

BE BM 150 8-chnl mono, 12 yrs old, 1 owner w/manual, \$400; McMartin B-802 stereo w/new 10 W mon amp, 8-pot board w/3 buttons over each pot, fair cond w/manual, \$350; Gates Yard mono 8-chnl w/manual & spare tubes, \$200. T Nichols, KWXI, POB 5, Glenwood AR 71943. 501-356-2151.

Harris Stereo 80, very gd cond w/sep pwr supply, manual & spare parts, you pay s/h, \$800. G Gibbs, KMNS, POB 177, Sioux City IA 51102. 712-258-0628.

Sony MX16 gd shape, \$250; Pyramid PR8800 Echo, 8 in, 2 out, new, \$400. J Parsons, 904-532-0192.

Sound Workshop Logex 8 16-chnl prod board w/EQ controls, BO, D Coffman, WSOR, 940 Tarpon St, Ft Myers FL 33916. 813-334-1393.

Yamaha M-916 w/16 input x4 output mixer, \$1500. D Gaydos, NYU, 721 Broadway, NY NY 10016. 212-998-1665.

Harris Mono 5, excel cond, \$500. B Walters, WASE, POB 2087, Elizabethtown KY 42702. 502-769-1055.

Sound Workshop 1208 B w/12 input, parametric eq, mon & mix down system, mint, \$1500. C Volpe, Volpe Prods, 540 Stemmers Rd, Essex MD 21221. 301-391-6927.

Gates Gatesway tube-type, mono, excel cond, some spare tubes, \$200/BO. P Wasson, Palm Tree Prods, 1106 Pineland Ave, Venice FL 34292. 813-488-4569.

McMartin B501 5-pot mono solid state, \$500; Howe 7500 12-chnl slide faders, remote starts w/books & custom copy stand, mint, \$2500; LPB Monogram 8-chnl slide fader stereo, remote starts & books, clean, \$1500. R Redmond, 518-798-1031.

Edcor MX300P (3) 8-chnl audio mixer, mic/line inputs, rack mountable, 13 1/4" H, new, \$90 ea/BO. M Wagner, LTM, 177 Hartford Rd, Manchester CT 06040. 203-565-9851.

Tascam 224 24 x 4 x 2 rcdg/live sound mixer, very gd cond. R Messick, WKGR, 3223 Comm Pl #101, W Palm Bch FL 33407. 407-686-9505.

Opamp Labs 20-input, 8 subs + stereo mix out, gd prod board, \$2500. L Wagner, ARN, POB 1788, Orlando FL 32802. 407-299-1299.

Soundcraft 200B mixing desk, 16x4x2, clean & quiet, \$1800; Otari MK-III 8-trk, low hrs, great sound w/cables, \$3000. C Lallo, Eartheart Inc, 465 W Anderson St, Hackensack NJ 07601. 201-646-0277.

**Want to Buy**

Svc manuals for Howe Audio 9000 w/parts list. K Austin, Ausin Bdct, 1101 Hwy 81 N, Marion OK 73055. 405-658-9292.

Gatesway. S Todd, 612-483-9163.

Langevin AM4A w/documents. J Gangwer, 942 32nd St, Richmond CA 94804. 415-644-2383.

**DISCO & SOUND EQUIPMENT**

**Want to Sell**

JBL D-130 (4) 15" speaker reconed w/E-series cone & coil, \$350; Peavey MFZ-X (2) mid/high freq horns w/22A drivers in cabs, gd cond, \$200, you pay s/h. M Anderson, Jerge Studio, 1469 3rd Ave, New Brighton PA 15066. 412-847-0111.

JBL D16R2405 replacement diaphragm for 2405 tweeter, new, BO/trade. J Roper, Imperial Sound, 383 N Studio St, Terre Haute IN 47803. 812-877-2663.

AKG BX-5 stereo spring reverb, \$150. P Cibley, Cibley Music, 138 E 38 St, NY NY 10016. 212-986-2219.

CAD CGM-2 2-chnl w/noise gate & dynamic expander, new, \$450. M Anderson, Jerge Studio, 1469 3rd Ave, New Brighton PA 15066. 412-847-0111.

Fostex 3180 stereo spring reverb w/24 msec pre-delay, BO/trade for UREI Coopertime cube. J Roper, Imperial Sound, 383 N Studio St, Terre Haute IN 47803. 812-877-2663.

EAW PM/2/SX coaxial stage mon w/speaker & tweeter, mint cond, \$450/pr. B Petruzzi, A-Z Music, 5050 Tamarus #269, Las Vegas NV 89119. 702-736-2303.

CBS DPE-450 EQ w/book, works well, \$350/BO. R Rushing, Rcdg Studio, 11710 Hoyt Ave, Tampa FL 33617. 813-988-0496.

E II w/HD+ & extensive library, \$1000; Fostex 4010 time code reader/gener, \$800; Revox HS-77 2-trk, \$500; Roland M-160 line mixer, \$500; 21 space black rack, \$75; Fostex 2-trk stand, \$150; Arp Pro Soloist w/Anvil case, \$150; Arp String Ensemble w/Anvil case, \$150, all mint cond. T Campana, 313-553-4044.

**Want to Buy**

Altec 612 (2) single port, silver/grey utility speaker cabinets for 604 speaker. F Christie, Power Station, 441 W 53rd St, NY NY 10019. 212-246-2900.

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**Want to Sell**

Ashley SC-50, excel cond, \$170; Marti CLA-40, gd cond, \$75. J Guber, Auburn ETV, Auburn Univ, Auburn AL 36849. 205-887-9198.

Marti CLA 40H mono, \$250 both/BO. J Powers, KTBO, POB 831508, Nacogdoches TX 75953. 409-560-6677.

CRL SGC-800; SG-800A; SMP 850; SEC 800. D Tabor, WLCK, Box 158, Scottsville KY 42164.

CBS Audimax RII2 tube type level control w/spare memory module, BO/trade for LA-3A, all cond. J Roper, Imperial Sound, 383 N Studio St, Terre Haute IN 47803. 812-877-2663.

**Optimod 8000 and 8100 Buy-Sell-Trade 414-482-2638**

CBS 4000 Volumax, \$400. D Seavy, KROC, 122 SW 4th St, Rochester MN 55902. 507-286-1010.

Volumax 4000A, \$300/BO, 1 for parts; Orban 245E synthesizer, \$200. R O'Kelly, 503-733-2217.

Mod Sciences Stereomaxx FM audio separation enhancer, 1 yr old, \$1200. A Keddie, WTP1, 3135 N Meridian St, Indianapolis IN 46208. 317-925-1079.

dbx 140 type II noise reduc, stereo; Comrex RLX single space rack mount; CRL FM-2 w/SPP-800 stereo prep proc & SP-800 stereo mod proc, BO/all. J Geering, KYKY, 3100 Market St, St Louis MO 63103. 314-531-9898.

CBS Audimax needs some tubes, \$75. R Rushing, Rcdg Studio, 11710 Hoyt Ave, Tampa FL 33617. 813-988-0496.

Marti CLA-40H (2), \$100 ea. J Michaels, WMVR, 2929 Russell Rd, Sidney OH 45365. 513-498-1055.

ATI Emph-A-Sizer, \$400. D Seavy, KROC, 122 SW 4th St, Rochester MN 55902. 507-286-1010.

Harris MSP90 AM peak, \$300. R O'Kelly, 503-733-2217.

UREI BL-40 w/manual, \$175. D Stebbins, KZZN, Box 192, Littlefield TX 79339. 806-385-4474.

Gates SA-39 tube type, gd cond, \$100. D Merrill, WROA, POB 2639, Gulfport MS 39505. 601-832-5111.

**Want to Buy**

Gates Solid Statesmen/similar. Rick, GRN, POB 2495, Patchogue NY 11772. 516-736-6347.

CRL PMC 300A peak. D Brown, WBZ, 49A Prairie Ave, Newton MA 02166. 617-332-9326.

Aphex 103A Compellor, aural exciter. R O'Kelly, 503-733-2217.

**MICROPHONES**

**Want to Sell**

Cebeless MB MBC-520 pair of condenser w/PS, German made, similar to AKG, \$350/BO; EV-666, mint, \$150; Fostex M55 RP, new ribbon type, \$300/BO. J Diamond, Blue Diamond, Box 102C Chubbic Rd, Canonsburg PA 15317. 412-746-3455.

AKG C414EB mint cond w/phantom pwr supply. J Green, Audio Brochures, 1078 Barbara Ct, N Bellmore NY 11710. 516-221-1344.

EEV RE-20 w/Luxo pro-bracket boom, excel cond, \$400. D Morris, WKUN, 204 W Spring St, Monroe GA 30655. 404-267-6558.

Sony ECM-21, \$100; C-22, \$150; ECM-22, \$150; ECM-65F, \$200; ECM-56, \$275; ECM-377, \$300; ECM-33P, \$200, AC-148A pwr supply, \$125, all mint cond. J Diamond, Blue Diamond, Box 102C Chubbic Rd, Canonsburg PA 15317. 412-746-3455.

Beyer M-500 cardioid ribbon, \$200. P Cibley, Cibley Music, 138 E 38 St, NY NY 10016. 212-986-2219.

CAD Equitek II (5) multi-pattern condenser w/windscreen kt & stand mount, new, \$650 ea; CAD-88 & 89 unidirectional PA, new. M Anderson, Jerge Studio, 1469 3rd Ave, New Brighton PA 15066. 412-847-0111.

Sure SM7 (3) dynamic cardioid, 2 yrs old, mint cond, \$450 ea/BO. J Powers, KTBO, POB 831508, Nacogdoches TX 75953. 409-560-6677.

EV 644 shotgun, new, \$60/BO. B Petruzzi, A-Z Music, 5050 Tamarus #269, Las Vegas NV 89119. 702-736-2303.

EV RE16/RE10 (3) EV RE165 & EV RE10, new, \$240 ea/BO; (1) RE10, \$160 ea/BO. M Wagner, LTM, 177 Hartford Rd, Manchester CT 06040. 203-565-9851.

EEV RE-11 w/bass roll-off switch, blast filter, 90 Hz-13 kHz, lined metal storage box, gd cond, \$80; Nady 49-F wireless system, lavalier mic, body xmtr, rcvr has signal & audio bar graphs, 120V/12V oper, tuned to red chnl 49.830 MHz, gd cond, \$75. R Williams, Krueger Prods, 6333 Pacific #203, Stockton CA 95207. 209-461-2123.

Telefunken U-47, Neumann U-67, KM-54 mint; RCA ribbon mics (2) KU3A's 10,0001, (3) 77-DX, (1) 44-BX, (2) BK-5; Altec tube mics M-11, M-20, M-30; 639 film version mic ect. Trade or sale. Tracy Eaves, 615-821-6099 (evenings before 10PM EST).

Desk mics (hiZ), EV-Shure mic stands, also baby booms (3); tubes, new (32) RCA, GE, Sylva; Sams tube sub books #8 & #6; RCA tube manual; Sony head demagnetizer (new); jack femal connectors; EV 502 transformer primary/secondary. Mr. Oliver, 212-874-7660/0274. Call afternoons till 10PM.

**Want to Buy**

HP lab reference prefer 1" condenser unit. S Dorsey, WCWM, 173-7 Merrimac Terr, Williamsburg VA 22183. 804-229-1547.

**MISCELLANEOUS**

**Want to Sell**

Up timers, new 2" readouts, counts to 9:59 then resets, \$5750. D Peluso, KJUL, 2880 E Flamingo Rd Ste E, Las Vegas NV 89121. 702-732-2200.

TV station liquidation, xmit & receive UHF ants, Drake sat rcvr, Wegener 1601 mainframe, 3/4" port rec, UHF pre-amps, gd cond. John, 509-826-0100.

Multisync MDA1B controller, BO. J Socolof, KULL, 3500 Maple Ave Ste 1470, Dallas TX 75219, 214-526-2580.

GR 1931-B mod radio monitor on 1379 kHz, BO; Ampex 601 deck w/tube elect, parts; Karr Conaler II, BO. W Craig, WGOH, POB 311, Grayson KY 41143. 606-474-5144.

**COMREX RENTALS**

1, 2 and 3-Line Extenders Switched 56 Systems Call Steve Kirsch for details Silver Lake Audio (516) 623-6114

Audio/RF tech manuals for Sparta Elec Corp equip. D Peluso, KJUL, 2880 E Flamingo Rd Ste E, Las Vegas NV 89121. 702-732-2200.

Kohler S340 auto xfer switch, 3 phase, 240 V, 225 A, \$1500. J Salov, WHGR, 3431 W Houghton Lk Dr, Houghton Lk MI 48629. 517-740-1165.

Kenwood TK 801-S land 2-way radio, UHF 450-470 MHz w/5 W DC conv & manual, gd cond, \$250; 400 gospel & C/W albums from 50s & 60s. \$1 ea; ET 700 elect 7-day time switch, new, \$200. D Morris, WKUN, 204 W Spring St, Monroe GA 30655. 404-267-6558.

Audio Xformers: (9) Ampex 4580116-20, 600 ohm input-15k ohm out; (4) Triad A10-J & Peerless 15095, both 150/600 ohm input to 60k ohm out, \$15 ea. S Lawson, KAK Prods, 928 Hyland Dr, Santa Rosa CA 95404. 707-528-4055.

AM retiring, equipment and parts must go. Write or call for list. James Doiron, 505-522-0331.

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Triad 120/7 isolation xformer for breaking pwr line to load grd loops, 120 V in/out, 7 amps, \$70; (2) EEV T-350 hi-freq tweeters, (2) University mid range 1040A, (2) 3-way University, N-3 crossover ntws, \$200 all. S Lawson, KAK Prods, 928 Hyland Dr, Santa Rosa CA 95404. 707-528-4055.

Combiner, Shiveley FM high pwr xmtr combiner, excel cond, Electro (20 kW) FM air cooled dummy or reject load. Goodrich Ent., 11435 Manderson St, Omaha NE 68164. 402-493-1886.

**Want to Buy**

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Turntables, disc recorders, tube amps, limiters, audio journals, 45/78 records, related material. K Gutzke, Custom Recording, 7134 15th Ave S, Minneapolis MN 55423. 612-866-6183.

Radio Shack TRS-80 software for TRS-80 III. E Stanley, KBTC, Box 12, Bottineau ND 58318. 701-228-2483.

Triad HS-29 audio interstage xformer w/push-pull plates to pushpull grids; Triad HS-56/HS-56V audio xformer line to line. A Grundy, Inst Audio Rsch, 64 Univ Pl, NY NY 10003. 800-544-2501.

UTC LS xformers; schematic for Western Electro-Acoustic Labs condenser mic pwr supply. R Robinson, 203-269-4465.

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.

TFT 760, \$150; Gates MO2639 AM mod, \$100. R O'Kelly, 503-733-2217.

**Want to Buy**

Belar AMM2/3 AM mod. George, WWCR, 1300 WWCR Ave, Nashville TN 37218. 615-255-1300.

Gates M5693. S Todd, 612-483-9163.

McMartin parts specifically tuning fork in EBS decoder. S Engelke, 215-828-6965.

FM stereo, working with IB, reasonable price. J Crawley, WMJL, POB 185, Campbellville KY 42718. 502-465-8884.

Any older McMartin mod monitors. C Goodrich, 11435 Manderson, Omaha NE 68164. 402-493-1886.

**MONITORS**

**Want to Sell**

Gates GTM-88F FM freq, BO. J Michaels, WMVR, 2929 Russell Rd, Sidney OH 45365. 513-498-1055.

**RECEIVERS & TRANSCEIVERS**

**Want to Sell**

Sony SRF-A1 AM stereo Walkmans, new, \$100 ea. C Fox, WOLF, Box 1490, Syracuse NY 13201. 315-468-0908.

Collins R390A (2) military HF tube, one works well, other for parts w/manual, you pick up, \$500 both. D Rickmers, D.R. Media, 1117 Peden, Houston TX 77006. 713-529-0233.

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Moseley PCL-505 mono, \$800/BO. T Ray, 203-522-1080.

Regency Cary-Corn 5 5-chnl handi-talkie, FM w/chrg, needs batt pack, 2 W out, \$50. W Craig, WGOH, POB 311, Grayson KY 41143. 606-474-5144.

Marti MR 30/150/170 w/pwr supply, tube, \$150. J Michaels, WMVR, 2929 Russell Rd, Sidney OH 45365. 513-498-1055.

**REMOTE & MICROWAVE EQUIP**

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Marti SCG-10/SCD-10 (2) pr on 39kHz, (2) pr on 92kHz, (1) pr on 67K. \$900/pr. T Ray. 203-522-1080.

Moseley MRC-1600 telco remote, gd cond. \$1200. S Youngberg. WLOL, 540 N Emerson, Cambridge MN 55008. 612-689-1055.

DB DCV FM band xlator. Allen. 404-325-7847.

Moseley PCL-505 STL for parts. BO. T Ray. 203-522-1080.

TFT 7601-C digital. \$1200. R O'Kelly. 503-733-2217.

Moseley SCG-9. \$250. D Seavy. KROC. 122 SW 4th St. Rochester MN 55902. 507-286-1010.

SA DAT (2) 15-kHz cards. \$200 ea. D Seavy. KROC. 122 SW 4th St. Rochester MN 55902. 507-286-1010.

**Want to Buy**

Wegener 1801/1601 systems. R O'Kelly. 503-733-22-7.

Gentner VRC/Sine System. R O'Kelly. 503-733-2217.

**SATELLITE EQUIPMENT**

**Want to Sell**

Prodellm 3-meter dish w/Harris 6550 rcvr. \$500. B Walters. WASE. POB 2087. Elizabethtown KY 42702. 502-769-1055.

Wegener 1601 w/1606. (2) 1610. 1645. 1646. 1605. \$200/BO. Fairchild 156 kHz chnl card for DART 384 rcvr. \$500/BO. R Morrison. WBZW. POB 932. Wooster OH 44681. 216-262-0503.

Wegener Format 41 rcvr/decoder. excel cond. \$4500/BO. s/h incl. T Smith. WQLS. 331 Ross Clark Cir. Dothan AL 36303. 205-671-1234.

Harris 5100 10' Delta gain dish used at remote site. \$7000. J Anthony. KTTN. Box 307. Trenton MO 64683. 816-359-2261.

Macom VR3X rcvr. \$300. R O'Kelly. 503-733-2217.

Systemation Superswitch for sat music ntwk. 1 1/2 yrs old. \$300. S Beeny. KRMS. Box 4564. Osage Bch MO 65808. 314-348-2772.

**Want to Buy**

TV Ku-band exciter video & audio; uplink dish. 5 meters or more. Ugly George. UG. Sat TV. 840 8th Ave. NY NY 10019. 212-969-0240.

**STATIONS**

**Want to Sell**

AM Class IV cvg over 34th mkt in mid-South. gd equip. one roof oper. real estate opt. low down pymt. pref exper buyer. L Johns. 615-381-1704.

Class C FM/10 kW AM. Miles City MT. top audience share. reg signals. mint equip. \$595000. Paul. 612-222-5555.

250W daytimer in SW MO just outside Springfield. gd community spt. \$34900. G Muse. KMRP. POB K. Marshfield MO 65706. 417-468-6188.

6 kW-FM, Joplin, Missouri. \$290,000 cash/firm. 417-781-1100.

5 kW AM and Class A FM in Missouri. only FM in county of over 160,000. excellent owner financing. Hal Duff. 1-800-424-2157 ext 545.

AM/FM Joplin, Missouri. 6 kW-FM. 5 kW-AM. \$580,000 cash/firm. 417-781-1100.

**Want to Buy**

AM/FM/Combo no money down & owner financing. K Weiss. WTVT. 17729-D Lake Carlton Dr. Lutz FL 33549. 813-463-2244.

**STEREO GENERATORS**

**Want to Sell**

Moseley SCG-3T. \$175. J Michaels. WMVR. 2929 Russell Rd. Sidney OH 45365. 513-498-1055.

Harris/BE STX-18/AS-10 C-Quam AM. works well. very nice mon & Kosmik audio 2300A phase chaser. new. \$995. P Patton. WAPO. 29 W Main St. Jasper TN 37347. 615-942-5611.

**SWITCHERS (VIDEO)**

**Want to Sell**

Panasonic AGSW100 AFV w/10 outputs. \$500. Shomi Adventure. new w/built in camera CCUs. downstream keyer has 82 inputs/outputs & 103 indicators. \$2900. Roman. World Video. 10625 Scripps Ranch Blvd. San Diego CA 92131. 619-695-1045.

GVG parts. \$300. American Data Systems. \$250. W Rudd. 205-826-0390.

**TAPES/CARTS & REELS**

**Want to Sell**

Music svc w/2 complete format libraries+recording equip. tremendous potential. great price. J Gelo. 813-642-6899.

3M/Sony/Ampex (100) shipping containers for 1" tape w/locking hatches. \$3 ea. Roman. World Video. 10625 Scripps Ranch Blvd. San Diego CA 92131. 619-695-1045.

Scotchcart II/Audiopak A-2 new/used. P Wells. KJOY. 625 Broadway #1200. San Diego CA 92101. 619-238-1037.

Audiopak AA-4 (200). used. 20 sec-5.5 min lengths. gd cond. low use. \$2-53 ea. C Scherer. 215-370-9046.

Fidelipac (2500) various lengths. gd cond. \$2000 all/51 ea. R Owen. KJOJ. POB 2368. Conroe TX 77305. 409-756-5501.

Comedy show America's Funniest Audios. \$2/week. R Schodel. WMCR. 6630 Monclova Rd. Maumee OH 43537.

Instant music format, lite AC library w/over 1100 songs on Scotch Cart II. recorded in stereo from Cent 21 Gold Disc CDs w/2 mobile cart racks that ea hold 660 carts. G Frischling. WLTJ. 7 Pkwy Ctr Ste 750. Pittsburgh PA 15220. 412-922-9290.

Pams Jingles & other jingles packages. TV themes & underscores to trade. Steve. SuperSonics. 1401 NE 159th St. N Miami FL 33162. 305-949-2040.

Used mostly Gold Mastercards. Dynamax & Red Mastercards. (3) 70s. (40) 100s. (20) 2.5s. (5) longer lengths. lightly used. clean. erased. cued to splice. \$120. M Friend. WTVJ. Box 711 Newcomb Hall Sta. Centreville VA 22904. 703-924-0885.

Eng student desiring donation of old bdct equip (anything) in repairable cond. will pay all shipping charges. EE student at Purdue. C Gill. POB 371. Indianapolis IN 46205. 317-923-2800.

Monte Vista Christian School. would appreciate any donations of used TV broadcast equipment. T Quinn. 408-475-0423.

**TEST EQUIPMENT**

**Want to Sell**

Technical Materials 5 kW dummy load. convection cooled. 50 ohms up to 30 MHz. 6'x4'x2.5'. ventilated weather proof. new. \$1000; ITT 17" oscilloscope w/manuals, fair cond; Panaramic (1) audio spec analyzer and (2) super sonic audio (10-150 kHz) spec analyzers. BO. R Meyers. Benchmark Comm Corp. 4700 SW 75 Ave. Miami FL 33155. 305-264-5963.

Patch bays (4) ADC single inputs (24) rack mount; Dynakit pre-amp PAS 2; manuals for Ampex recorders 601. 351. 350 also for Gotham PBF 150 W amp & Neuman lathe 131 disc cutter; Ampex mixer MX-35. Mr. Oliver. 212-874-7660.

Potomac RMP-19 meter panel for AM-19 ant mon. \$50. T Ray. 203-522-1080.

Heath Schlumberger SM-20 vacuum tube voltmeter. D Morris. WKUN. 204 W Spring St. Monroe GA 30655. 404-267-6558.

**RADIO RESOURCES**

We can save you \$ on your next equipment or supply purchase

Ask for our current list of quality pre-owned equipment Equipment available to rent for a day or a month

- Field strength meters
- Audio test system
- Impedance bridge
- Telephone frequency extender
- Spectrum Analyzer

**1-800-54-RADIO**  
**1-800-547-2346**

FAX  
**1-301-783-4635**  
9am-6pm EST

**Circle (4) On Reader Service Card**

Leader LVM 5863A waveform & color in leather case. new. \$1300. Roman. World Video. 10625 Scripps Ranch Blvd. San Diego CA 92131. 619-695-1045.

PR 70-24. 70-21/22 Tomcat align carts. full-trk. will trade. we pay s/h. Rick. GRN. POB 2495. Patchogue NY 11772. 516-736-6347.

Avcom PSA-65A 100 kHz-16 Hz spectrum analyzer. BO. C Springer. KSEC. POB 890. Lamar CO 81092. 719-336-2206.

Patch bays (4) ADC single inputs (24) rack mount; Dynakit pre-amp PAS 2; manuals for Ampex recorders 601. 351. 350 also for Gotham PBF 150 W amp & Neuman lathe 131 disc cutter. Mr. Oliver. 212-874-7660/0274. Call afternoons till 10PM.



**Circle (16) On Reader Service Card**

**Want to Buy**  
Jingles packages & TV themes/underscores. Steve. SuperSonics. 1401 NE 159th St. N Miami FL 33162. 305-949-2040.

**TAX DEDUCT EQUIP**

Considering a tax deduction? We are the bdct training school for underprivileged from poor/low income families. Call 615-624-7126.

Will accept letters from schools for donation of Radio Design Labs PODS to make up 2 control boards. new. D Carrigan. KJUL. 2880 E Flamingo Rd Ste E. Las Vegas NV 89121. Fax 702-731-1211.

Non profit org needs low pwr AM/FM xmtrs. CD plyrs. any donations/low priced equip. R Schodel. WMCR. 6630 Monclova Rd. Maumee OH 45357.

Nonprofit educ radio seeking college-quality donations in working order. Dr Newcomb. Grand River Radio. 19130 Nelson-Parkman. Garrettsville OH 44231. 216-693-4125.

Nems Clark AM field strength mtr. working. \$500. A Crain. WLVV. POB 1364. Southaven MS 38671. 601-393-8056.

Goldline TS-1 audio test set. rack mountable. new. \$149. Potomac FIM-72 UHF field strength meter. \$5495. Steve. 401-783-0737.

B&B Phase Scope AM2 used once w/manuals. \$2000. G Fern. Best Audio. POB 2366. Van Nuys CA 91404. 818-763-2378.

Potomac AM-19 antenna. single pattern. 2-tower. 50-ohm termination. \$1000. T Ray. 203-522-1080.

**TRANSMITTERS**

**Want to Sell**

McMartin BF25K 27.5 kW on 107.3. spare parts. new tubes less exciter. \$15000. D Solinsky. WWRM. 877 Exec Ctr Dr W. St Pete FL 33702. 813-576-1073.

Precision AM 100 mW. 530-1610 kHz. perfect cond. tunable. \$360/trade for R/P cart mach. F Smith. 615-624-7126.

Details on space availability  
Call  
**1-800-336-3045**

Gates FM-1G gd cond tuned to 92.7 MHz. BO. C Hunter. KBOX. Box 518. Santa Maria CA 93456. 805-735-7656.

Elettronica KA 15000 FM w/600 W driver. \$32K w/o. \$37K w/exciter & driver. Allen. 404-325-7847.

40 kW harmonic filter for RCA 20 kW xmtr. band cut for full FM. \$400+s/h; plate xformer for TTC 10 kW xmtr. 3 yrs old. excel cond. \$500+s/h. K Austin. Austrn Bdcig. 1101 Hwy 81 N. Marion OK 73055. 405-658-9292.

RCA BTF 40E1 FM. gd cond. \$1500. R Dees. 806-355-4554.

Harris FM 10H3 excel cond tuned to 94.7 w/spare finals. \$13500. R Stratton. WXID. POB 679. Mayfield KY 42066. 502-247-5122.

Gates/Harris TE-3 gd cond on 107.1. \$500. D Merrill. WROA. POB 2639. Gulfport MS 39505. 601-832-5111.

McMartin BF25K 27.5 kW on 107.3. spare parts. new tubes, less exciter. \$15,000. D Solinsky. WWRM. 877 Exec Ctr Dr W. St Pete FL 33702. 813-576-1073.

**NEW 3 kW FM transmitters for under \$14,000.**  
Call for details  
**Bill Hoffman**  
**518-583-9490**

Used Transmission Line. many sizes & lengths. many like new. 816-635-5959.

# TRANSCOM CORP.

Fine Used AM & FM Transmitters and Also New Equipment

For the best deals on Celwave products, Andrew cable and Shively antennas.

1 kW FM	1964 Gates FM1C	1 kW AM	1967 Collins 20V3
1 kW FM	1978 Collins 831C2	1 kW AM	1982 Cont. 314R1
2.5 kW FM	1978 CCA 2500R	1 kW AM	1974 Harris BC1H1
5 kW FM	1968 Collins 830E1	1 kW AM	1968 Harris BC1G
20 kW FM	1974 RCA BTF 20E1	1 kW AM	1978 Harris MW1A
25 kW FM	1988 Wilkenson 25,000	2.5 kW AM	1982 CCA 2500D
30 kW FM	1980 BE FM-30	2.5 kW AM	1976 McMartin BA2.5K
		5 kW AM	1968 Harris BC5H
		5 kW AM	1972 CCA AM5000D
		5 kW AM	1977 RCA BTA 5L
		10 kW AM	1972 RCA BTA 10U
		50 kW AM	1977 CCA AM5000D

1077 Rydal Road #101  
Rydal PA 19046

800-441-8454 • 215-884-0888 • FAX No. 215-884-0738

**TRANSMITTERS . . . WTS**

FMS 1-C 1 kW, tube w/o exciter, gd cond, \$1500+ s/h; Gates TE-3 Statesman FM exciter, solid state, \$750. J Michaels, WMVR, 2929 Russell Rd, Sidney OH 45365. 513-498-1055.

**50 kW AM Transmitters**

(Two) Continental 317C transmitters in good condition! Will be checked on your frequency before shipment! \$65,000.00 each... some spare parts also available! Call 806-372-5130 for specific information! Transmitters available April 1992.

Combiner, Shiveley FM high pwr xmtr combiner, excel cond. Electro (20 kW) FM air cooled dummy or reject load. Goodrich Ent., 11435 Manderson St, Omaha NE 68164. 402-493-1886.

RECTIFIERS: molded replacements and open assemblies available. Upgrade kits for older transmitters. DEALERS WELCOME. Repairs on open assemblies. Plastics Technology Inc, 205-633-6277 or FAX 205-633-3202.

**TRANSMITTERS**

15 watt FM Harris MX-15 Exciter  
 30 watt FM B-E FX-30 Exciter  
 2.5 kW FM 1977 Harris 2.5H3  
 5 kW FM 1969 Visual 5KB  
 20 kW FM 1972 RCA 20E1  
 20 kW FM 1987 B-E 20A  
 25 kW FM 1974 AEL 25KE  
 1 kW AM 1978 Harris MW-1A  
 2.5 kW AM 1988 Nautel Amfet 2.5

**PMA Marketing, Inc.**  
 "Transmitting Savings to You"

**414-482-2638 FAX 414-483-1980**

**Want to Buy**

AM 60-100 W 530-1610 kHz, tunable. F Smith, 615-624-7126.

1 kW solid state. P Kapiloff, WLLH, POB 1818, Lowell MA 01853. 508-458-8486.

**WE BUY**  
**MOSELEY PCL-303, 505, & 606's**  
**414-482-2638**

20/25 kW AM needed for VA. L Smith, Ultra High Fidelity Medium, POB 1339, Frederick MD 21702-0339. 800-786-9180.

QEI 675T150/similar 150 W solid state FM pwr amp, any age. M Humphrey, WRTI, Temple Univ Annenberg Hall, Philadelphia PA 19122. 215-787-8426.

McMartin AM/FM xmtr, any model, exciter or stereo modules. Goodrich Ent., 11435 Manderson, Omaha NE 68164. 402-493-1886.

3CX1500A7, 4CX5000A, 6146B, 4CX250B, 4CX3000A & more. We carry large inventory all major brands, Eimac, Amperex, RCA, etc. Call Stew 1-800-842-1489.

**Want to Buy**

828s (2) modulators for ham restoring old GE rig. P Courson, 202-955-7363.

**TURNTABLES**

**Want to Sell**

Technics SL1200 MK2 (2), new, \$450 ea/BO; Harris CB1200 w/3345/78 spds, \$100 ea/BO. J Powers, KTBO, POB 831508, Nacogdoches TX 75953. 409-560-6677.

**Want to Buy**

Gates CB11. S Todd, 612-483-9163.

**TV FILM EQUIP**

**Want to Sell**

EIKI (2) theater type w/EX 6100 Xenon lamp sound film proj.s, auto changeover, douser sound relays, optical/mag sound system, low hrs, pedestal bases, gd cond. W Rudd, 205-826-0390.

**VIDEO PROD EQUIP**

**Want to Sell**

Shomi Cheetah dual time base corr & frame synch, fader bar built in, can dissolve between 2 VTRs, \$1400. Roman, World Video, 10625 Scripps Ranch Blvd, San Diego CA 92131. 619-695-1045.

Quanta Select 7 char gener w/dual disc drive, works gd, \$2300. Roman, World Video, 10625 Scripps Ranch Blvd, San Diego CA 92131. 619-695-1045.

Aurora AV/220 paint box system w/1.12.1, works excel, \$15000. Roman, World Video, 10625 Scripps Ranch Blvd, San Diego CA 92131. 619-695-1045.

Telcom TCG550 time code gener, \$700. Roman, World Video, 10625 Scripps Ranch Blvd, San Diego CA 92131. 619-695-1045.

Chyron VP-2 char gener, new, mult fonts & sizes, \$3500. B Bridges, KCAM, 827 Meridian St, Nashville TN 37207. 615-226-1122.

Convergence Super 90 w/built in time code readers for Sony 3/4" 5800 & 5850 VCRs, \$1200. Roman, World Video, 10625 Scripps Ranch Blvd, San Diego CA 92131. 619-695-1045.

Kurzweil 250, loaded, new, \$7500. Roman, World Video, 10625 Scripps Ranch Blvd, San Diego CA 92131. 619-695-1045.

CVS 504B time base corr, excel cond, \$400; Sony time base corr I, parts, \$215. W Rudd, 205-826-0390.

**VIDEO TAPE RECORDERS**

**Want to Sell**

Sony BVH500 1" port w/color stabilizing unit & external pulse gener, gd shape, \$3800. Roman, World Video, 10625 Scripps Ranch Blvd, San Diego CA 92131. 619-695-1045.

Sony AC-2400/3400 pwr supplies for 2400, 3400 video tape decks, BO/trade for audio gear. J Roper, Imperial Sound, 383 N Studio St, Terre Haute IN 47803. 812-877-2663.

Sony 5850 U-Matic 3/4", edit, new, \$4500. B Bridges, KCAM, 827 Meridian St, Nashville TN 37207. 615-226-1122.

Sony 5850 & 5800 w/RM 440, low hrs, \$6800 FOB West Kansas. J Harsah, 913-672-3428.

Sony 3/4" w/XLR audio plugs, \$750. J Harsh, 913-672-3428.

## EMPLOYMENT

To place ads in this section, use the ActionGram form. To respond to box numbers, write Radio World, PO Box 1214, Falls Church, VA 22041, Attn: \_\_\_\_\_

**POSITIONS WANTED**

Experienced at seeking new challenge, S/SE, small/med mkt. J Reynolds, 919-671-1162.

Former GM & 20 yr veteran bdcter (PD/OM) seeks pos w/bdct facility in Balt/DC/PA mkts. B White, 401-931-1176.

Energetic informative Golden Era show w/trivia & facts seeks AT opening in E/SE, avail on tape. E Pell, 201-791-4610.

Young Christian man w/Bus Admin & Masters Degree in Christian Educ seeks radio bdct/mgmt pos. K Bolt, 417 S Story St, Boone IA 50036. 515-432-1741.

Secretary/Traffic/Prod/AM Anchor seeks FT pos, will relocate, call collect. Beth, 814-288-3402.

#1 rated programmers w/unique format, engr/audio guru, sales/mktg wizard & staff, temp/per. B Elliott, B Bryar, 813-849-3477.

High energy, hard working personality seeks new challenge in CHR, AOR, M/C, C&W or news/talk, prefer FL, will consider all. D Alan, 904-237-5816.

Announcer on top C/W combo overnight show w/CHR/AC/ prod/remote exper seeks better hrs. Tony, 616-696-1631.

Mgmt consultant w/20 yrs exper avail for new station build-outs/existing turn-arounds, hiring/training sales & on air staff, excel credentials. 512-490-7489.

AC bdcter searching for PM/overnight pos, dependable, stable, excel refs, 18 yrs in radio, other shifts considered. Mike, 904-255-6950.

Seasoned engr seeks challenge & oppor w/bdcter, dependable, hardworking, dedicated, prefer midwest, IL-CO. Gerry, 712-258-0628.

Irish CE hard working, AM/FM/STL/construction w/11 yrs bdct exper, SBE senior cert wants to move to USA. Peter, 011-353-1-406778.

Bdct adv specialist w/19 yrs exper in mgmt/sales, NE area, radio/TV/agency corp promo expert, copy, prod. 617-834-0028.

Creative 9-yr pro, major mkt, exper CHR, UC, jazz, seeks PD, APD, MD in med-small mkt. Skip, 212-465-3416.

Take charge mgr revenue/ratings driven w/25 yrs exper, new constructions, upgrades, sales, programming, short term considered, South/Mid West. J Parker, 502-247-0990.

1-yr college grad w/BS in Comm, prod specialization w/quality voice & superb prod, the investment your station is looking for. Colin, 703-792-2681.

Aggressive, tireless, company-minded seeks sm/med Midwest mkt mgmt pos, 13 yrs exper as Ops Mgr, Bus Mgr, CE, sales on-air. Deb, 712-792-5653.

Exper friendly highly-motivated adult communicator w/great prod skills seeks stable oppor, team player, AC/bodies/C&W. Dave 712-262-7954.

**HELP WANTED**

COMPANY PAID TRAVEL...to install computer automation. Must know music scheduling, traffic, and automation; DOS computers; radio engineering. People skills and ability to train required. FAX resume, salary history to: Brad Young, TM Century, Dallas, 800-749-2121.

Engineer, 3 stations, 1 market, \$25,000 minimum plus perks. West Texas. EOE. Write to: Radio World, POB 1214, Falls Church VA 22041. Attn: Box •RW04-u8-1.

**ECONCO**

**Quality Rebuilt Tubes**

Approximately 1/2 the Cost of New

Call for Our Price List  
**800-532-6626**  
**916-662-7553**

**FAX 916-666-7760**

**Circle (8) On Reader Service Card**

Xmtr (4) 833-A, (1) 8008, \$15 ea. R Rushing, Rcdg Studio, 11710 Hoyt Ave, Tampa FL 33617. 813-988-0496.

Audio generator, TE22 (Lafayette), Sencore translator tester (portable); Cannon plugs, male & female 3 prong (new); new & used cable w/Cannons or without. Mr. Oliver, 212-874-7660/0274. Call afternoons till 10PM.

## ACTION-GRAM

**Equipment Listings**

Radio World's Broadcast Equipment Exchange provides a FREE listing service for all broadcast and pro-sound end users. Simply send your listings to us, following the example below. Please indicate in which category you would like your listing to appear. Mail your listings to the address below. Thank you.

Please print and include all information:

Contact Name: \_\_\_\_\_

Title \_\_\_\_\_

Company/Station \_\_\_\_\_

Address: \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone Number: \_\_\_\_\_

Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a **paid** basis. Line ad listings & display advertising are available on a per word or per inch basis. Call 1-800-336-3045 for details.

I would like to receive or continue receiving Radio World FREE each month.  YES  NO

Signature \_\_\_\_\_ Date \_\_\_\_\_

Please circle only one entry for each category:

**I. Type of Form**

- |                              |                                 |
|------------------------------|---------------------------------|
| D. Combination AM/FM station | F. Recording studio             |
| A. Commercial AM station     | G. TV station/teleprod facility |
| B. Commercial FM station     | H. Consultant/ind engineer      |
| C. Educational FM station    | I. Mfg, distributor or dealer   |
| E. Network/group owner       | J. Other _____                  |

**II. Job Function**

- |                       |                           |
|-----------------------|---------------------------|
| A. Ownership          | D. Programming/production |
| B. General management | E. News operations        |
| C. Engineering        | F. Other _____            |

WTS:  WTB:  Category: \_\_\_\_\_

Make: \_\_\_\_\_ Model #: \_\_\_\_\_

Brief Description: \_\_\_\_\_

Price: \_\_\_\_\_

WTS:  WTB:  Category: \_\_\_\_\_

Make: \_\_\_\_\_ Model #: \_\_\_\_\_

Brief Description: \_\_\_\_\_

Price: \_\_\_\_\_

\*Closing for listings is the first and third Fridays for the next month's issue. All listings are run for 2 issues unless pressed for space or otherwise notified by lister.

**Broadcast Equipment Exchange**

PO Box 1214 • Falls Church VA • 22041 • 703-998-7600 • FAX: 703-998-2966

## 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 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.

BROADCAST EQUIPMENT EXCHANGE • PO Box 1214, Falls Church, VA 22041

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Heavy Duty Replacement Transformers, DC Filter chokes and capacitors for AM & FM transmitters manufactured by:

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Circle (44) on Reader Service Card



# OPTIMUM OPTICAL D740 DIGITAL CD RECORDER

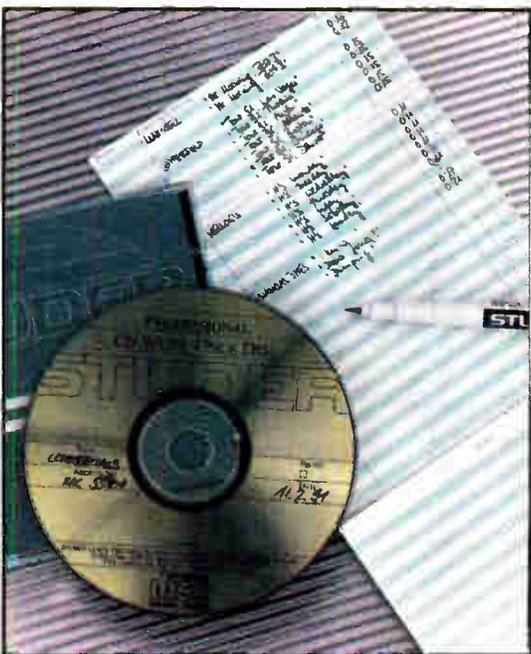
**OPTIMUM PERFORMANCE.** With Studer's D740 Compact Disc Recorder, custom CDs can now be produced conveniently in-house for demos, sound effects, studio refs, masters, jingles, com-

plete music libraries and more. For archiving tasks, the D740 offers the highest quality digital audio on a virtually nondestructive medium that takes up very little inventory space.

**INNOVATIVE DESIGN.** Studer's D740 combines a complete read/write unit, converters, encoder, decoder and subcode generator in a single, die-cast aluminum chassis. No additional hardware, PCs or filters are needed for operation. The D740's innovative format capabilities allow recordings of varying lengths to be put on

the same compact disc, and the D740 CDRs may be played back on any standard professional or consumer deck.

**OUTSTANDING AUDIO QUALITY.** Featuring the latest optical technology, Studer's D740 delivers the legendary audio quality you've come to expect. And as always, you'll get the complete service and on-line support from Studer's team of professional audio technicians to keep your facility up and running. To find out more about the D740 CD Digital Recorder, call the Studer office nearest you.



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Circle (33) On Reader Service Card

World Radio History

# STUDER

# PRODUCTS & SERVICES SHOWCASE

For more information on the products shown below, circle the appropriate Reader Service No.(s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.



**The Secret is out!**  
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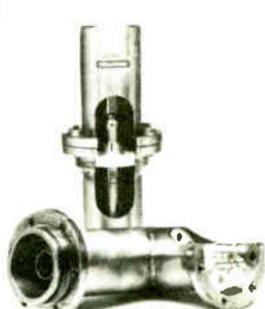
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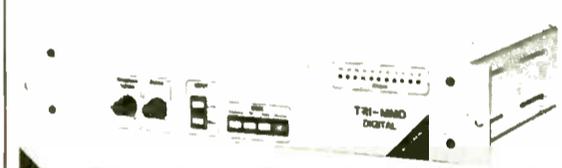
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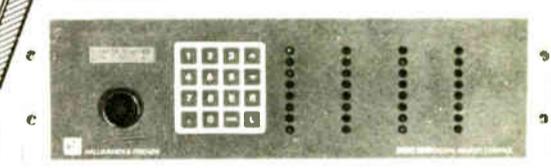
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# BUYERS GUIDE

April 22, 1992

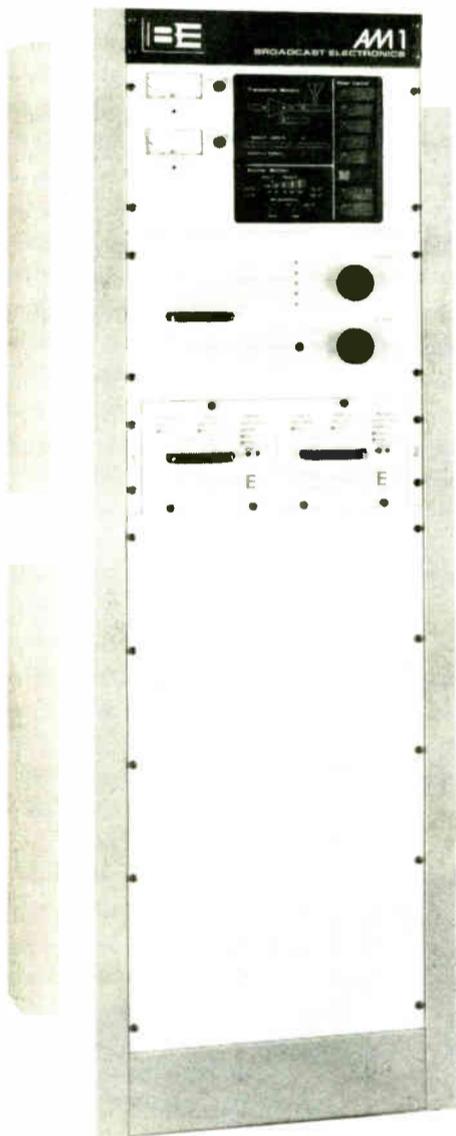
AM Transmitters & Exciters

## USER REPORT

# BE AM-1 Integrates C-QUAM Stereo

by Sam Caputa  
CE, KEZK-AM-FM

**ST. LOUIS, Mo.** Historically, broadcasting in AM stereo required the modification of an existing monaural AM transmitter by interfacing an external AM stereo generator to it.



The Broadcast Electronics Model AM-1 transmitter was put to the test by KEZK-AM-FM in St. Louis.

The on-air performance and quality of this arrangement varied greatly, depending on the circuit design, age and condition of the transmitter and its ability to operate into the varying bandwidth, impedance and phase characteristics of the antenna load.

Broadcast Electronics has taken the next logical step to significantly improve AM transmission and AM stereo performance. The Model AM-1 solid state AM stereo transmitter is designed as a system: It incorporates a unique, on-carrier C-QUAM stereo exciter with a patented Class E RF power amplifier, switching regulator power supply and a controller. The system is comprehensive yet simple to install and operate.

The 1 kW AM-1 was introduced last September and is currently available. There

also is a 5 kW version (Model AM-5), which was introduced in January and is scheduled for delivery in late spring.

### Rack-style cabinet

The AM-1 is housed in a full-height, sturdy, rack-style metal cabinet. At the top is the exciter/controller unit (ECU), which houses the exciter, stereo and controller plug-in circuit cards and motherboard.

There is a separate switching supply to power the ECU and a common extender card for maintenance. The front panel of the ECU contains two meters and selector switches to monitor Forward and Reflected Power and Line Voltage. The right side of the front panel is hinged and contains the power level controls, audio bar graph metering and status and alarm indicators.

There are five front panel selectable power levels and a raise and lower button for output level trimming. A diagnostic panel shows the operating status for all sections of the AM-1 to make trouble-shooting simple and straightforward. The audio metering is selectable to indicate Left, Right, L+R and L-R; it also is autoranging. All control, status and metering is remotely available on the back panel of the ECU using screw clamp terminals.

Below the ECU is the output network and tuning assembly, which has separate knobs for variable tuning and loading. The range of tuning in the output T-network is designed to match into an antenna VSWR as high as 1.5:1 at carrier.

There are recessed front panel trimmer controls to adjust the modulation monitor RF sample for each of the five selectable output power levels. Unwanted harmonics are attenuated by a seven-element bandpass filter and a clever circuit detects lightning strikes using a spark gap and a photo sensor.

An RF power block section is located directly below the output network assembly. This section contains two plug-in power modules rated at 700 W apiece. Each power module is made up of two power amp boards and one modulator board. The power amp boards each have two MOSFETs running "Class E" in a push/pull mode.

### Highly efficient

This class of operation is highly efficient and allows high RF power output with relatively few MOSFETs. The modulator PWM (Pulse Width Modulation) frequency runs in the area of 125 kHz, varying slightly with carrier frequency.

This allows for improved Bessel PWM filtering with minimum overshoot and greater transient response. The power modules can be reliably removed and inserted while the AM-1 is operating, allowing maintenance while on the air. The power modules are combined using a "Star Combiner" configuration. This allows continuous operation with a faulty or removed module and provides a constant load to the remaining module so that total output power is only 50 percent reduced.

Operator safety is a big consideration in

the AM-1 design. An AC line disconnect switch is incorporated into the rear door lock. Opening the rear door activates an antenna grounding switch to prevent stray charges from feeding back through the transmission line while working on the transmitter.

The AM-1 has been operating at KEZK(AM) St. Louis, as part of the field testing, since May 1991. KEZK operates at 590 kHz with a four-tower, in-line directional array, with a separate pattern for day and night mode.

### Narrow banded

The common point impedance is extremely narrow banded, especially at night. The towers are top loaded and there is up to a 3:1 VSWR in the sidebands. All of these factors add up to quite a proving ground for any transmitter, particularly a solid state transmitter.

The AM-1 is extremely tolerant of narrow and changing load conditions and the associated increase in VSWR. We are able to modulate higher and we do not experience

the ducking. During icing conditions we would sometimes have to reduce power drastically to stay on the air. The AM-1 operated through two separate icing incidents without us having to make any adjustments.

There was a big concern as to how the stereo signal was going to sound after passing through our antenna system. The AM-1 stereo generator has enough delay and equalization adjustment range to even compensate for KEZK's questionable antenna load.

There are separate EQ adjustments for day and night mode, which further helped the stereo performance. The results were impressive. KEZK plays an EZ Listening format using CDs for the source. The station sounds very good in mono and stereo with the AM-1. We have received good response from our listeners and from fellow engineers in the St. Louis area.

□□□

For information on the Broadcast Electronics AM-1 transmitter, contact Bill Harland at BE: 217-224-9600; fax: 217-224-9607; or circle Reader Service 130.

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USER REPORT

# DX-50 Meets N.Y. Talk Radio Challenge

by **Bill Krause**  
CE, WABC(AM)

**NEW YORK** Metro New York has to be one of the toughest talk radio markets in the country. At 77 on the AM dial, WABC is a consistent winner in the no-holds-barred ratings wars here. Our transmitters have to support that success record by keeping WABC

getting dirtier. Who knows what was in the air, but it got so bad we had green corrosion growing in the building, even inside the transmitters themselves. Due to the corrosion problem, there was no way to prevent the transmitters from arcing over inside, which caused additional damage.

The two MW-50 transmitters were about 15 years old, and one day they just died. We were off the air for three hours or so.

After that experience, I wasn't about to trust WABC-AM's future to outmoded tube technology. The only two solid state AM transmitters on the market were the Nautel and the Harris DX-50.

I visited the Harris factory in Quincy, Ill., to evaluate the DX-50. While at the factory, I tried to blow up the transmitter by shorting the antenna, discharging

a 50,000 V capacitor across the antenna input, modulating the transmitter at 140 percent with a 1 kHz square wave for several hours, and pulling the power to the transmitter several times.

I found that the transmitter survived this treatment with no problems. I also performed intermodulation and THD tests. The results were surprisingly good. The very satisfactory results of these tests and my fascination with the digital modulation, formed the basis of my decision to buy the DX-50s.

Installation of the two transmitters was easy, because each comes in two cabinets: the coupling network and the transmitter, which has a self-contained power supply. The transmitters are relatively light, which

made it easy to move them into place. The installation took two days from the day of delivery, and within 48 hours we had the first DX-50 on the air. We might have had it on the same day it came off the truck, but we had to wait for the electricians to hook it up.

**Operating costs**

Like every radio station these days, WABC-AM is concerned with operating costs. The DX-50's superior efficiency has paid big dividends in this area.

My power bill for the transmitter building has gone down by about \$1,500 a month, even with the addition of air conditioning. I was able to install two DX-50's in a completely closed, air-conditioned environment. The corrosion, humidity and dust problems are all gone. It is a nice, clean place to work in now.

Despite the attractiveness of the new transmitter facility, I spend a lot less time at the transmitter plant than I used to. If I didn't have to go to the transmitter site to fill out the maintenance log every week, I probably wouldn't see the transmitter very much.

The DX-50s have been trouble-free except for some "infant mortality," when we lost a few of the output transistors. Fortunately, several output transistors can go bad in any output module without making a noticeable difference in audio or signal strength.

**Very good response**

Harris' response to the few problems we did have was very good. In the first month, we had a problem with the analog-to-digital converter chip, which Harris identified and replaced within 24 hours.

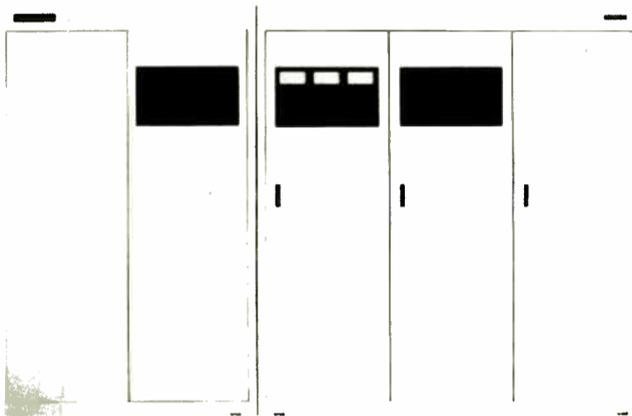
In a tough market like New York, signal quality is a vital weapon in the battle for ratings. The DX-50 has given WABC(AM) a real advantage. It has

definitely made an improvement you can hear on the air. Other people say, "You guys sound good," and that's because of the DX-50.

It doesn't have the intermodulation (IM) distortion that a tube transmitter has. The absence of IM is noticeable and allows us to process harder to get more apparent punch without emphasizing the processing distortion. It's just a real good sounding transmitter on the air.

□□□

For information on the Harris DX-50 AM transmitter, contact Ron Frillman at Harris Allied: 217-222-8200; fax: 217-222-7041; or circle Reader Service 53.



The DX-50 from Harris-Allied is scoring points with broadcasters worldwide.

(AM)'s 50,000 W signal clear and strong.

That job became very difficult a couple of years ago, when problems at WABC's transmitter site in Lodi, N.J., compromised the on-air availability of our two Harris MW-50 transmitters.

It wasn't only the fault of the two transmitters, it was a combination of lots of things. We had a very elaborate, over-designed air handling system that became a maintenance nightmare. Even the people who originally put it together couldn't keep it operating properly.

**Who knows**

On top of that, the air outside of the Lodi transmitter plant was quite dirty and

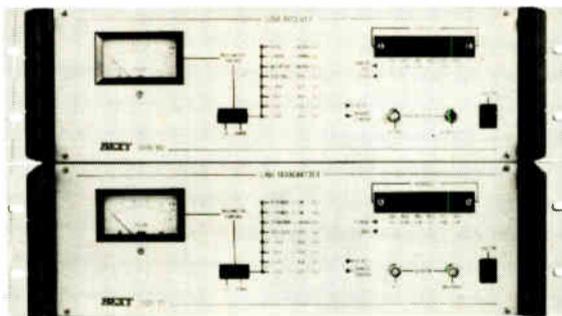
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## TECHNOLOGY UPDATE

# Electro Impulse's Cool Dummy Loads

by Mark Rubin  
President  
Electro Impulse Laboratory

NEPTUNE, N.J. Dummy loads for AM transmitters involve special considerations for proper selection.



Electro Impulse Laboratories DACT-7.5KFM dry, convection-cooled dummy load is suitable for 5 kW AM transmitters.

Of utmost importance is power rating. An AM transmitter normally is rated in terms of carrier output, but its dummy load must be rated for the full carrier, plus 100 percent modulation.

For example, a typical 10 kW AM transmitter requires a 15 kW rated load. Otherwise, the load could overheat when the transmitter was modulated.

Many transmitter manufacturers advertise modulation greater than 100 percent; Electro Impulse Lab loads are conserva-

tively rated, so no further upgrading of the power rating is necessary.

Power measurement techniques normally associated with coaxial line and higher frequencies cannot be used at AM frequencies. For example, most directional coupler-type wattmeters are not normally rated for use below 1750 kHz.

For power measurement in the AM band, a voltage divider-type circuit is available as an optional feature on many Electro Impulse loads. In this circuit, a part of the signal is attenuated by a voltage divider network and then rectified with a diode; a meter circuit is carefully matched and calibrated to the network impedance. This type of power measurement circuit is FCC type accepted.

AM loads are available in many different types of cooling, including convection, forced air-cooled and liquid-cooled. Convection and forced air-cooled are generally preferred for AM service and are readily available.

When sizing a load, remember to consider that all of the power dissipated by the load (carrier plus modulation) will be dissipated as heat. The room where the load is located should be suitably ventilated so that a reasonable temperature can be maintained even on a hot summer day with the load under full power. Loads should not be installed in an air conditioned room unless the air conditioning is properly sized for the full heat the load may dissipate.

Another method of dealing with the dissipated heat is to duct it out of the room. Ducting requires special considerations because it can restrict the cooling of a load. Only add ducting to a load that is specifically designed for ducting—or alternatively, add an air mover to the duct that matches the air flow of the load and place an exhaust hood over the air discharge so as not to add any backpressure to the load's own air mover.

Also bear in mind that an exhaust fan or duct system will mean that make-up air will be drawn into the room; this could further

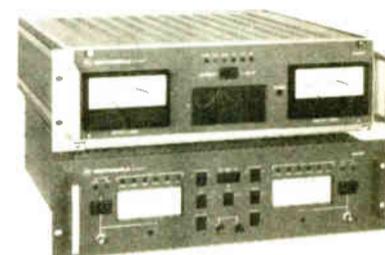
complicate the cooling of the room and could allow dust and other contaminants to enter.

Electro Impulse Lab loads for AM service use broadband matching techniques and do not utilize expensive tuned circuits. No tuning is required.

□□□

For information on Electro Impulse Laboratory dummy loads, contact Mark Rubin at 908-776-5800; fax: 908-776-6793; or circle Reader Service 27.

## BUYERS BRIEFS



**SCHAUMBURG, Ill.** The Motorola Model 1400 AM stereo exciter was designed after the company equipped more than 300 AM stations with C-QUAM stereo. It takes advantage of the knowledge gained in those installations to deliver top-quality AM stereo performance to the many transmitters with which it can work.

The Model 1410 AM stereo monitor delivers reliable performance and allows for easy optimization of stereo adjustments during installation.

The 1400 features a fold-down front with removable cards. All adjustments can be made from the front or top. Power supply status indicators confirm the proper operation of the power supply. The unit comes with standard day and night cards, which allow for independent adjustment for either different transmitters or two different antenna loads. The cards are functionally partitioned for easy trouble-shooting.

For information on the Model 1400/1410, contact Don Wilson, Motorola's manager of AM stereo broadcast equipment, at 708-576-3592; fax: 708-576-5479; or circle Reader Service 61.

□□□

**WOODLAND, Calif.** Econco Broadcast Service provides a low-cost alternative to the purchase of new transmitter tubes.

The company has supplied vacuum tube rebuilding services to the broadcast industry for 23 years.

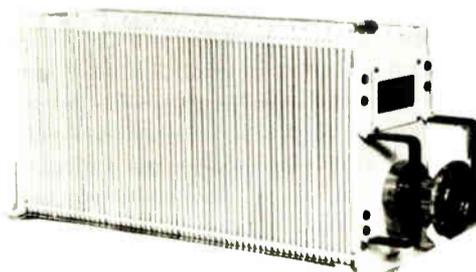
Econco's application engineers are happy to assist you with tube problems you may encounter, regardless of whether or not you are an Econco customer. We believe that our success is a result of working in partnership with broadcast engineers.

We have available free to tube users our booklet, "Tube Topics," a hands-on manual for tube users. For a copy, contact Debbie Storz at Econco: 916-662-7553; fax: 916-666-7760; or circle Reader Service 145.

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## USER REPORT

# Delta Ushers in New AM Exciter Era

by Mark Persons  
Engineering Consultant

**BRAINERD, Minn.** It's here—the next generation of AM stereo exciters.

Delta Electronics of Alexandria, Va., was the first to introduce a C-QUAM AM stereo exciter that didn't have the Motorola label on the front. Now, Delta has responded to requests for low-priced AM stereo equipment by introducing the ASE-2 exciter.

The new exciter has better stereo separation and lower distortion. So, why is it lower priced? Well, it interfaces with just one transmitter instead of two. In the many dozens of AM stereo installations I have done, more than half have involved just one transmitter. The stations either had only one transmitter or management didn't feel

**The new Delta ASE-2 is just one rack unit high, instead of three. All set-up controls are on the front panel.**

it was necessary to connect and tune up an auxiliary transmitter that might be used for only a few hours on rare occasions.

#### Straightforward

The new Delta ASE-2 AM stereo exciter is much more straightforward. It is just one rack unit high, instead of three. All set-up controls, including equalization and delay, are on the front panel.

Previous exciters had an inconvenient top access plate. To protect the controls from operators' fingers, there is a clear plastic face that allows non-engineers to look at, but not mess with the adjustments.

I can see how Delta was able to improve performance while decreasing cost. The previous exciter had six major circuit cards, four small cards, five circuit edge card connectors, numerous pieces of chassis metalwork and huge wiring harnesses.

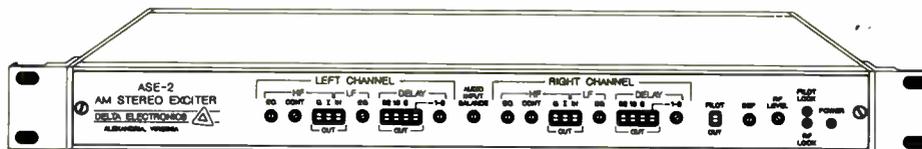
The new exciter has all components, except for the toroidal power transformer and input power, on one large circuit card. This should dramatically reduce assembly costs. I have not always been a proponent of large circuit cards because I have seen some warp and become intermittent. That should not be the case here, however: Delta is a defense contractor and has long since learned the art of making reliable circuit cards from the best materials.

Delta Design Engineer Tom Wright says the new stereo encoder circuitry is so easy to align that Delta has included the procedure in the instruction book. This internal alignment has normally only been done at the factory because of its complexity. Now, it can be done in the field.

Another way Delta reduced costs was by eliminating the front panel meters. I always felt these meters had little value. They were rarely used and certainly were never used for meaningful measurements.

#### Recommend two

The Delta ASE-2 exciter is so impressive that I will recommend two for the next



Delta Electronics' ASE-2 AM Stereo Exciter.

installation where alternate main or main and auxiliary transmitters are both going to be stereo equipped. This will improve overall station on-air reliability.

I understand that the FCC does not require an AM stereo modulation monitor at stereo stations. A monaural monitor to read

AM modulation from 100 percent negative to 125 percent positive may be all that is required for compliance. Delta has a program to rent its AM stereo modulation monitors for initial installations and later tune-ups. The price is \$300 each time.

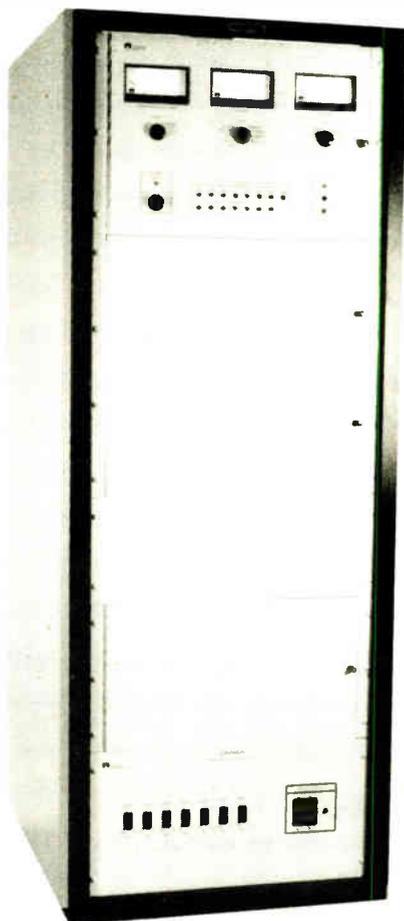
The original Delta ASE-1 exciter has a

price tag of \$5,550. The ASE-2 exciter is \$3,155. Options include high level output for older tube transmitters, a synchronous transmitter interface and a sample transmitter for system analysis.

□□□

*Mark Persons is a 20-year broadcast engineering veteran. He has built 10 new radio stations in that time. Contact him at 218-829-1326.*

*For information about the Delta Electronics ASE-2 exciter, contact Barth Pitchford at 703-354-3350; fax: 703-354-0216; or circle Reader Service 117.*



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## USER REPORT

# Kintronic Key to WCHB Start-Up

by Lewis Munn  
Contract Engineer

**WEST ALTON, Mo.** The opportunity to build a 25 kW clear channel station in one

of America's top 10 markets does not often come along.

When the chance was offered to construct such a facility in Taylor, Mich., just outside Detroit, I could not refuse. While the prob-

lems of allocation and siting were past, there remained the challenge of building a state-of-the-art facility incorporating some unusual features.

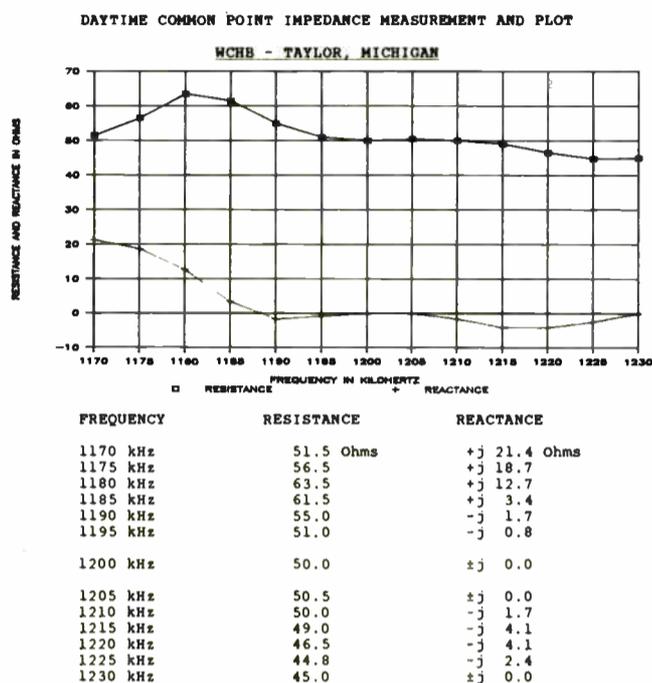
WCHB is assigned to 1200 kHz with 25

four towers are used by both arrays.

The available site is slightly more than two miles from busy Detroit Metropolitan Airport. Zoning restrictions held the maximum tower height to 165 feet above ground level. In order to meet minimum required efficiency, the daytime array required top-loading, but this was not required for nighttime operation.

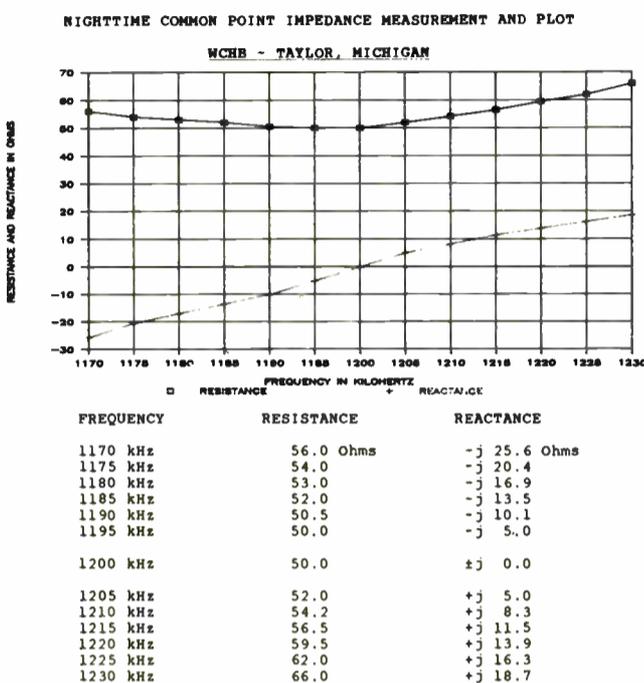
Accordingly, the engineering consultants, E. Harold Munn, Jr. & Associates, specified relay switching at the top of the four common towers. Kintronic Laboratories (KTL) designed and built these tower-top units in weatherproof enclosures, incorporating 300 W thermostatically controlled heaters to prevent condensation and cold weather icing of the relays. In addition, KTL supplied custom isolation inductors to isolate the AC and status wiring to the

Figure 1.



Daytime common point impedance measurements were made January 22, 1992, by Mr. Donald J. Baad, Staff Engineer with E. Harold Munn, Jr. & Associates, Inc., and Mr. Lewis E. Munn.

Figure 2.



Nighttime common point impedance measurements were made January 22, 1992, by Mr. Donald J. Baad, Staff Engineer with E. Harold Munn, Jr. & Associates, Inc., and Mr. Lewis E. Munn.

**Kintronic Laboratories (KTL) designed and built tower-top units in weatherproof enclosures, incorporating 300 W thermostatically controlled heaters . . .**

tower switches from the RF.

Detuning of the unused towers was critical to proper array performance within the FCC's specifications. Temporary sampling loops were utilized at a computed spot part way up each tower with a Potomac Instruments FIM-41 used to measure detuning effectiveness. Current distribution on the top-loaded towers was measured using a boat-swain's chair and spacing fixture to sample the fields at predetermined points for the height of the tower. The final current distribution tracked within less than three percent of the theoretical design by the consultants.

The system was installed in the fall and winter months of 1991-1992, a period when unusual conditions of freezing and thawing could be expected to exacerbate any instability. Elaborate grounding was utilized, including (where required) 12-inch wide ground strapping.

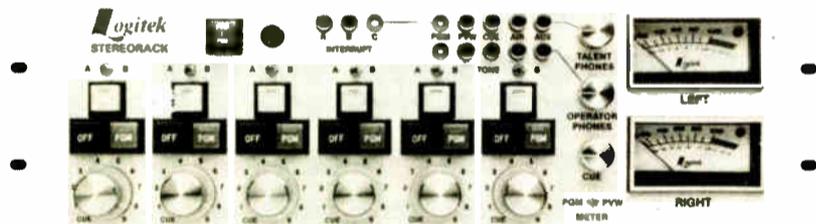
Primarily for lightning protection of the solid state transmitter equipment, but secondarily for common grounding, all coaxial lines, sampling lines, control cables and AC circuits were brought to a bulkhead grounding unit designed and provided by Kintronic. MOVs were added to aid in the suppression of voltage spikes. Use of this unit also assisted in orderly installation of the respective lines.

#### Careful matching

Actual tuning of the array took less than two weeks. This was due in part to the

continued on page 46 ▶

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kW daytime and 0.7 kW at night, using different directional patterns from a common site. The "clear channel freeze" at the FCC lasted 33 years, from 1947 to 1980, but plans for this facility were laid in 1964, applied for in 1980 and put into motion in 1990, after battles before the FCC, not to mention local zoning boards.

#### Eight, six, four

Terry Arnold, general manager of WCHB in Taylor, Mich., assigned me the task of implementing the CP. The day array utilizes eight towers, the night array six towers, and

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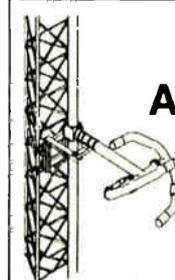
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TECHNOLOGY UPDATE

# Altronic Research Fills a Tall Order

by James L. Keyes  
Design Engineer

**YELLVILLE, Ark.** This is a story about a lot of hot air.

Once upon a time, an RF engineer with Harris-Allied in Quincy, Ill., wanted to build a really *big* transmitter. Not one that was too big to move or had to have its own

"Can you build a 1.5 megawatt load for the AM broadcast band?" he asked. "It must be a 50 ohm load, broadband, low VSWR, low maintenance and easy to operate, too."

According to John Dyess, president of Altronic Research, Inc. of Yellville, Ark., "When we were first approached about this project, we were incredulous. That's a lot of heat."

How much is a lot? Well, there are 3,413 BTU/Hr in one kW, so they would be dealing with 5,119,500 BTUs. That's enough to keep 6,826 Arkansas homes warm and cozy in the dead of winter.

"We have extensive experience building water-cooled loads for the 200 to 500 kW range, so we naturally looked at that technology," Dyess said. "When we realized that we would need to supply 750 GPM of coolant, water-cooled loads lost a lot of their appeal. We decided to concentrate on the idea of many

good contact was maintained over time.

Overtemperature and differential pressure sensing are both used to monitor load condition, because it is operating out of sight of the operator. Temperature sensors start the fans automatically if RF power is inadvertently applied without energizing the load. Best of all, it was delivered on time and installation was completed in time to allow testing to proceed on schedule.

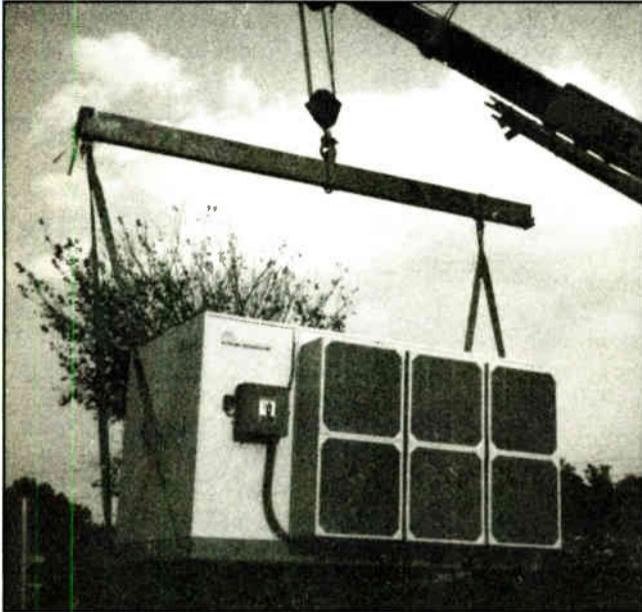
They say that success builds on success and Altronic Research is presently building several 150 kW loads. Other sizes are being designed to meet customer needs and

each load hopes to be a unique solution to the problem of providing a stable, dependable load for transmitter development and maintenance.

The next question is, what do we do for an encore? Perhaps your idea could be our next project.

□□□

James L. Keyes designed the Model 671500 dummy load with John Dyess, president of Altronic Research. For information, contact Dyess at 800-482-LOAD; fax: 501-449-6000; or circle Reader Service 171.



Altronic Research came up with the Model 671500 dummy load upon request.

multi-story building: The computer people had done that and just looked silly when everything went solid state and shrank to laptop size.

No, this engineer wanted *power*. One million watts plus modulation. And all solid state.

**How to test?**

As he mused about his dream, he realized that he knew how to build the transmitter, but wasn't sure how to test it. Building a medium-wave combiner to adapt a gaggle of water-cooled loads to the task sure wasn't inviting, and managing a brine-resolution load the size of an Olympic pool was just out of the question. He decided to ask around.

resistors and lots of air."

Expanding Altronic's proven air-cooled resistor technology seemed the only way to provide a load this size that wouldn't need an operating engineer just to tend to its needs. That design approach led to the creation of the Model 671500, or the "Megaload," as it was called by the manufacturing team.

**Special attention**

The Model 671500 has six belt-driven fans to cool 1,320 resistors. Since this load was to sit outside of the building envelope, special attention was paid to finish, corrosion resistance and the control system. Silver-plated components were used in all corrosion-sensitive contact areas to ensure

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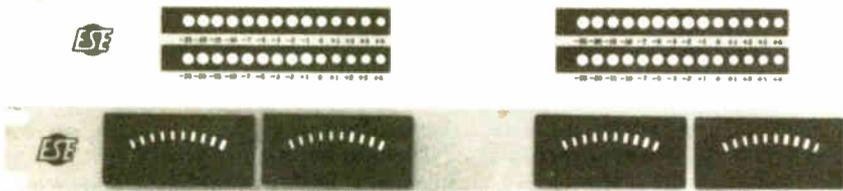
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# MARKETPLACE

Radio World's Marketplace is a collection of new and recently introduced radio broadcast products.



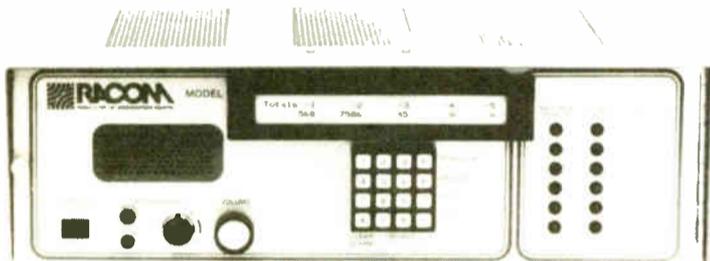
### LED Audio Level Indicator

ESE has unveiled the ES-215, a new LED audio level indicator with rackmount options. Also new are innovative rackmount options for the popular ES-216.

The LED meters are designed to simulate the action of a conventional VU me-

ter, but with superior dynamic characteristics. In addition, both units have peak or average response modes.

For information, contact Brian Way, marketing manager at ESE, 310-322-2136; fax: 310-322-8127; or circle Reader Service 17.



### Telephone Voting System

Racom Products has introduced an addition to its digital voice announcer line, the Tele-Vote, a multiple caller automatic telephone voting system.

With the product, radio stations can have listeners call in and vote on questions asked by on-air personalities. The caller will hear

a greeting message, then, for example, press "1" for yes, "2" for no, entering their response on 1 through 5 on a telephone keypad.

For easy tallying, an LCD displays the number of times, up to 99,999, that each button is pressed by callers. Up to six independent lines are available, along with multiple unit linking for greater expandability.

For information, contact David Williams, marketing consultant for Racom, at 800-722-6664; fax: 216-351-0392; or circle Reader Service 110.

### CPI Services

Computer Power Inc., manufactures off-line, on-line and true on-line units in either ferroresonant technology or pulse width modulation. The product line consists of more than 100 models, ranging from 100VA to 300kVA in the standard product line.

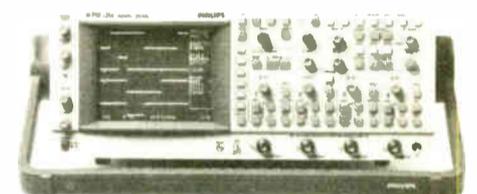
The company also provides comprehensive front-end support to design professionals, engineers, contractors and end-users, who often require uninterrupted power that is tailored to individual specifications. CPI will provide a complete turn-key solution, handle system turn-on and provide parts, service and regular inspections of the equipment.

As well, Computer Power has added the phrase, "Custom Solutions at Off-Shelf Prices" as its new corporate motto. The change "reflects CPI's commitment to providing systems for critical applications at affordable prices," the company said.

For information, contact the company at 908-638-8000; fax: 908-638-4931; or circle Reader Service 2.

Although digital to fiber codecs, such as Scientific Atlanta's HDB-MAC, are running at around 10.6 MHz, this means that HDTV signals now can be transferred from one point to another through free space or fiber optics directly into an uplink and from remote sites through the studio and out for broadcast with only slight modifications to existing equipment.

For information, contact Tim Hillman at John Hillman Associates at 305-756-7749; fax: 305-756-7749; or circle Reader Service 196.



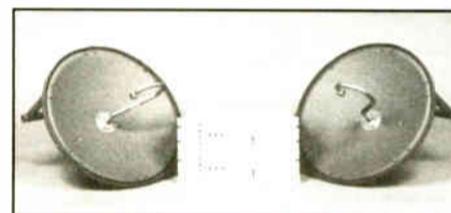
### Philips Analog/Digital Scopes

The Philips PM 338X/9X Series of analog/digital scopes from John Fluke Mfg. represents a step forward in powerful and affordable digital storage oscilloscopes (DSO) technology. New models are available with true four-channel operation, as well as 2+2 channel configuration.

The introduction of the new DSOs was driven by increased requirements of mid-market "traditional" scope users in the 50 to 200 MHz bandwidth range.

Features of the series include real-time representation; extensive capture and storage capabilities; automatic voltage and timing measurement functions; intelligent triggering for digital applications; and optional Math+ measurements for ATE applications.

For information, contact the John Fluke Mfg. Co. at 206-347-6100; fax: 206-356-5116; or circle Reader Service 151.



### Wideband Radio

Bi-Directional Microwave Systems offers portable and fixed wideband radios capable of Y/C or SVHS and other forms of HDTV transfer. The video format is phase lock looped and equivalent to satellite up-link performance.

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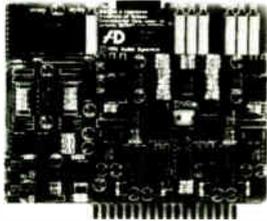
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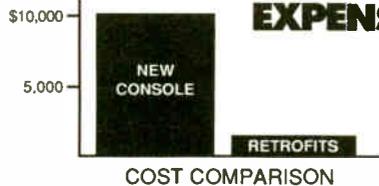
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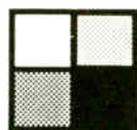
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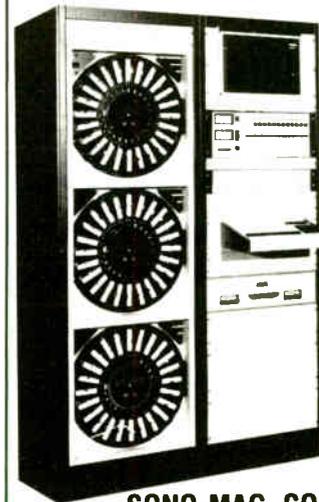


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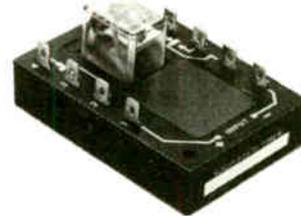
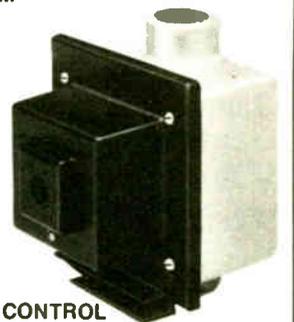


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# Kintronic Labs Key to WCHB(AM) Start-Up

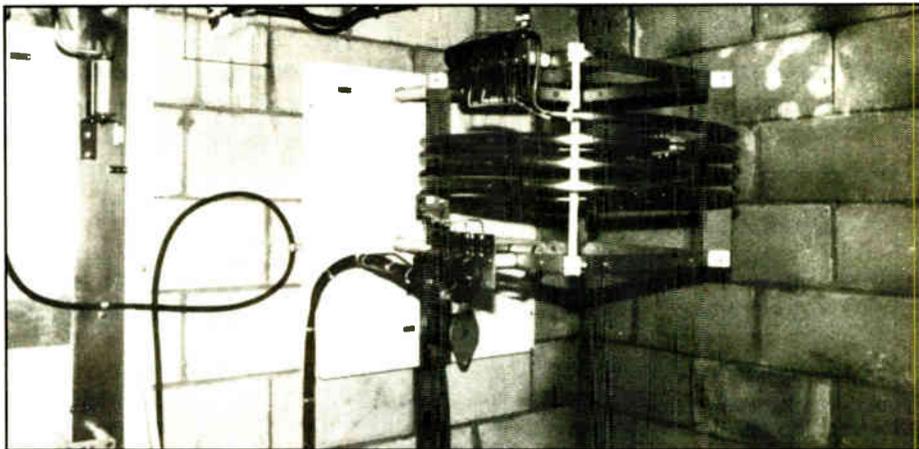
► continued from page 42

painstaking bridging of components and the use of a vector impedance meter to assist in presetting of phase shifts across the networks. Careful matching at the tower bases also contributed to the excellent values at the common point and the tremendous broadbanded signal, as attested to by the common point impedance sweeps shown in Figures 1 and 2.

The main transmitters are the Harris DX-25U for daytime and a Harris-

produced Gates One for night. The transmitter not in use is switched to a dummy load. Array parameters are monitored using a Potomac Instruments state-of-the-art Model AM-1901 modular digital antenna monitor.

The transmitter site is remotely controlled from the main studios on Henry Ruff Road in Romulus. The Potomac Instruments RC-16+ is utilized, along with an additional 16-channel expansion unit. Interconnection is achieved using STL and



WCHB's custom isolation inductor for AC supply to tower-mounted switches, designed by Kintronic Laboratories.

TSL facilities, beamed across busy DTW Airport. The equipment automatically switches patterns, monitors all phase monitor indications, prints out data on an

hourly basis, continually monitors transmitter functions and will dial-up the transmitter site by a backup landline in the event of microwave link failure.

WCHB was one of the first minority-built stations in the United States, dating back to its original 500 W operation on 1440 kHz. It is still owned and operated by the Bell Broadcasting Co., named for its first president and founder, Dr. Haley Bell.

His dream of establishing a major clear channel station serving the metro area of his adopted city, Detroit, now has been fulfilled. The state-of-the-art transmitting plant utilized the finest in RF technology with the Kintronics coupling and phasing equipment.

□□□

For information, contact Tom King, president of Kintronic Laboratories, at 615-878-3141; fax: 615-878-4224; or circle Reader Service 158.



TUNED TO TOMORROW



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# *The New Wheatstone Production – Air Console*



## *In Fact, a Whole New Console Family...*

These consoles give you full multitrack production capability while at the same time providing familiar program and audition busing so your production room can double as a back-up on-air facility. They free up your primary Air studio for routine calibration and maintenance sessions. They are a perfect solution for complex talk or news formats.

Beyond its on-air capability the SP-4 is a powerful production console offered in 2, 4 and 8-track formats. Production crews will love the smooth sounding equalization, the auxiliary send buses, and, of course, the full on-air type machine and console logic. There's also plenty of room for those special functions: like a phone module that can handle multiple callers, yet

doesn't tie up your line inputs: an intercom module that lets you communicate with other Wheatstone consoles and rackmount locations throughout your facility; plus a studio control module, line preselectors, tape controllers, and automatic timers.

And, of course, there's the componentry: all gold contact switches for the ultimate in reliability, gold bus connectors, gold I/O connectors, solid state on/off lamps, and triple burned-in ICs. Naturally, each console is also triple-tested.

**The fact is,** Wheatstone's got the features, the componentry, the reliability, the performance and the reputation you can depend on.

Call us.

*SP-44/4-Track*

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**WE MEAN IT**—we really DO provide the quality, performance, technical support, and innovation we promise!

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We've also handled your special requirements as well with a super family of accessories, including a choice of three different telephone modules, an intercom module, an off-line mixer module for your remote feeds, talent control stations, accessory panels, failsafe power supplies, and auto cart and CD sequencing options.

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