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Radio World

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Buyers Guide
 pp. 23-33

Vol 16, No 14

Radio's Best Read Newspaper

July 22, 1992

NEWSWATCH

AM Stereo Bill Gets Green Light

WASHINGTON The U.S. Senate's Committee on Commerce, Science and Transportation has approved the AM Radio Improvement Act of 1991 (S. 1101)—a bill that would require the FCC to choose an AM stereo standard.

The committee has sent the legislation on to the full Senate for consideration.

The FCC would be required to initiate a standard selection process within 60 days of the law taking effect, and choose a standard within 180 days.

The bill was sponsored in 1991 by Sen. Larry Pressler (R-S.D.) and had several co-sponsors. Proponents believe choosing an AM stereo standard will help the ailing AM band, which does not enjoy technical or overall ratings parity with FM.

The odds-on favorite for a standard would be the Motorola C-QUAM system, used by about 30 percent of U.S. AM stations. In 1981, the FCC declined to adopt an AM stereo standard as it had for FM in the early 1960s.

Digital Radio Proposals Submitted

WASHINGTON Eight companies have submitted preliminary digital
 continued on page 2 ▶

AM Network Pans for Gold

by Nancy Reist

PUYALLUP, Wash. The AM band is a great place to grow. That is the philosophy at Washington's Country Gold Network, a group of AM stations covering the Puget Sound area.

The Country Gold Network, owned by Joy Broadcasting, mixes current hits with older country music. This format, however, is a bit different than what you expect from the mainstream stations that mix country oldies with chart hits.

When Country Gold Network Program Director Emilio Cinco digs for gold, he may bring out hits that have been buried for 50 years or more. The playlist includes Vernon Dalhart, Gene Autry, and Hank Thompson & His Brazos Valley Boys. The station's oldest song, Patsy Montana's "Cowboy Sweetheart," goes back to 1913.

Many of the old songs come from original 78s, which are sent to The American Gramophone and Wireless Co. (see sidebar story), a local company, where they are cleaned up and dubbed to tape.

"There's something missing on the CDs, and it's not just the scratches. It's the feeling," Cinco said.

Garth Brooks and 78s, too

That down-home, old-time feeling is an important part of the style of the Country

Gold Network. Cinco said some of the 78s the network has added to its music library have come from listeners' attics.

KJUN—the network's flagship station—has an 800 phone number for requests, but the disk jockeys also keep a CB radio on in the control room so they can talk to truckers and take requests, according to Cinco.

They also spice up the program-

ming with some of the old western radio dramas like "Gunsmoke" (with William Conrad as Matt Dillon), and "Six Shooter."

The network includes four AM stations: KJUN in Puyallup, KBLV in Bellevue, KENU in Enumclaw, and KTOL in Lacey. The network is waiting for FCC approval to add another station in Everett.

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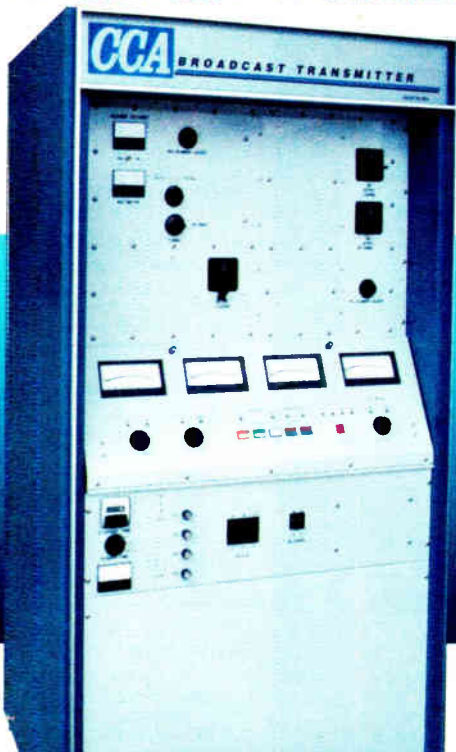
Photo by Chris Brady

Inside WMMR: Morning host John DeBella holds court in the control room of "Philadelphia's Home of Rock 'n' Roll." For more on the station, see p. 18.

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Cross-Border DAB at Issue

by John Gatski

WASHINGTON Although potential cross-border interference problems may result from Canada's planned digital audio broadcasting (DAB) on the L-band, U.S. and Canadian telecommunications officials believe a compromise can be reached.

DAB was a primary topic of discussion at a recent Center for Strategic and International Studies (CSIS) seminar.

The potential for intra-country interference stems from Canada's selection of L-band (1500 MHz) for satellite and terrestrial use at this year's World Administrative Radio Conference (WARC) in Spain. The U.S. chose the S-band (2300 MHz) for satellite DAB and is leaning toward an in-band FM solution for terrestrial.

If Canada uses L-band, U.S. officials said the Canadian broadcasts could interfere with U.S. military telemetry testing in border areas such as Seattle.

If the U.S. uses S-band, Canada could be interfered with since it uses S-band for military testing and telemetry.

During the seminar, Ronald Begley, director general of broadcasting regulation for the Canadian Department of Communications, admitted "the degree of difficulty is high" in settling the DAB cross-border issue.

However, he said the U.S. and Canada have historical precedents for solving disagreements. "I don't think it will be a stalemate," he added. "Typically, between our two countries, we fix things."

William Hassinger, assistant chief for engineering at the FCC's Mass Media Bureau, also emphasized that the obstacles must be resolved. "Negotiations will have to take place," he said.

The U.S. and Canada do not have much time to resolve these issues before Canada begins broadcasting on L-band. Begley said Canada plans to begin experimental service from several Canadian cities, starting with

continued on page 8 ▶

NEWSWATCH

► continued from page 1

broadcasting system proposals to the Electronic Industries Association (EIA) Digital Audio Radio Subcommittee.

According to the EIA, the "statements of intent" by the companies were submitted to the subcommittee by the June 15 deadline. The companies include: American Digital Radio, Inc., AT&T Bell Laboratories, Digital Planet, Kintel Technologies, Mercury Digital Communications, Inc., NHK, Thomson Consumer Electronics for Eureka

147 DAB and USA Digital Radio (Gannett-Group W-CBS).

Strother Communications sent a letter to EIA, apologizing for its tardiness in submitting its statement of intent, but promised the document would be delivered by early July.

The statements of intent submitted by June 15 were to be reviewed by the subcommittee's working group A on June 26, and statements received after June 15 will be reviewed at the July 16 meeting, according to EIA.

NRSC Subcommittee Advances ID Logic Concept for RDS

WASHINGTON The odds of ID Logic B's incorporation into the proposed Radio Data System (RDS) standard continue to improve.

The National Radio Systems Committee's (NRSC) RDS subcommittee working group met June 17 to discuss adoption of the ID Logic B system for AM.

The technology allows an ID Logic-equipped tuner to automatically tune to stations by format. U.S. station IDs and formats are programed into an internal memory of the tuner/receiver and

must be updated periodically.

"Essentially there is a very good plan for implementing it," NAB Manager for Technical Regulatory Affairs John Marino said. "Certainly, by the July 17 meeting, it will all be finalized and ready to be presented to the committee."

ID Logic B has become a compromise solution to provide some data capability for AM within the RDS standard. RDS, a technology developed for FM, is a broadcaster-operated data stream that can provide format scanning, digital text and other functions.

At the June 17 meeting, the working group also proposed a final set of the PTY (program

type) codes likely to be incorporated into the RDS standard, according to Marino.

The working group also has proposed the option of future amendment of the RDS standard to add an RDS-type data stream system for AM. Real Time Design's Robert Clark has proposed such a capability.

Marino said the company is now developing test plans.

Senate Approves DAT Bill

WASHINGTON The so-called DAT bill has cleared the U.S. Senate, but one of the two House of Representatives versions is still awaiting approval from the House Judiciary and Ways and Means Committees.

The Senate version (S. 1623) is similar to the House versions in that it would assess a royalty on blank digital media and recorders imported or manufactured in the United States.

The law also would require the Serial Copy Management System (SCMS) on all recorders. SCMS prohibits second generation copying.

Although reservations have been voiced by professionals and the NAB about the proposed law's impact on broadcasters, support from music publishers and consumer audio manufacturers all but assures enactment of the legislation.

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Radio Board to Seek Progress Reports on In-Band DAB

by Alex Zavistovich

WASHINGTON Broadcasters irritated with what they consider slow development of in-band digital audio broadcasting (DAB) have prompted the NAB to seek six-month progress reports from system proponents.

NAB President Eddie Fritts revealed the association's plans at a press conference following the NAB's radio, television and joint board meetings held here in June.

Other actions of the NAB Radio Board included the election of Wayne R. Vriesman, VP of Tribune Broadcasting's Radio Group, as chairman of the board. Robert Fox, chairman/CEO of KVEN/KHAY, Ventura, Calif., was chosen to be the board vice chairman.

A brief update also was provided on the AMAX campaign.

Fritts said the decision to "actively seek" progress reports from the DAB system proponents came as a result of "lack of evidence that in-band technology is progressing." He said there was "irritation on the part of some broadcasters," and a need for some evidence of meaningful progress.

The NAB came out in favor of an in-band solution to DAB in the U.S. after the National Telecommunications and Information Administration (NTIA) ruled out domestic L-band allocation for the technology. Before the NTIA decision, NAB had been prepared to go forward with a licensing agreement with Eureka, the European consortium whose Eu-

reka I47 DAB system is favored in Europe, Canada and Mexico.

According to Fritts, the NAB hopes to have an interim progress report presented at an informal radio board meeting in September, coinciding with the association's radio show in New Orleans.

Radio board members also expressed concern that the Electronic Industries Association (EIA) digital audio standards-setting process has had insufficient broadcast input. Fritts said representatives from the NAB and the EIA will meet to address this concern.

Earlier in June, at NAB/Montreux in Switzerland, NAB Executive VP of Operations John Abel expressed caution about in-band DAB development. He added that Canada and Mexico may attempt to persuade the U.S. to switch its DAB allocation from the S-band to the L-band.

At the board press conference, Abel was asked whether the NAB would rekindle its relationship with Eureka if Canada and Mexico succeeded at swaying the U.S.

"That's a difficult question to answer," said Abel. "If it (a U.S. reversal) happened, we would look at it (the Eureka agreement) again, yes."

In other radio board news, NAB spokesman Walt Wurfel gave an update on the association's radio campaign to increase consumer awareness of AMAX. Receivers carrying the AMAX certification mark feature improved fidelity and other techno-

logical enhancements.

According to Wurfel, the program—which included voluntary airing of spots urging listeners to ask for AMAX receivers—has not worked as quickly as some broadcasters would have liked. He said it has been hard to move manufacturers into making AMAX receivers available.

Wurfel added, however, that the cam-

paign has some "traction." He stressed the importance of continuing to push manufacturers to get AMAX receivers on the market, as well as raising awareness and creating consumer demand for AMAX.

Approximately \$20 million worth of air time has been promised by radio stations for the airing of future AMAX spots, Wurfel said.

In-Band Ignored at Montreux

MONTREUX, Switzerland Judging by the digital audio broadcasting (DAB) symposium held two days prior to the NAB International Radio show in June, the Europeans have little interest in the in-band technology research that is underway in the U.S.

Although a full menu of activities espoused the virtues of the European-developed Eureka I47 DAB system at the European Broadcasting Union (EBU)-sponsored Montreux symposium, there was little technical background provided on in-band work that is ongoing in the U.S.

The EBU set and executed the agenda for the two-day symposium that drew roughly 500 attendees.

In-band proponents in the U.S. "actively tried to participate in the symposium," according to USA Digital (Project Acorn) spokesman Paul Donahue. "We were told that the NAB had no control over the agenda."

Besides not being invited to the DAB symposium, in-band proponents were not invited to the general show, either. NAB Senior VP of Science and Technology Michael Rau, confirmed that the Europeans are not keen on the the in-band technology.

"The NAB's policy is to develop, encourage and promote in-band technology," he said. "But the Europeans are not interested."

The Europeans are interested, however, in the L-band Eureka I47 project (also a sponsor of the symposium).

Eureka officials have commented in the past that they do not believe in-band is technically feasible for radio broadcasting.

In-band proponents initially were not upset at the lack of interest in their technology. But one in-band proponent described the show as "a sales seminar for Eureka."

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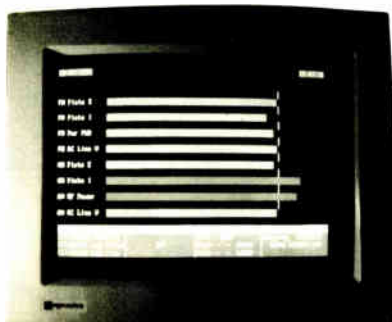
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It Takes Time to Build a Flying Car

by Alex Zavistovlch

WASHINGTON Let's say you want to build a helicopter.

You *could* go to a well-respected automobile manufacturer, hand him a helicopter propeller and say, "Here, try to enhance your existing product with this." Or, you *could* go to an equally knowledgeable independent engineer, explain what you want and leave him to get it together from scratch.

I'd guess that it would probably take the auto maker longer to come up with a flying car than it would the engineer in the second scenario to create the helicopter. The car manufacturer has to figure out a way to make the new service (flight) work in his already mature technology. The other person, who is working under no such constraints, is free to seek any solution he thinks will work best.

That's what's going on in digital audio broadcasting (DAB) these days. Radio broadcasters in the U.S. have voiced their preference for a DAB system within the current broadcast bands, both AM and FM. The European Eureka consortium, on the other hand, has created a system that its proponents believe will replace the current broadcasting system.

What's the point? Well, at a press conference after the NAB's recent radio, television and joint board meetings, NAB CEO Eddie Fritts said that broadcasters are getting "irritated" at how long it's taking in-band proponents to come up with working systems. He said the NAB will try to get progress reports from the proponents at six-month intervals.

Let's try to put a few things in perspective. It's been quite less than a year since the NAB threw its support to an in-band digital broadcasting solution.

In that time, we've seen laboratory demonstrations of in-band systems from Project Acorn and Strother-LinCom, and proposals from a handful of others. The Electronic Industries Association (EIA) has created a standard-setting committee that set a deadline of mid-1993 for systems testing.

That seems like a good bit of progress in a short time. I mean, the high definition tel-

evision (HDTV) debate has been going on for 10 years, and lately people have been complaining that things are moving too fast.

See, broadcasters asked for quite a feat of engineering when they said they wanted an in-band DAB system. AM and FM are mature technologies (RDS notwithstanding), and asking for DAB as an enhancement is like adding a helicopter propeller to an automobile. A good idea, but it's not going to get done overnight. Hey, the Germans don't think it can be done *at all*.



Comparatively speaking, the European Eureka consortium was working under very few constraints when it came up with Eureka 147.

You know, I really can't imagine who might be concerned about how slowly in-band DAB is developing. After all, I seem to recall broadcasters being up in arms when the NAB first endorsed the Eureka system. They said the NAB was moving too quickly, and not allowing alternate systems to be explored. Now, alternate systems *are* being explored. And considering the minimal funding most of the proponents have received, progress has really been pretty swift and quantifiable.

We should all try to be a little more patient with in-band system development. Compared with HDTV, DAB is proceeding at a blistering pace. You really can't rush things like this. After all, think about what's happening: It's like trying to make a flying car.

★ ★ ★

Another interesting thing I heard at the NAB's press conference had to do with the unresolved relationship that exists between the NAB and the Eureka partners.

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Remember, the NAB originally wanted to enter into a licensing arrangement with Eureka for the development of the technology in the L-band in the U.S. The only reason the talks were tabled was that the National Telecommunications and Information Administration (NTIA) wouldn't let the U.S. use L-band spectrum for DAB. Negotiations between NAB and Eureka were never curtailed, they've just been on the back burner, on a low simmer.

Lately, though, people have suggested that Mexico and Canada may try to influence the U.S. to switch its telemetry research—which is now at L-band—to the S-band. That would make sense, because Canada is already doing telemetry work at S-band. That would make the L-band available in the U.S. for DAB, and would create a unified hemisphere for digital broadcasting, eliminating any cross-border incompatibility concerns.

So I asked John Abel, the NAB's executive VP of operations, whether the NAB would resume its talks with Eureka if Canada and Mexico were successful in opening up L-band in the U.S. Granted, that's a big "if," but Abel admitted the NAB would consider taking up the issue again.

What's interesting about *that* is that the NAB is still on record in support of in-band technology. Unless the association abandons its in-band support, the only good faith licensing of the Eureka technology the NAB could engage in would be to other potential users of the L-band.

Who might those users be? Well, they *could* be satellite companies. After all, several FCC commissioners have said that they would consider satellite delivery for national or regional service when the DAB issue comes before them. That tracks perfectly with the current Commission's pro-competitive stance.

What's interesting about *that* is that the NAB has been opposed to national or regional distribution for DAB. The NAB position has been that regional or national DAB service would be harmful to the concepts of localism and diversity.

Here's the rub. If the NAB doesn't abandon its in-band support, there won't be any point in marketing the Eureka system to broadcasters. If satellite companies become the only real consumers of Eureka in the U.S., what would that say about the NAB's loyalty to localism and diversity? Quite a dilemma, eh?

If I were with the NAB, I'd be following pretty closely what's going on with our neighbors to the north and south. And I'd be *very* intrigued by any irritation broadcasters may feel at the slow development of in-band DAB.

★ ★ ★

On to other matters. A few days ago I learned that John Binsfeld, formerly of CCA, has moved over to S.C.M.S., Inc., an equipment distributor. We all wish him luck.

Then I got another surprise when I learned that Laura Tyson, formerly of Denon, has joined Broadcast Supply West! She's starting up a BSW regional sales office in the New York City area.

Laura had been with Denon since 1987; before that, she managed the 24-track recording studio at the University of Miami School of Music.

Congratulations, Laura. The only question I have is, what are you going to call your office, "Broadcast Supply West—East"?

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

Alex

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Modifying digital record rates

Dear RW,

This is in response to Mike Sokol's letter to the editor (RW June 10, 1992), inquiring as to the availability of a modification kit to allow 44.1 kHz digital recording on the Technics SV-DA10 DAT recorder.

Such 44.1 mod kits are available from me for \$30; write to Klay Anderson Audio Inc., 1856 Grover Lane, Salt Lake City, Utah 84124. Good soldering skills are needed. Parts and instructions furnished.

Klay Anderson, president
Klay Anderson Audio, Inc.
Salt Lake City, Utah

An appropriate cutoff for RFR

Dear RW,

Your article in the June 24 issue of RW about Hammett & Edison's opposition to the proposed ANSI adoption of the IEEE C95.1-1991 RFR standard, as a successor to the ANSI C95.1-1982 standard, did a good job of alerting FM stations to a potentially major complication to their operations. I hope that the resulting publicity helps convince the IEEE that the proposed body current limit extending to 100 MHz, the middle of the FM band, is a bad idea.

However, there was one aspect of the article that needs clarification. Hammett & Edison does not propose extending the upper frequency range of the proposed body current standard to 108 MHz. My point in mentioning the top of the FM band was that if the IEEE SCC28 group truly believes that the scientific literature supports the need for a conducted body current standard at VHF frequencies, then its selection of a 100 MHz cutoff cannot be justified, as obviously the human body does not suddenly quit conducting RF energy at 100 MHz.

However, it is our belief that there is no justification in the scientific literature supporting the need for a body current

standard extending into the VHF range, and that a cutoff frequency of, say, 40 MHz, would be a more appropriate frequency. A 40 MHz cutoff would ensure that only AM broadcast and international shortwave stations are subject to having to measure for conducted body currents.

Dane E. Ericksen
Hammett & Edison, Inc.
San Francisco, Calif.

In-house or on-call?

Dear RW,

There seems to be a misconception about the current state of contract engineering in the U.S. No longer are all contract engineering companies comprised of a single person who handles multiple stations in an area.

The recent editorial in RW about the LA riots (RW, June 10, 1991) indicates that you feel having an employed chief engineer is more valuable than using a contract engineer exclusively. This would be true if the contracting company didn't have the resources to handle a major emergency. However, there are many large, well-organized contract engineering companies operating in the U.S. and abroad.

An organized contract engineering firm has contingency plans, maintains backup facilities, has enough manpower to staff all its clients during an emergency and is very capable of providing extraordinary service at a moment's notice.

Smart stations don't throw good money after bad. They know the value of a good contract engineering company, or they would hire their own staff people. We work with some of the biggest names in the broadcasting industry. They're tuned into the savings and competitive edge that comes from using the best entrepreneurial talent in the market.

Here's a rarely recognized secret about radio engineering: Regardless of whether they are employees or business owners, all good broadcast engineers will do whatever it takes to keep radio stations on the air. Creative problem solving is the nucleus of our service!

Chip Morgan, president
Chip Morgan Broadcast Engineering
Folsom, Calif.

RW replies: You are correct when you say that stations know the value of a good contract engineering company, and that all good broadcast engineers will do what it takes to keep a station on the air. The June 10 editorial does not attempt to dispute those statements.

Operating efficiencies aside, RW contends that no matter how diverse, talented and well-staffed a contract engineering firm may be, it does not obviate the need for the physical presence of a competent technical person at a radio station. Each has its place in broadcasting.

Unfortunately, opinions from exhibitors at numerous trade shows in recent years indicate a subtle but steady decrease in technical expertise of show attendees. For a variety of reasons, technically-oriented individuals seem not to be entering the radio broadcast industry. Worse yet, many former broadcast engineers have left

FMization of AM Radio

There has been much talk lately of the "AMization of FM." For the Country Gold Network in Washington state, however, the topic at hand is the "FMization of AM." That is, how to get AM stations to perform like FM stations in the ratings.

The Country Gold Network includes four AM stations: KJUN in Puyallup, KBLV in Bellevue, KENU in Enumclaw, and KTOL in Lacey. The network is waiting for FCC approval to add another in Everett.

Using readily available technology, the AM stations in this network bring to their listeners a music mix that can't be found anywhere else in the market—AM or FM. Program Director Emilio Cinco and his dedicated band of archivists span decades of country music to create a unique programming alternative.

Other AM broadcasters could take a page from the lesson book of the Country Gold Network stations. Not only are the stations in the network flourishing without the benefit of FM's superior frequency response, they also gain the operating efficiencies available to stations sharing program material.

It is the programming, in fact, that is the real star in the Country Gold Network's story. Through care, innovation and attention to listeners' desires, the network proves that music is still a worthwhile programming choice for AM.

When FM was young, the band was the haven for experimentation, alternative programming and broad creative effort. For its efforts, it successfully stole listeners from AM, some of whom have never looked back.

AM programmers who are attuned to that same creative innovative attitude, as the people involved in the Country Gold Network are, know that the potential is still there for AM stations to compete aggressively with FMs in any market.

—RW

broadcasting to pursue careers in other industries. That's a worrisome trend that cannot be allowed to escalate.

There will always be a need for companies of competent professional engineers, and such firms are to be complimented for their responsiveness to their clients. But station managers must be reminded that a full-time engineer is not a frivolous expense, and can be at least as useful and valuable to them as a full-time sales manager or a full-time promotions director.

Accept EBS responsibility

Dear RW,

It seems everyone has put his or her two cents in about EBS, so I hope not to sound like the same old song and dance. A great many people are complaining that EBS doesn't work, period. The real problem is not the technical aspect of the system, but the human factor involved. The equipment works and if used properly enables us as broadcasters to use the EBS system correctly. The trouble is too many of us just don't give a damn!

According to some of the FCC's findings based upon inspections done in the last year, an alarming number of those stations inspected did not have working EBS equipment. That's not only a lack of respect and compliance for the rules set forth but a total lack of consideration for the public well-being.

If the equipment doesn't work and is therefore of no use to a station, whose

fault is it when the system doesn't work? If during an emergency one station—particularly a CPCS-1—chooses not to participate and run emergency tones, therefore breaking the "chain," whose fault is it that the system does not work? If a station chooses to run EBS tones from a cart machine or other tape deck and the tones do not trip the decoders of the monitoring stations, whose fault is it when the system fails to work as designed? It seems to me that when those who have accepted the responsibility, almost willingly fail to follow EBS procedures, the system does indeed not work.

Instead of trying to find ways to fix what is not broken—that is, the technical aspect of EBS—we should be focusing instead on making sure that those who do not use the system properly be held accountable for their actions (or their lack of action).

The Emergency Broadcast System can and does work! It is time we stopped blaming the equipment and the design of the system and start focusing on the real culprit, the very group that pushes the buttons and flips the switches: all of us, as broadcasters. When we fully accept the responsibility of EBS, the system will truly work as it was designed to do. No system, no matter how good from a technical standpoint, can work effectively if those who administer it do so incorrectly!

Aaron Brodbar, CE
WHLI/WKJY
Garden City, N.Y.

Radio World

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**Next Issue of
Radio World
August 5, 1992**

Panning for AM Country Gold

► continued from page 1

Although the music is important, Cinco said the owners believe local programs like church and public service shows are very valuable. "We have local studios in each city of license. We can put locals on and break away from the network for things like high school sporting events. They're still the little studios where people can stop by."

Equalized phone lines

The Country Gold Network does not use a satellite distribution system. Instead, each station is linked to KJUN by a single 8 kHz equalized phone line. The network's chief

engineer, Larry Gruber, is happy with the quality.

"I don't know how it would work if you tried to get the stations much farther apart," he added.

A modified Radio Systems console at KJUN is used to coordinate the signals. Engineers can send network programming to all the stations, but they can send unique signals, such as local spots, to each station.

"There's a separate mix for each set of phone lines," Gruber said. "If they do a commercial set, for instance, there's a stack of cart machines and there's one row for each site. If they want to send duplicate commercials, they just duplicate the carts."

One fire button triggers all the cart machines simultaneously. Gruber explained. Obviously, each station's commercials must be timed perfectly so the spot sets will all be the same length, but he pointed out that timing is just as critical for a satellite network. The carts are coded by color and number to make sure they don't get sent to the wrong station.

A complex network

Nevertheless, Gruber said he hopes eventually to simplify the system. "When the disk jockey comes out of a spot set, he's got to put up probably 15 carts. They're all right there beside him, so it's not a matter of him running all over, but he's got to turn around and get all the stuff and make sure that he's following the log. The log looks like a Los Angeles phone directory."

Gruber said the disk jockey's job is further complicated by the fact that the Country Gold Network's music library includes a couple of rooms full of music. The old music usually is on reels, but they also play carts, CDs and some vinyl. Gruber is now developing a music database using DBASE III to help the jocks find individual songs.

The Gentner Voice Remote Control (VRC) for the transmitters also makes his job much easier, Gruber said. It allows him to monitor and control the individual transmitters by phone. He also can use it to switch an individual station to a local feed for events like high school football games.

"All the stations call into the same computer. It (the VRC) calls up the computer on the modem and feeds it all the data and drops back off the line. You can call it up if you want to change the power or shut one of them on and off, or whatever you want to do. It pretty much takes care of the transmitter. It can't fix it, but it'll let you know if something's not quite right."

Preparing for the addition of a fifth station to the network has been a challenge for Gruber.

Cinco anticipates that the network will continue to grow on the AM band. There's no problem getting sponsors, the response to the multi-decade country mix has been very positive, and best of all, they're having fun, he noted.

Vintage 78s Resurrected

by Nancy Reist

ORTING, Wash. Once upon a time there was a magic land where wonderful music came from the grooves of discs that spun at 78 revolutions per minute.

It sounds like a fairy tale today, but Rick Jorgensen, a music archivist for The American Gramophone and Wireless Co. in Orting, Wash., has evidence that this legend is based in truth.

A full-time auto mechanic by day, Jorgensen also specializes in pulling music out of records that have not been played in decades and capturing it on more accessible tape.

The continual remastering of old 78s keeps him busy. He calls it a "hobby gone berserk," but it has enabled the Country Gold Network (see accompanying story) to add good recordings of rare older music to its playlist.

Jorgensen said the key to successfully renovating a 75-year old recording lies in the disc. So he usually insists on working with the original recording, rather than a tape. "All the information is in the groove. There's only so much you can do to clean up a sound that's on a tape. You need to get right back to the groove."

Special equipment

He works with a Swiss-manufactured Bogan Presto Lenco turntable and Astatic ceramic cartridges. He said he finds magnetic cartridges to be too sensitive for this type of work. "The ceramic will do the job and not pick up quite as much unwanted information," Jorgensen said.

The turntable allows him to cant the stylus to the right or left to find the perfect spot for reproduction, even when

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Radio Emphasized at Montreux Show

by Alan Carter

MONTREUX, Switzerland There was no recording studio equipment to navigate or television equipment to peer around. The focus was radio-only.

NAB Radio Montreux, held here June 10-13, was the first Pan-European convention and exhibition devoted exclusively to radio broadcasting. It was sponsored by the NAB and the city of Montreux.

Reaction from broadcasters and the approximately 100 manufacturers that promoted equipment and services generally was positive. Attendance reached 1,500, representing 38 countries. Paid attendance was 500; 800 exhibitor guests; 101 exhibitors; and 120 press representatives.

Radio-only focus

"I've not heard from a dissatisfied exhibitor or a dissatisfied broadcaster" said John Abel, executive VP of operations for NAB. "It was better than people anticipated."

NAB may repeat the show next year, rather than waiting until 1994 as first planned. Abel said the event could move to a new site in France. Possible locations are Paris, EuroDisney or Cannes.

He also noted NAB would seek a partner such as the Association of European Radio (AER) or the European Broadcasting Union (EBU).

A broad range of radio broadcasting equipment and services covered the 20,000 square foot exhibit in Montreux.

Pacific Recorders and Engineering (PR&E) launched its new European operation, Pacific Recorders Europe. It is based in Langenfeld, Germany, as a joint project with the distributor Thum + Mahr Audio GmbH.

PR&E highlighted the new ADX Production System, an integrated digital audio workstation and automated production console.

Also at the PR&E booth was Telos, with its new Delta 100 telephone hybrid that was introduced at NAB.

Continental Electronics promoted its line of AM and FM transmitters, with Dave Russell, international sales manager, noting a strong

interest in his line.

Charles Peabody, VP of sales and marketing for Shively Labs, said NAB/Montreux was a logical exhibition for manufacturers seeking to broaden their international base.

Full lines displayed

Comrex, along with its sister European company Vortex, promoted its full line of frequency extender systems and its new Talk Console.

Thomson-CSF presented the new Series 7 solid-state medium wave transmitters at 100 and 300 kW; the company also promoted a new generation of the Series 6 single-tube transmitters. Thomson-LGT focused on the FMT line of solid state transmitters for FM.

Riz also was at NAB/Montreux, drawing attention to its line of transmitters with an outdoor exhibit of a mobile system.

Itame showed its full range of transmitters, but highlighted the new Super Galaxy 5 kW solid state unit.

At a booth shared by Corporate Computer Systems (CCS) and Wegener, there was a new BBC digital stereo satellite service. Using the CCS CDQ2000 multi-rate digital audio codec and the Wegener network control system, radio stations can subscribe to BBC programming in digital stereo.

EuroDisney's booth informed radio broadcasters about its remote broadcast operations that are available from Paris.

Drawing Interest

Fidelipac demonstrated the Dynamax DCR-1000, a digital cart machine that uses a 3.5-inch floppy diskette. Company President Roger Thanhauser noted a strong interest in the unit with recent sales in Australia and Venezuela.

Valentino displayed the Production Music package and the Sound Effects Library, all on compact disc. Also at the Valentino booth was the Digital Commercial System (DCS) from Computer Concepts Corp.

AKG, which offers Orban products including the digital Optimod 8200, also introduced a Tapeless Digital 32-Track Recorder. The company also showed its

line of microphones.

Radio Computing Service (RCS) demonstrated the Selector music scheduling system and introduced a new option, the Linker/IBC PC-based software that links a station's schedule program. RCS also premiered a new version of the Tracker hardware and software.

Other exhibits included Nokia Paging, promoting its relay dialed-in message system that works via a telephone network to FM radio stations.

Audio Folo showed the D.D.O. Broadcast Range (Direct to Disk Optical) editing system with a new studio interface (D.D.O.12) and dispatch interface (D.D.O.13).

Dalet had new software for its digital system including the Radio Manager, an add-on for the Traffic Manager system.

Dalet also promoted the Sound/Workstation, a new automatic playing system for satellite programming that can use up to four stereo or eight mono channels.

Philips Communication Systems introduced a new line of radio broadcasting products. Among the list is a 7 kHz ISDN telephone; a 7 kHz audio codec; and a 7 Mbit/sec audio system. The company also plans a 2 Mbit/sec audio system for satellite uplinks, Digital Satellite Radio (DSR) and distributions systems.

A highlight of AEV's booth was Digital Jingle, a new product introduced to the international market at NAB.

Sharing the booth with AEV was RVR. Among RVR's popular new products were the TEX-100, a 100 W FM exciter with integral stereo encoder, and the PJ-1000M, a compact MOSFET 1 kW FM transmitter.

CTE showed its VL-1000, a 1 kW MOSFET FM transmitter that is the second of its MOSFET line; more models are expected by next October.

A company making its first appearance at an international show was Elca; some of its products are well established under the Bext label. Elca manufactures UHF and microwave links and STLs for FM. But the company's HPT-FMR channel-to-channel transposer drew particular interest.

At Aquila Broadcasting Sets (ABS), a new FM transmitter was introduced—intended to be a passive back-up in "n+1" systems. The unit is specifically devised for higher power levels.

SIEL showed the new 8.45 GHz microwave link (specifically for the French market) and the EXC-20 series of low-power FM exciters.

SIEL's booth was shared with Telecomunicazioni Aldena, which exhibited its antennas, topped by a parabolic unit made by IPR.

TEM exhibited a complete range of FM equipment, notably a new line of compact solid-state, low-power, low-cost transmitters.

□ □ □

Dario Calabrese, who covers radio technology for RW in Italy, contributed to this report.

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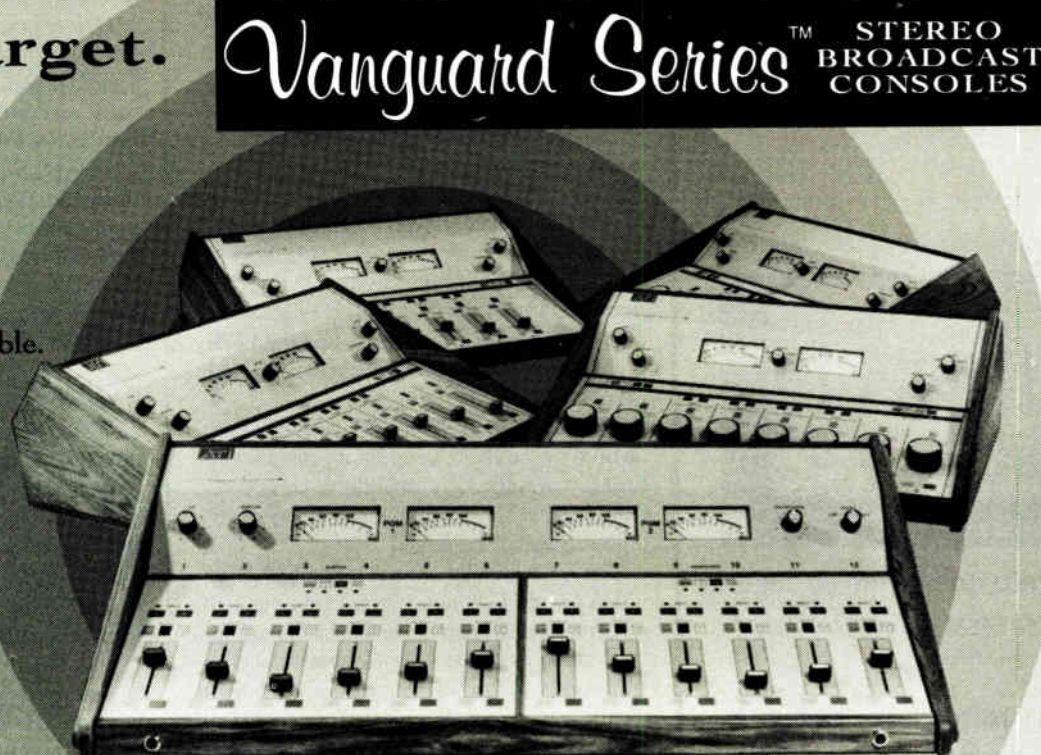
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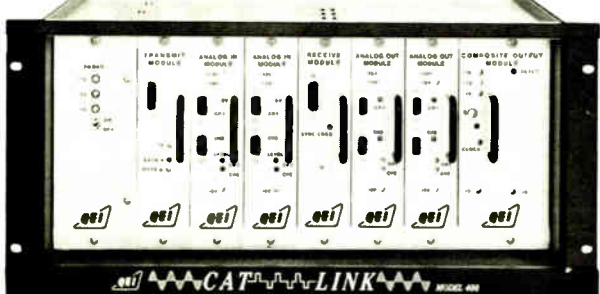
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Vintage 78s Resurrected

► continued from page 6
records are heavily worn. Jorgensen said he has successfully dubbed records so worn that they were almost gray.

"If you take an old 78 that belonged to Grandma Peabody, let's say, and that record was continually played on the same type gramophone, a steel needle struck that record at a certain angle every time it was played. By canting the needle, I may find a portion of the wall—sometimes a very small portion—that has not been touched and is vastly improved over the straight regular angle."

Jorgensen prefers to keep processing to a minimum because he wants to bring out the original sound, not change it. He uses simple five- and 12-band equalizers. He also relies heavily on an Orban 424A Limiter/Compressor/De-Esser to control the peaks.

Do-it-yourself

Jorgensen also uses two pieces of equipment he designed himself: the Acoust-O-Gap filter, which is based on a theory from the 1920s, and the American Wireless Wonder-Box.

"The (Acoustic-O-Gap) filter takes out certain types of unwanted groove noise and hiss without touching, basically, the information that you want to retain, the musical information," he said.

The American Wireless Wonder-Box, enables Jorgensen to seek the cleanest signal and can add or subtract components from the system while he's working on the recording.

The most audible problems are pits, scratches and bubbles. "We cannot always get rid of the clicks and pops. We can usually get rid of the hiss and bring out a roundness and fullness of tone, so when the

sound is good enough you don't notice some of the clicks and pops that will occur occasionally," Jorgensen added.



The studios of American Wireless and Gramophone Co. where Rick Jorgensen remasters old country and folk recordings.

Delco to Test L-Band DAB

by Alex Zavistovich

KOKOMO, Ind. Delco, the U.S. car audio manufacturer, is testing mobile digital audio broadcasting (DAB) reception in the L-band (1500 MHz).

The testing will involve simulcasting with WMRI, in Marion, Ind., a 50 kW station at 106.9 MHz. WMRI will simulcast a signal to Delco's Kokomo offices, according to John McComas, manager of Delco's advanced audio and communications systems department.

The Delco researchers have designed their own software for the transmitters and receivers, he added. The Delco system, however, is not among those in consideration by the Electronic Industries Association (EIA) Digital Audio Radio subcommittee. The EIA group has undertaken a standards selection process for DAB.

Delco is exploring L-band in part because of doubt regarding in-band DAB's potential in the mobile environment, according to McComas. Delco's previous filings with the FCC regarding DAB have "expressed doubt about in-band system robustness" in such applications, he said.

He also noted that Delco's position has been that "a combination of terrestrial and satellite (DAB) would be a benefit to the motoring public."

McComas said Delco has no preconceptions about what it will discover with its tests, although he noted that Canadian tests of L-band DAB propagation "have been very positive." For Delco, the point of the tests is to gain a greater understanding of the technology.

"We (Delco) have a lot of experience in FM and AM, but we have little experience with the L-band," McComas explained.

Delco researchers had anticipated the tests to begin in June. At press time late in the month, McComas said the tests had not yet begun.

As to whether or when Delco's tests will lead to a product for general consumer use, McComas said, "That depends on the consumers."

Cross-Border DAB at Issue

► continued from page 1
Toronto this fall.

If the U.S. had chosen L-band instead of S-band, many industry observers believe implementation of worldwide DAB would go more smoothly. Some European countries are interested in L-band satellite DAB, while Mexico is pursuing terrestrial DAB on L-band.

Hassinger said L-band was the first choice favored by the FCC, but military interests ultimately prevailed. "I think the L-band spectrum is far more valuable for more commercial purposes," he added.

The NAB initially favored L-band DAB solution for the U.S. and aggressively pursued an agreement with the European Eureka consortium, in 1990 and 1991. However, pressure from domestic radio stations and broadcast technology companies forced the NAB to back away from an agreement with Eureka and allow other systems to be considered.

With the impending use of L-band by the U.S.'s neighbors and Europe, government and industry insiders recently speculated that the U.S. eventually could be persuaded to abandon its S-band stance and use the L-band.

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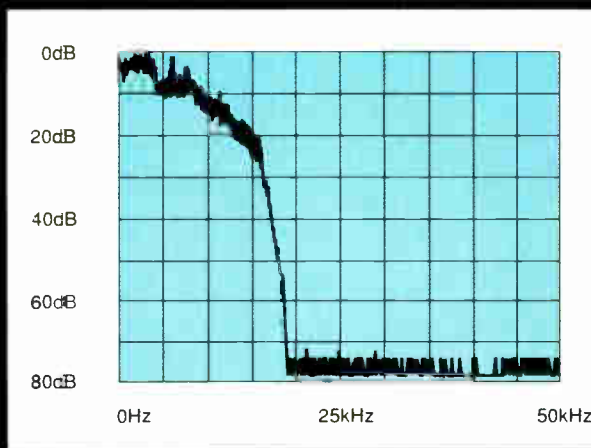
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World Radio History

COLE'S LAW

Ownership Rules: The Local Picture

by Harry Cole

WASHINGTON The upcoming change in the radio ownership rules has been the topic of much discussion in the trade press and at trade shows. But we noticed that several interesting, and potentially important, aspects of those rules were often not mentioned at all.

Under the new rules, up to six stations (three AMs and three FM's) can be commonly-owned in a single market—provided that there are 40 or more commercial radio stations in the market and that the combined audience share of the commonly-owned stations does not exceed 25 percent.

Even in the smallest markets, a single licensee can own two stations in the same service (and a third in a different service) as long as the commonly-owned stations represent less than 50 percent of the stations in the market. AM/FM combos will still be permitted even if they represent more than 50 percent of the market's stations.

For medium-sized markets, the limits are up to two AMs and two FM's in markets with 15 to 29 stations, provided the commonly-owned stations do not exceed a combined audience share of 25 percent. A single entity can own up to three AMs and two FM's in markets with 30 to 39 stations, again subject to the 25 percent audience share limitation.

In an attempt to get a handle on LMAs, the Commission also adopted limits on time brokerage. Where an individual or entity owns an attributable interest in one or more stations in a market, time brokerage of more than 15 percent of another station's programming in that market will result in that other station being counted as owned by the brokering party for purposes of the multiple ownership rules.

Further, those who do choose to broker more than 15 percent of the programming of another station in the market are now faced in any event with a limit on local program duplication: A licensee cannot duplicate more than 25 percent of its owned-station's programming through brokered stations if those brokered stations are in the same service and serve substantially the same area.

So much for the broad outlines of the new rules. What about the fine print? Here are a

few observations which might come in handy.

The new rules require that *all* time brokerage agreements involving a station owned by the broker in the same market as the brokered station must be in writing. And the deal *must* contain a certification by the brokered station that it "maintains ultimate control over the station's facilities, including specifically control over station finances, personnel and programming."

Time brokerage

"Time brokerage" is now defined as the sale of blocks of time to a broker who in turn "supplies the programming to fill that time and sells the commercial spot announcements in it." Presumably, any hybrid brokerage deal which does not include the provision of *both* programming *and* spots would not fit into this definition.

The FCC is using Arbitron's definition of the term "radio market." There's nothing wrong with this, but it does create the

possibility that some folks might try to get Arbitron to mess around with its market designations in subtle ways. And, unlike the FCC (which is governed by the Administrative Procedure Act and the Government in the Sunshine Act), Arbitron is not necessarily required to open its processes to the public.

In an apparent effort to avoid the perception that Arbitron may be akin to a mini-FCC, the new rules do mention the possibility of reliance on non-Arbitron market definitions if those definitions are taken from "a comparable independent professional audience survey organization applying generally accepted industry standards and generally coinciding with metropolitan statistical areas."

It's hard to tell at this point what that means, but it certainly suggests that licensees unhappy with the Arbitron designations may be able to look elsewhere for hope.

Because of the limits imposed on local

licensee time brokerage, the term "duplication of programming" appears in the rules. Duplication is defined as "the broadcasting of identical programs within any 24 hour period"—it does *not* refer only to *simultaneous* broadcasts.

Existing situations

According to the FCC's Report and Order, the new rules will go into effect on August 1, 1992. The Commission recognizes that there may be parties who will find themselves in time brokerage arrangements which, because of attribution considerations, would result in their having too many attributable interests. Anybody in that fix will have until August 1, 1993 to come into compliance with the rules.

Other more general observations might be made about the new rules. While they appear to be deregulatory in nature, in fact they create a new layer of regulatory concern. The FCC will now have to monitor not only station ownership, but also station ratings performance.

Also, the Mass Media Bureau will now have to prepare an annual report assessing the impact of the new rules on the competition, diversity, and minority ownership in the radio industry. In preparing that report, how will the Bureau be able to determine whether any particular licensee, in order to assure eligibility for maximum ownership in a market, might have taken steps to decrease its overall market share?

And what happens when, after such eligibility is established and the maximum number of stations are obtained, the stations' performance improves to the point that common ownership is *inconsistent* with the market share limit? In such cases, will the Commission require divestiture?

These and a host of other questions lurk in and around the new radio ownership rules. You may wish to give them some thought. And, of course, if you have any questions of your own, you should consult with your communications counsel.

□□□

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

PRODUCER'S FILE

Test Driving the Symetrix 425

by Ty Ford

BALTIMORE This month we'll take a look and listen to the Symetrix 425 dual channel compressor/limiter/expander. At a list price of \$579, the 425 offers a very affordable solution to the problems of maximizing levels without breaking the bank.

Both unbalanced quarter-inch TRS and balanced XLR inputs and outputs are available on the back of the unit. The unbalanced jacks are designed to accept either unbalanced quarter-inch TS or balanced quarter-inch TRS plugs. There is also a TRS sidechain in/out jack, that allows you to connect equalizers or filters for selective sidechain frequency processing.

You can also configure the 425 sidechain to automatically *duck* the music when the mic is in use.

Being a stereo or dual channel device, the front panel has two sets of controls for expansion, compression, limiting and output. There is also a dual/stereo switch that allows

the two channels to be used independently or linked together for stereo operation.

In the link mode, channel 2 controls are disabled, allowing the channel 1 settings to control both channels. Channel 1's sidechain receives a mono mix of the two signals, which keeps the gain reduction of both channels locked together.

I experimented with using the dual mode on some stereo spots, using slightly different settings on each channel. While this *effect* may have its uses at certain times, the constant shifting of the voice track in the stereo spectrum was distracting and seemed to reduce the overall punch of the voice. Switching to the stereo mode centered the audio instantly.

The expander has a fixed attack time of four
continued on page 18 ▶

Solution to July 8 Puzzle

I	O	T	A		G	O	O	P		T	O	N	E	
T	R	A	C	K	E	R		B	E	L	A	R	L	
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G	R	A	T	E	F	U	L		E		C	O	A	X

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- 007 029 051 073 095 117 139 161 183
- 008 030 052 074 096 118 140 162 184
- 009 031 053 075 097 119 141 163 185
- 010 032 054 076 098 120 142 164 186
- 011 033 055 077 099 121 143 165 187
- 012 034 056 078 100 122 144 166 188
- 013 035 057 079 101 123 145 167 189
- 014 036 058 080 102 124 146 168 190
- 015 037 059 081 103 125 147 169 191
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ENGINEERING MANAGER

Pink Slips, Silver Linings

by John Cummuta

ALGONQUIN, III. A lot of people today are hearing that they're out of a job. Most of the time they're told that it's a "lay-off," but the result is they won't be getting any more paychecks from that employer. And the fallout from that can be pretty scary.

In this article, we'll first examine how and why people get fired. Then we'll take a look at what you could do if it happens to you.

You can, of course, be fired for incompetence, but one of the more common reasons for losing one's position is for operating on a different set of performance criteria than the person who signs the paychecks.

Use the same yardstick

I'll never forget one time that I got canned. I thought I had been doing a fabulous job. In fact, I had taken the station from oblivion to being a market force in its format. I was not, however, doing the administrative things around the station that the GM thought I should be.

I had been performing by my own mental job description instead of achieving the goals my employer had in mind for me. So the station was doing great—but I was out the door.

Another very common reason for getting the boot is the inability to get along with different types of people. Radio stations are businesses, and to be successful a business must run like a team. Anyone who sours the team spirit becomes a liability to the station

rather than an asset. The negative effect on other employees can outweigh even exceptional individuals.

Professionals will tell you a person is mentally healthy to the extent that he or she can get along with the widest variety of personality types. How do you match up against that standard?

Job insecurity is prevalent

Today more and more people are losing their jobs for financial reasons. Radio stations, like many other businesses, are looking for ways to reduce costs so they can survive.

Technology is another predator on job security, continually making obsolete entire positions or reducing staff sizes.

Being discharged from a job is one of the most deflating experiences in life. It creates a tremendous sense of rejection, and can be debilitating to a person's self-confidence.

So the first thing you need to do is wallow in it. That's right. Let your emotions conduct a world-class pity party. But only for a maximum of 48 hours.

Move forward

It's a necessary part of the healing process. However, remaining in that depressed state for more than a couple days becomes dangerous. You have to reach inside, suck it up, and stand tall, because you have to find a new job. Your landlord or mortgage

continued on page 15 ►

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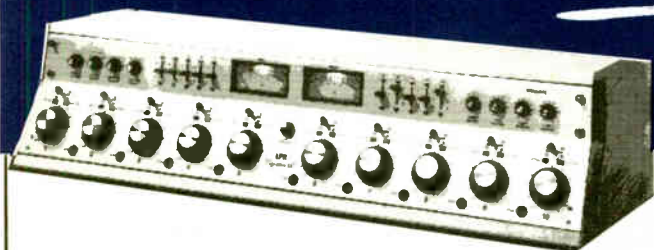
But even all that's not all. Because the 122MKII also features front-panel bias and EQ, +4 dBm XLR-balanced Ins and Outs and a suggested retail price of just \$1099.

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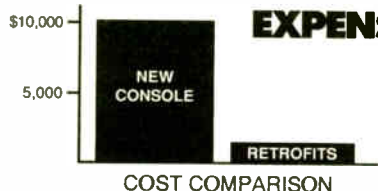
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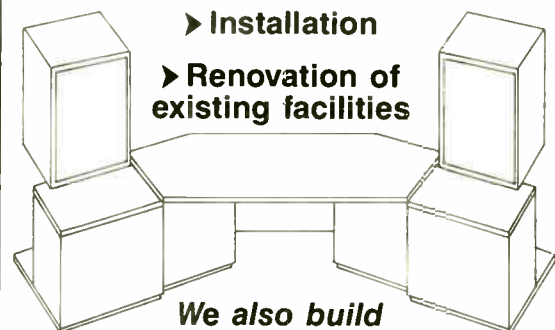
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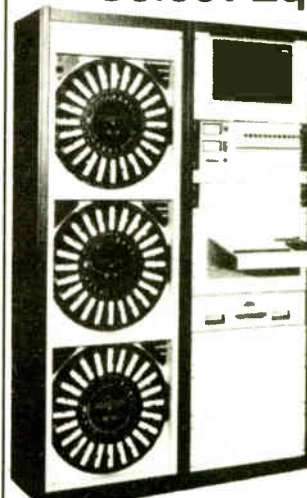
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FROM THE TRENCHES

by Alan Peterson



The Birth of a New 'LAD

Dear Alex,

As the nurse would say, "Congratulations, Mrs. Peterson: It's a studio."

Late in April, WLAD's new AM studio went on-line, and man, is it beautiful!

Now that it's complete, allow a proud papa to show off pictures and boast a little.

The RMX board is running flawlessly, and at first that had me worried. For two weeks I waited for some exploding cigar

couple of the connectors to the RMX, put a ground strap across his little tush. I then hit the "reset" key a few times, and now everything is fairly stable.

One of the more fun aspects of our new studio was the opportunity for a little artistic embellishment. The trusty old Telechron clock which was obviously a WLAD relic was given a new lease on life. I opted for not replacing it with a quartz battery job.

I took it home and stripped, cleaned and painted it with shocking pink and chrome neon spraypaint. I added neon acrylic concentric circles on the clockface—in short, it came back to life as the "gas station clock from Hell," resembling those hideous ticktocks seen in old episodes of "Route 66."

Two big surprises turned out to be the addition of Shure SM57s as talk-guest position mics (they sound really crisp, astounding to us RE20 snobs), and the efficiency

of the sound correction panels I put up.

Nine fiberglass/fabric panels in all were put up, mounted in lumber frames at strategic points in the room. While we could've stuffed the walls with acoustic foam panels, I had wanted to execute a project like this for a long time.

An added benefit was that without black foam all over the walls, the studio is visually bright as well.

For the money spent by the corporation, everybody is happy with the outcome. We all got what we wanted, the station sounds fantastic, the log is filling up, and as you can see, the place looks great in photography. The latter is very important because the local cable TV people stop by now and again to tape political types on our talk show segments.

What of our old AM studio? It'll live again as a production room. But that's further down the road, Alex. Right now I'm still plucking fiberglass filaments out of my fingers, and prepping for tomorrow's show from WLAD's brand new, designed-by-us *pleasuredome*.



WLAD Danbury CT has switched on its new studio.

Talk to you soon,

—Al

□□□

Al Peterson hasn't been the same since he was passed over to replace Bob Villa on "This Old House." He can be contacted at WLAD, Danbury, CT 06810.



WLAD's jock position. That's RoboJock in the rack beneath the Otari.

to appear from somewhere . . . nada.

The only problem we encountered worth mentioning was the inability to reset the digital clock—Pacific uses magnetic sensors and a little wand to step the digits around. Instead we tried the wand that goes to our FM studio's RMX console. That worked. Go figure.

Our CD players are consumer units. They sound great and helped us keep our commitment to staying on budget. CE Tom even wired in a surprise for my own benefit: a defeatable monitor mute.

When the headphone level creeps too high, off come the cans, flip goes the switch, and I can use the main monitors at a reduced level when I key the mic. The Symetrix mic processor keeps feedback in check (*love* that downward expander), and I can switch it back to normal for the jock on after me.

For our "Classic Hits Weekends," we can switch in an optional CRL to add a "vintage AM sound," making the music sound just like it did way back.

The 3-D call letters on our wall were inspired by a photo of WBZ(AM) Boston we have knocking around here, and built out of plywood and pine by morning man Pete Summers. We had the tracklights already from an older sign used two years ago. New life all around, *and* within budget.

Admittedly, we did have a minor hassle with "RoboJock." RoboJock is the miniature sequencer we use to play spots and liners during our Business Radio Network time. They send the satellite commands, RoboJock hits the cart machines.

For the first few days, he didn't want to behave in the new digs—he fired carts out of order, hit two or more at once, and wouldn't work or play well with others. I swapped a

Pink Slips and Silver Linings

► continued from page 13

company will appreciate it ever so much.

The first thing you want to do is to get a recommendation from the boss who fired you. Unless you left under the most strained of circumstances, the person who fired you is probably feeling extreme guilt, so you can use that to your advantage.

Tell him or her how tough it is out there, and ask if he couldn't at least give you a hand by making it sound like it wasn't your fault you were fired (even if it was). If he hesitates, you may want to remind him that should you not find another position, you'll be forced to apply for unemployment benefits. That will ring the cash register in his head.

Now that you have your recommendation in hand, you'll need a good resume to go with it.

When writing up your resume remember this: People who need to hire someone are thinking about the set of skills they need to fill a certain position. They are not looking for a six-foot, thirty-year-old with two kids,

who weighs 195 pounds.

Start with a listing of all the things you can do, not with your personal information and educational stuff.

Prospective employers are looking for someone to *do something* for them, so tell them what you can do.

Or you can begin your own free-lance engineering service.

Whatever path you decide to take, remember why you left your last position. Learn from it. Life's most important lessons seem to come wrapped in difficulty, but if they help you be more successful in the future, you may find that it was cheap tuition indeed.

Finally, maintain a positive attitude. People don't hire mopes. They want dynamic, positive additions to their employee family. Show them that you would be that person. And good luck.

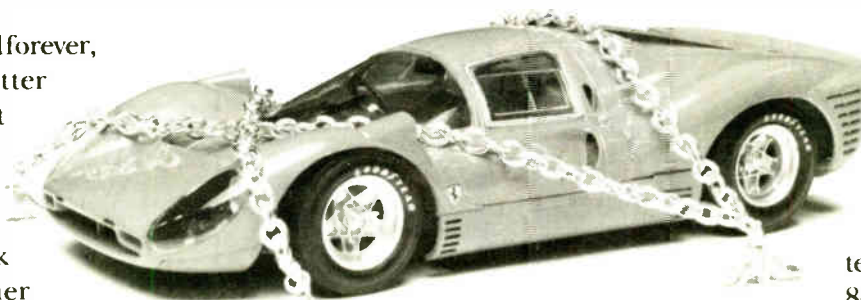
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John Cummata is an independent marketing and management consultant. He can be reached at 708-658-9107.

What happens when you buy a "high performance" product from a low performance company?

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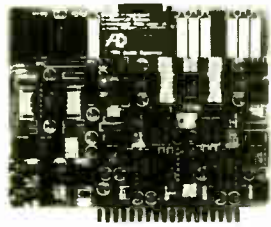
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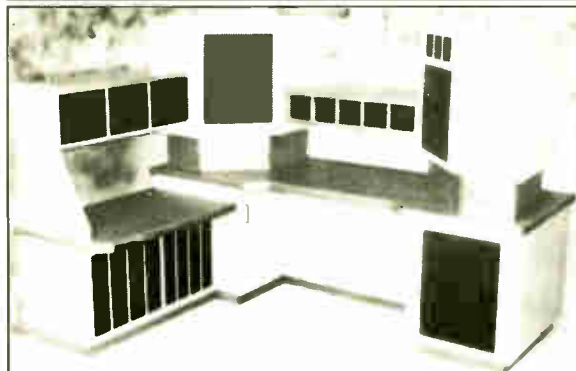


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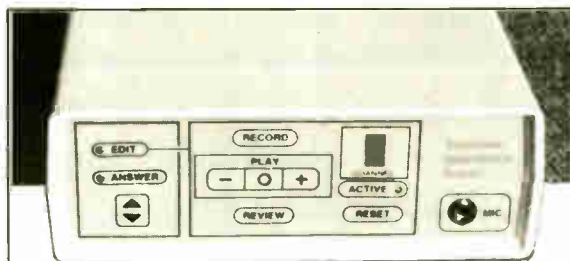
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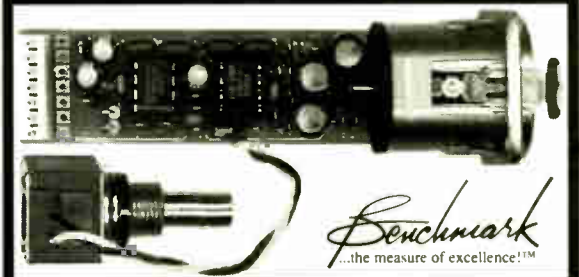
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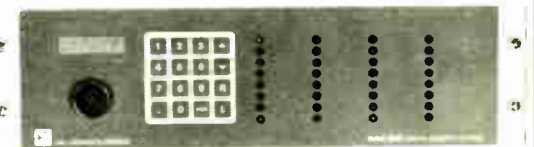


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READER SERVICE NO. 110

LOWPOWER LOWDOWN

Can FM Boosters Solve Terrain-Shielding?

by Howard L. Enstrom

MOUNT DORA, Fla. FM boosters haven't been discussed much in this column because interest in them is minor. Nevertheless, some broadcasters want to know if a booster can solve signal coverage problems caused by terrain-shielding.

In large metro areas, such as along California's coast, the FM band is saturated with both stations and translators. Finding a frequency for a new system amidst such congestion and rugged terrain, which affects an antenna's effective height for different azimuths, can be challenging.

The FCC rules don't change any of the ownership requirements, but do affect other aspects of booster regulation. If a non-commercial educational (NCE) station's booster operates on a reserved channel (201-220) its input signal may be via STL, intercity relay, fiber optics, phone lines or satellite. A commercial station's booster may use any of these signal delivery means, except satellite.

The Commission increased operating power up to 20 percent of the power of the FM station. This power may not necessarily be advisable or legal, since boosters will only be authorized within the protected contour of the class of station being rebroadcast. Agreements with Canada and Mexico pertaining to power limits near the border apply to boosters, too.

Maybe you've heard the awful stories, like the one about Sidney, the poor engineer with the hollow eyes and changed personality. How he struggled with that booster, mumbling profanities all day and sleeping with the animals at night.

The problem was that the system was off-air fed. It wanted to act as a PA system into feedback—a power oscillator, not an amplifier. Yeah, of course he located the downconverter close to a high front-to-back ratio receive antenna.

Of course, the upconverter was located close to the same kind of transmit antenna. Yes, the two antennas were really blind to each other—there was a huge natural terrain barrier between them. And yes, the interconnecting coax for the 10.7 MHz I.F. signal and DC power to the downconverter was double-shielded. Poor Sidney even built a small I.F. amplifier to compensate for losses in the coax line.

After many days of zilch success, in desperation he unhooked the line and let it lie on the ground, all 1,850 feet of it. Then things seemed a bit improved. *Aha!*

So laborers were hired to help dig a trench for the coax. Some of the ground was so rocky, they had to use pick-axes. Anyway, the trench got dug and the coax was nice and out of the way now. The booster still talked to itself, too.

Then Sidney realized what was going on: The booster's output was being reflected back to the input by signal reflection—from another mountain. The sheriff's deputy said some camper reported a wild man shouting obscenities at some sort of black box he was beating with a pick-axe.

Isolation of booster input/output involves variation of output power, antenna radiation patterns and antenna polarization, plus what happens to a signal's polarity after it has been reflected from a surface. Bottom line: A lot of grief can be avoided if a booster's input is not off-the-air. But there still can be problems, involving the electrical phase of two signals received in an interference zone.

Several years ago, Omega International an-

nounced its "FM Synchronous System" (patent applied for), whereby digital technology locks the booster's signal frequency and phase with that of the main signal. In areas where the main and booster signals are received, the locking system avoids audible beat notes and "phase jitter noise" that cannot be overcome by the capture ratio of an FM receiver.

More recently, another California firm, TFT Inc., mailed consultants a copy of a paper, "FM Booster System Configuration," that was presented at this year's NAB by Stan Salek, of the consulting firm of Hammett & Edison.

TFT acknowledges that it funded the measurement portion of the study, and the

mailing describes its Model 8900 Reciter™, a 5 W to 50 W FM band exciter/940-960 MHz STL receiver package. When the 8900 is used in a booster mode, it has a Pilot Carrier Synchronization module installed to control the booster signal's phase, frequency and modulation.

TFT points out, as does Salek's paper, that radio signals travel at the rate of one mile in 5.37 microseconds (μ secs). Salek states that, when the main and booster signals are perfectly timed, distortion is minimal. If signal level ratios are low, shifting time alignment just 5 μ secs causes rapid deterioration.

The firm offers the TFT Model 8920 IF loop-through Digital Delay Network, for

predetermined delay to be added to the RF signal which has a shorter path to the overlap area, adjustable from 0.1 μ sec to 399.9 μ secs in 0.1 μ sec steps.

I commend the fine minds working to relieve technical problems, even a little bit. But I say what's needed is a federal regulatory agency that leads and acts, not follows and reacts to pressure from vested broadcasting interests.

We have the technology to be liberated from the FM band's congestion. What's needed is a plan for programmed transition.

□□□

Howard L. Enstrom is a broadcast consultant. He has owned and managed an AM station and is president of FM Technology Associates, Inc., specializing in engineering design and sale of FM translator equipment. He can be reached at 904-383-3682 or by fax: 904-383-4077.

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FACILITIES SHOWCASE

WMMR Builds a Studio for the Future

by Dee McVicker

PHILADELPHIA The year 1961 was a good vintage for a lot of things, perhaps radio studios were not one of them. WMMR(FM)'s Philadelphia, Pa. studio was showing its age by the late 1980s, and had become a "little bit ragged," according to WMMR CE Phil Harris.

The renovation plan was to fit WMMR into its sister stations' building in order "to get the synergy value of having the people work together," said Harris. But quarters were already tight; to carve out a place for WMMR in the four-story building, some-

thing had to give—or be added.

Owner Westinghouse decided to expand the mezzanine, an area above the first floor. "The mezzanine area was not a full floor, so we brought in a structural engineer," said Harris.

The structural work was extensive, taking over two years for planning and implementation, but resulted in more space for KYW-TV and modern studios for WMMR.

During planning of the studios, Harris brought in Spectrum Broadcasting to implement studio wiring and installation and McClaine Blankmeyer Company to custom-design the furniture, as well as a host of other

contractors.

With offices above and below the mezzanine, the group was advised by acoustic consultant Bob Hansen to acoustically treat the offices and to raise the studio floors for optimum sound isolation. The plan worked.

Studios for everyone

Occupying a good portion of the new floor structure, WMMR's new studios include a

large on-air studio, a news studio, two production studios and an auxiliary on-air studio.

Of the five studios, the on-air studio is the largest, sized at 16'x32'—enough room to hold an additional position for the album rock station's morning show.

In addition to the on-air talent position, which includes a Pacific Recorders BMX III 22 console with Otari MX5050-BIII reel recorders, Denon 950 CD players and ITC Delta cart machines, the air studio has a producer's station for production of WMMR's morning shows.

continued on next page ▶

Test Driving the Symetrix 425

▶ continued from page 11

milliseconds (msec) and a fixed ratio of 1:1.5. The threshold is variable from 0dBu to -40 dBu and the release time is variable from 250 msec to five seconds. Typically, the expander threshold and release settings are adjusted to reduce the sound noisy studios or any noisy source material that passes through the circuit.

The compressor attack time is fixed at about 2 msec. Within that time the compressor reduces the gain to within 0.5 dB of its final value. There is a dual release network that provides a short release for short duration events and a longer release for longer events.

Following that is a traditional compressor network with adjustable release times of between 180 msec and 2.5 seconds.

The limiter attack time is fixed at 200 μsec. The release time is fixed at 100 msec. The section operates at a 20:1 ratio with a variable threshold of -10 dBu to +20 dBu.

At first you may be surprised when increasing the compression ratio or lowering the threshold reduces the output level. Don't be. Just increase the output level of the 425 to compensate. That's why it's there.

Here's another trick. Process a mixed voice-over music commercial through the 425. Set the compression ratio to 2.5:1 and adjust the compression threshold until the compression display reads -10 to -12.

Notice that when you adjust the compressor release time to a faster setting, the music

increases in level relative to the voice. If your voice is buried deep in the mix to begin with, you may find that trying to make your spot louder only results in not being able to hear the voice properly.

Try experimenting with mixing voice and music tracks together so you can hear what the 425 is doing to the relative levels.

Used with moderate to slightly above average settings the Symetrix 425 does a good job in keeping levels from getting out of hand. It will also make your work sound louder.

The harder you make it work, the more you'll hear it work. While the attack times aren't fast enough to reduce brightness, aggressive settings cause the 425 to pump and sound very hard and bright. Some people consider that a benefit, others don't.

One of the features I liked best about the 425 was that, even with high amounts of compression and limiting, it didn't dull the sound of the audio the way some comp/limiters do when they're working hard.

The only thing I didn't like about the 425 was its lack of hardwire bypass. It's a small thing, but a consideration if you're thinking about putting it in your on-air audio chain. Other than that, it offers a good bang for the buck. For more information call Gordon Doucette at Symetrix at 800-288-8855.

□□□

Ty Ford is currently testing a theory that in addition to hearing with our ears, humans "hear" audio via conduction through blood in our capillaries.

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CONSULTANT'S CORNER

Factors in Transmission Line Selection

by Steve Crowley

WASHINGTON Transmission lines are the most common radio-frequency device an engineer will encounter at a station. Every engineer is at least familiar with transmission lines.

Knowing some of the practicalities of transmission line operation can aid you in making the correct choices.

The most important consideration is to select a line large enough to handle the heat and voltage that will be produced in the line. These factors, in turn, are functions of power, type of modulation, and any impedance mismatch between the line and the equipment to which it is connected.

Heat is directly related to the loss of a transmission line—the greater the loss, the

more heat is generated. The loss, in turn, depends on several factors, including frequency, geometry, and the electrical properties of the conductors and insulators. The dominant losses are dielectric loss in insulators and skin loss in the conductors.

The inner conductor of a coaxial transmission line is encased. That affects the line's power handling capability. Pressurization of an air-dielectric line is often done to prevent moisture from entering and affecting the line.

The increased density of the gas between the inner and outer conductor, however, can allow more heat to be carried from the inner to the outer conductor and thus increase

power handling capability.

The disadvantage of relying on pressurization to improve power handling is that in the event pressurization is lost, the power limit is immediately reduced. It is important to monitor pressure and have a provision for automatic power reduction if pressure is lost to prevent permanent damage to the transmission line.

Balanced open-wire feed lines don't have a big problem with heat because of the open structure and wide spacing between conductors.

Heat is not the only concern. Voltage ratings must not be exceeded. This is espe-

cially important in stations employing amplitude modulation because voltages on modulation peaks greatly exceed voltage levels that exist when the carrier is not modulated.

Remember that transmission line voltage and power ratings are a function of voltage standing wave ratio (VSWR). Typical ratings such as those found in a manufacturer's catalog apply only to a line that has a good impedance match.

If the line is mismatched, greater-than-normal voltages will be produced in the line. The transmission line power limit must then be derated accordingly. These mismatches appear suddenly if the line or antenna is damaged.

□□□

Steve Crowley is a consulting engineer in Washington, D.C. He can be reached at 202-223-6700, or by fax at 202-466-2042.

WMMR Studio

► continued from previous page

The producer's position interfaces to the BMX through a Pacific Recorders custom panel and sits to the rear of the console so the morning producer can produce the show without getting in the way of the talent. Included at the producer's position are two Otari MX5050 reel recorders, four ITC playback cart machines and two Denon CD players.

Production studios

Next in size is WMMR's Production A studio, which has an adjoining sound room. Harris purchased a Wheatstone SP-6 console and outfitted it with an Otari multitrack MTR12 recorder, Denon CD players, Panasonic R-DATs, and a host of sound effects units.

Included in the effects gear are an Eventide harmonizer and a digital editing system, and the Otari ProDisk PD-464, for the station's staff musician who helps compose a variety of parodies for the morning show.

Production B, with a four-track Auditronics 300 series console, also has workstation access to a ProDisk. Each workstation has two 620KB hard drives for editing 12 tracks and approximately 30 minutes of audio. All audio archiving is done on R-DAT or 8 mm digital tape, which is built into the ProDisk.

The news studio is not yet completed, but it will be expanded with a multitude of news inputs from outside sources through a BMX console and a terminal of the BASYS system. The news editing system is used extensively at all-news station KYW(AM) and is one of the benefits Westinghouse will realize in having all three services in one building.

For signal routing, Harris purchased a Sierra Automated Systems (SAS) switcher, a stereo 48×48 router, and installed a new Pacific Recorders studio switcher for studio-to-studio access.

The lion's share of the project was completed in February, with plans to expand the studios when digital technology becomes more mainstream. "Someday we envision a network system where spots can be produced in the production studio, put on a storage medium, and played on the air," said Harris.

That day is not too far off in the future for WMMR, and Harris has prepared the station for this eventuality by making room for an extra rack in the control room and by including space for computer monitors in all studios.

□□□

Dee McVicker is a free-lance writer and regular contributor to RW. She can be reached at 602-545-7363.

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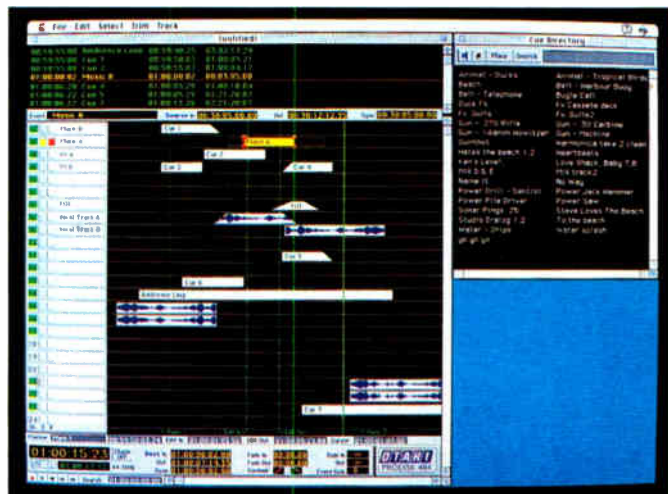
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Sure, Otari's new ProDisk™ 464 is the only system to give you up to 64 tracks. True, it's one of the few to use standard SCSI devices so you won't be locked-in as technology advances. But as much as we'd like to tell you about the rest of its great features, the most important thing about the ProDisk system (given the changes that are certain to occur in this technology) is the Otari name up front — a name that professionals around the world have come to trust for product support and customer service.



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USER REPORT

Burk Solves WKVT Switching Dilemma

by **Mark F. Hutchins**
Owner, WKVT-AM-FM
Broadcast Consultant

BRATTLEBORO, Vt. When WKVT recently began unattended overnight operation, the project yielded two additional benefits: much cleaner on-air product and switching capability almost like having another studio.

Both of these improvements resulted from adding the Burk Technology LX-1 stereo switcher to our ARC-16 automatic remote control system, also from Burk.

WKVT is a typical station in that it has several studios and sources that could feed the transmitters through numerous patch panels and relays. Unattended operation required a reliable and timely response to EBS activation while providing the remote duty operator choices in the event of satellite or other source failure.

In short, it was time for the old switcher to retire.

We were initially torn between installing a complicated and expensive audio routing switcher or building a 1992 version of the old relay box. Neither seemed the way to go.

The Burk Technology LX-1 stereo

switcher solved our dilemma, providing cost-effective and flexible audio control.

The LX-1 provides six stereo inputs that can be selected by front-panel switches or remotely, either through the remote control system or from a studio. Selecting one source can turn off the previous one or, in "Mix" mode, two or more sources can be aired simultaneously.

The news studio can put itself on-air along with the control studio. With tone (or other control) capability as WKVT has, an announcer at a remote can go on-air without help. And unlike the old relays, the audio switching is soft—no clicks or pops.

The Burk Technology LX-1 has made the audio path cleaner and audio switching more versatile and foolproof.

The LX-1 audio performance will challenge test equipment; it is very transparent. Rather than creating common-mode problems as relays and patch panels often do, the LX-1 boasts common-



The Burk Technology LX-1 stereo switcher gave WKVT not only unattended overnight operation, but a cleaner on-air product and switching capability.

mode rejection greater than 110 dB below 1 kHz. With a 50 kilohm impedance, it will easily match IHF or other consumer-type sources.

for each source.

Two isolated output pairs are provided. WKVT uses one to feed the FM STL and the second to feed the AM for simulcasts. Previously, the AM could only simulcast by taking the FM control console program output, which was fine if that was what was really feeding the FM. Now, the simulcast can happen with whatever is feeding the FM.

The LX-1 "Loop" function allows audio processing to be switched in or out. I dislike too many patch points—it's one more place for trouble—but I have to balance that against being able to patch around anything that might fail in the path to the transmitter.

With the Loop function, the processing can be bypassed without using a patch panel. As is the case with other LX-1 functions, the Loop function may be inter-

posed to a device like the ARC-16 for remote control and status. The ARC-16 digital speech unit lets us "talk" to the LX-1 remotely, and I can also access the ARC-16 with my office computer.

The LX-1 may also end up effectively giving you another studio. If you use a satellite feed or automation for part of the day, for instance, you can free the control console for production while the LX-1 feeds your transmitter.

Providing WKVT with the solution to switching audio during unattended operation, the Burk Technology LX-1 also has made the audio path cleaner and audio switching more versatile and foolproof.

For more information, contact Peter Burk at Burk Technology; 508-433-8877; fax: 508-433-8981; or circle Reader Service 175.

USER REPORT

Take Control with Symetrix 528

by **George Blisso**
CE, KMPS-AM-FM

SEATTLE Over the years, I have been asked what makes KMPS announcers sound so great on the air. When I tell



The Symetrix 528 gives KMPS total control over the mic/voice signal

them we use the Sennheiser 421 mic, the reaction is always the same: "Isn't that a kick drum microphone?" Well, here's the way it happened.

When I came to KMPS almost six years ago, the station had a mixture of EV 635A and Sennheiser 421 mics scattered around the station. I had used the Symetrix 528 Voice Processor at another station in California with great results. Hoping to score another win, I gave it another try in hopes

of improving the on-air mic sound at KMPS.

The Symetrix 528 gives you total control over the mic/voice signal. For me, it's a wonder box and it can improve any mic or room feeding its input. There's a com-

pressor/limiter, parametric equalizer, downward expander, de-esser, notch filter, phantom powering and more, all in a single rack space.

Mic preamp gain is variable up to 50 dB and phantom powering is provided for condenser mics. The de-esser senses and regulates selectable high frequencies.

I installed one Symetrix 528 in FM-control and another in AM-control. In both cases, I used the Sennheiser mics, with their low-frequency response switch set to "Music." I did a quick setup with

some of the on-air talent, and wow—great sound.

The PD liked the air sound and the jocks loved it, so the following year, I collected all of the 421s that I could from the other stations in our chain and I bought 16 528s. We now have 528 voice processors everywhere at KMPS and at least as many Sennheiser 421s.

If you have different mics around your station or studio and don't have the budget to buy a bunch of new mics, you should try the Symetrix 528. I think you'll be surprised at just how much it helps microphones and the people using them to sound better.

We even use the 528 on remotes because the downward expander helps hold back the outside noise.

For more information, contact Gordon Doucette at Symetrix: 206-282-2555; fax: 206-283-5504; or circle Reader Service 82.



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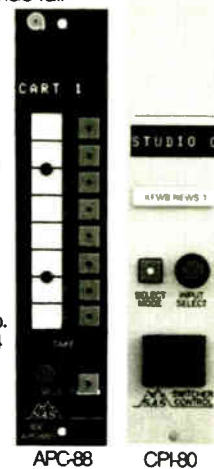
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Reference Guide: Studio Furniture

Company And Contact	Reader Service #	Lines	Price Range	Materials	Pre-Fab, Custom	Pre-wired	Features	How Shipped	Delivery Time
Arrakis Systems Inc. Rod Graham 303-224-2248 FAX: 303-493-1076	29	Modulux supreme, Modulux, Modulux II, Modulink® and custom	\$1,500-\$15,000	polyboard, hardwood plywood, Wilsonart plastic, solid oak	Both	Yes	Modular, flexible, high quality, affordable	UPS, air freight, van lines	3-30 days
Atlas/Soundolier Gary Shamei 314-349-3110 FAX: 314-349-1251	140	System V Heavy-Duty Cabinets, Consoles and Desks	Contact factory	CRS	Both	No	MIG-welded, 14-gauge CPS frames Multi-formed vertical column sections	Ground freight	Quick Shipper Products—48 hours
Audio Broadcast Group Dave Howland 800-999-9281 FAX: 616-452-1652	57	Pro Studio, Executive, Custom, Video 1000, Design V, Enterprise Series	\$2,600 and up	High density composition board, 16th grade formica, solid oak trim	Standard stock systems, and built to customer specifications	Standard AC wiring inc. pre-wires, complete turnkey install avail.	Cable runs, construction exceeds AWI standards, leveling feet, drilled/tapped rack rails, frameless cabinet design, choice of colors	Company truck, blanket wrap, padded van	10-45 days
AudioArts Engineering Mark Kaltman 315-455-7740 FAX: 315-454-8104	180	AudioArts® Furniture	\$2,900 - \$8,600	Birch Plywood, Laminated high density particle board, oak hardwood trim, steel rack rails	Pre-Fab	Optional	No laminate to laminate seams, flexible configurations, leveling feet, extra large wire management area, rack space throughout furniture, major market looks, high quality	Truck	1-4 weeks
The Express Group Byron Andrus 619-298-2834 FAX: 619-298-4143	11	Series 1000, 2000, 3000, 4000, 5000, 6000 and custom	\$2,915 and up	Void-free birch plywood, poplar wood supports, high grade laminate, solid oak or walnut	Both	Yes, by Express Group distributors	Superior design, craftsmanship and value. Six flexible modular systems and unique custom designs. All series include oak or walnut trim, standard high quality laminates, premium birch ply and hardwood construction throughout (no particle board).	Truck—U.S., Canada, Mexico; Air freight—overseas	1-4 weeks
Murphy Studio Furniture Dennis Murphy 619-698-4658 FAX: 619-698-1268	131	Avant-Garde, Elite, Premier XL, Classic & Dub/Edit Station	\$1,000- and up	Solid oak, poplar wood, plywood, plexiglass, high density particle board, taped steel rack rails, high pressure plastic laminate.	Both	Option exists	Superior ergonomic anti-resonate modular and flexible designs. Passive ventilation, wire management, leveling feet and durability systems incorporated into the design. Exposed corners/edges are protected with oak trim. High density particle board in key areas reduces vibration resonance.	Blanket wrapped moving van normally, motor freight for small pieces, air freight when required	1-8 weeks depending on size and customization.
Pacific Recorders & Engineering Corp. Dave Pollard 619-438-3911 FAX: 619-438-9277	78	Custom and Primeline	\$2,865 and up	¾" birch plywood, high density particle board, plastic laminate, oak and selected hardwood trim, steel rack rails	Both	Yes, if desired	Custom cabinetry is designed and built to the highest quality standards. Economical Primeline offers a flexible, modular design, while maintaining a quality appearance	UPS, air freight, padded van	Custom: as quoted individually, Primeline: 2-4 weeks
Wheatstone Corporation Ray Esparolini 315-455-7740 FAX: 315-454-8104	198	Wheatstone furniture	\$5,000-\$15,000	Horizontal grade laminates, all oak trim, steel rack rails	Both	Yes	High quality, major market systems. No laminate to seams, all counters same height, 1.5" thick throughout and with solid oak trim, large wire and management and termination areas	Moving van	4-10 weeks

The Reference Guide is a selected sampling of current products. Specifications and prices are supplied by the manufacturer and are subject to change without notice.

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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.

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READER SERVICE NO. 48



TECHNOLOGY UPDATE

VR240 Makes Digital Logging Practical

by Gil Griffith
National Sales Manager
Eventide

LITTLE FERRY, N.J. Audio logging? You probably don't even think about it.

It's impossible, for one thing: You need storage for mountains of tape, plus someone to maintain those finicky, slow-speed machines and change reels. Finding anything takes hours of listening to high-pitched fast forward and rewind—and then when you do locate the segment you want, it's barely intelligible. Besides, what does logging do for the bottom line?

Full-time audio logging *could* do plenty. You'd have absolute verification of which ads ran when, and for live spots, exactly

giving a practical, easy-to-use "set-it-up-and-forget-it" tool?

What about storage? The VR240 automatically records 252 hours of audio onto a single 90-meter DAT cassette (60-meter cassettes hold 168 hours). That's 10½ 24-hour days on one low-cost tape that fits in the palm of your hand. You can store several year's worth of VR240 DAT logs in a standard file drawer.

How about maintenance and operation? The VR240 has very few moving parts—remember, this is a digital device. The 252-hour recording time can be divided among as many as 24 channels. And here's the amazing part—a high-capacity digital data buffer enables the VR240 to pack audio segments continuously on tape with zero

wasted track space, even when some channels receive no input for long periods, while others are continuously active.

On top of that, the VR240 goes on recording to the data buffer even when the Tape Full alarm has been triggered. Power interruptions don't faze the VR240 either, thanks to the built-in Uninterruptible Power Supply.

Other options include dual transports with automatic switching that doubles unattended logging time to more than three weeks (when used to record a single channel). The dual-deck VR240 will be upgradeable to simultaneous record/playback

in the near future, or you can order separate desktop playback units for those who like to scan logs at their desks. Eventide also offers a handy telephone interface and an automatic tape label printer.

That's the good news. The only bad news is that someone across town may already be using a VR240 Digital Broadcast Logger to check out your top tunes and hot spots.

□ □ □

For information on the VR240 Digital Broadcast Logger, contact Gil Griffith at Eventide: 201-641-1200; fax: 201-641-1640; or circle Reader Service 73.



The Eventide VR240 logger automatically records 252 hours of audio onto a single 90-meter DAT cassette.

what was said. With a reliable, easy-to-scan log of the competition, your sales manager would know who's buying their air, but not yours.

Fine tune programming

Your PD could fine tune your programming and dayparting versus the competition. Logging fire and police messages could help the news director stay on top of local emergencies. Phone lines could be usefully logged too. You could settle contest line disputes (who was the 25th caller?), keep track of requests and collect listener endorsements for on-air promos.

All very nice, but still not worth the hassle and expense of analog loggers. But now Eventide makes a Digital Broadcast Logger, the VR240. Does it really make log-

wasted track space, even when some channels receive no input for long periods, while others are continuously active.

On top of that, the VR240 goes on recording to the data buffer even when the Tape Full alarm has been triggered. Power interruptions don't faze the VR240 either, thanks to the built-in Uninterruptible Power Supply.

How does it sound?

Search time? How does 90 seconds to locate any date and time sound? Plug in an inexpensive printer and the VR240 even prints its own tape labels. Audio quality outshines any reel-to-reel logging recorder. With the VR240's digital circuitry, wow and flutter are unmeasurable—you can even record and store modem and fax transmis-

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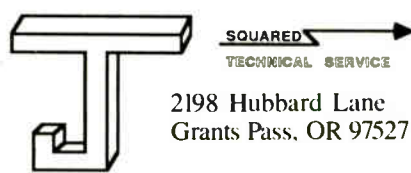
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TECHNOLOGY UPDATE

System 1000 a Benchmark of DA Quality

Modular Audio Distribution and Processing Package Accommodates up to 12 1×10 DA Cards in the Frame

by Jim Fitzgerald
Studio Supervisor
KVIL-AM-FM

DALLAS In a crowded marketplace of equipment that often can hardly be told apart, it's pleasing when a product comes along that is actually worth what you pay for it and, on top of that, works like the sales literature promises.

If you like things straightforward and

consistent, as in a single transmission level for everything—and you won't miss the lack of "asking-for-trouble" pots—take a look at the Benchmark Systems System 1000, a modular audio distribution and processing package.

The packaging on the 1000 is a work of art if you don't like wasting rack space. You can get up to 12 1×10 DA cards in the frame. As a result, the wire-out is a bit dense, but so is everything

else these days.

The metering is a gas, too. I am not really that knocked out by "bargraph" meters, except for the true British PPM the BBC uses. But Benchmark has built usefulness right in. We can now tell which board operators like to "light 'em up."

Benchmark also makes "daughter" boards for everything under the sun: mic preamps, EQs, you name it. Of course,

as low as you can get it.

The Benchmark system is built around the magic 60 ohms output impedance, not 600. After all, the 600 ohms level is a hold-over from years past when the 50 ohm microphone was standard and stations, wanting to save a few bucks, made everything 600 ohms.

When the System 1000 is ordered, we recommend having it pre-wired. Also, ADC now makes an OEM version of its QCP product for Benchmark, which we use for the rear terminations. We use the Pro-Patch exclusively and it all goes together very nicely.

In addition to the System 1000, Benchmark makes some truly nifty outboard

The packaging on the 1000 is a work of art if you don't like wasting rack space. You can get up to 12 1×10 DA cards in the frame.

they provide true 48 V phantom power as well. In the future, we will not move anything around the plant at less than half a volt, and this appears to be the philosophy behind the planning.

With a total of 24 DA cards, we opted for the dual redundant power supply rig, since we cannot risk losing so many feeds.

For those of you who like to hear and see what is going on, there is a "direct" output on each card that can be used as a "hot" speaker monitor. There are dip switches that allow you to configure the various boards in whatever manner needed.

The documentation is all there as well, and updates are always available. In addition, I have never had a problem getting tech support on the phone.

There are also facilities for 12 V logic control of features built in. With all these features, the only complaint I have is that I cannot find uses for all of them.

When installing the system, the wire should be at least 24 gauge. We still use 22, but it would be great if someone could make it smaller. The reason for this is that on long runs, the capacitance needs to be

gadgets. We have replaced all of previous headphone amps with Benchmark's HPA-1 units.

We were having problems keeping transducers in the beyer DT-100s we use everywhere for everything. At \$17 a crack, replacement was getting a little pricey, and we figured that the 600 ohm element was part of the problem, along with the distortion created in the amp when it was trying to deliver a big enough voltage swing.

When we switched to the Benchmarks and 50 ohm elements, they were louder and cleaner.

Other useful items are the Benchmark balancing amps, models DIA-1 and DIA-2, built onto the Switchcraft XLR-style connectors. Using -10, unbalanced consumer gear is unavoidable at times, but nothing says you have to have hum loops and buzz as a result. These amps also provide excellent isolation and improved performance.

□□□

For information, contact Allen Burdick at Benchmark in New York at 315-437-6300; fax: 315-437-8119; or circle Reader Service 42.



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TECHNOLOGY UPDATE

KFWB Makes Switch to SAS 32000

by Dow Jones
Staff Engineer
KFWB(AM)

LOS ANGELES When the current KFWB radio studio plant was built, audio routing was built around an audio distribution amplifier for each source, with all

Sierra Automated Systems and Engineering Corp. of Burbank, Calif.

All necessary modules

The SAS 32000 is a high-quality microprocessor-based audio switching and mixing system housed in a three-rack frame. The frame accommodates all neces-

sary amplifier modules, switching modules and power supplies to provide 64 mono inputs and 16 mono outputs. A single frame can alternately operate in stereo mode providing 32 stereo inputs and 16 stereo outputs. Expansion beyond these limits is accomplished using multiple frames.

lowing freedom from overload. The output amplifiers also provide a balanced, fully-floating "transformer-like" source with a low 60 ohm output impedance. Maximum output level is in excess of 28 dBu, providing ample headroom for our installation.

The SPS-3 switching power supply module can support one entire frame. The SAS 32000 has locations for two SPS-3 modules, each with its own line cord, allowing separate AC feeds to be used for a greater level of redundancy. When two SPS-3 power supplies are installed, each power supply assumes half of the frame load. When either power supply is removed, the other will automatically power the entire frame with no interruption.

All input, output and frame interconnections are made via crimp pins and Euro connector housings, supplied and mounted on the rear of the SAS 32000 frame. In the installation at KFWB, the SAS 32000 audio routing switcher was supplied pre-wired with appropriate multiconductor shielded cable to facilitate punching down on existing telephone punch-blocks.

Output control

Each of the outputs is controllable by several methods. Full system access and control is allowed from the XCP-3 X-Y control panel or a terminal. A personal computer also can be used.

The XCP-3 has lever wheels to select the output to be controlled, as well as the input select for that output. As the output selector lever wheels are changed, the LED "input active" display shows the current input selected to that particular output. A new input selection may be made on the input lever wheels; depressing the Take push-button will switch immediately to the selected input.

Each output can be controlled by a single controller panel, which can be either a panel with programmable push-buttons or an eight-digit alphanumeric display for

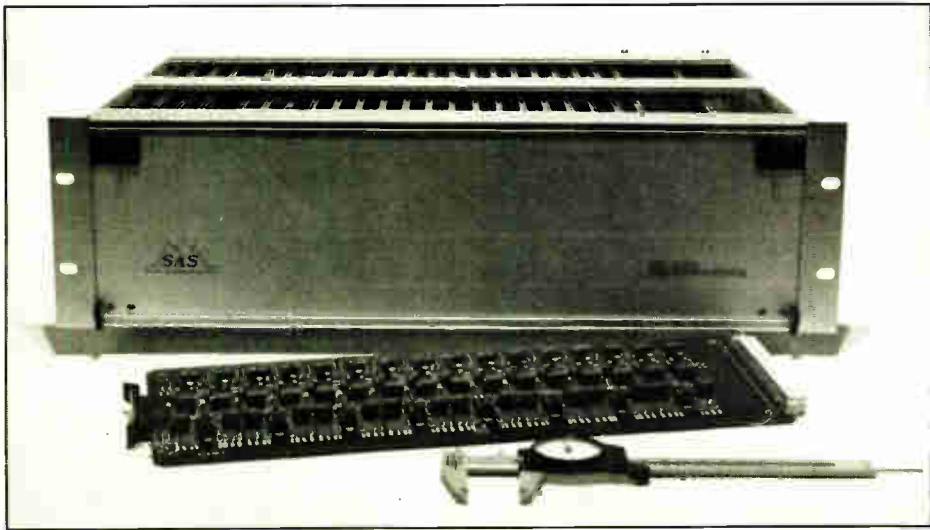
that output. The alphanumeric display control panel is available in several configurations, including single and dual output panels.

The installation at KFWB has been essentially flawless. About the only problem has been inadvertent improper punching, which is easy to resolve. Since the installation, the system has operated without any failures and is almost forgotten, except for the occasional "guided tour" when the front doors of the frames are opened to show off the blinking LEDs on each output/crosspoint module, which indicates proper operation.

□□□

Dow Jones has worked in the broadcast field for more than 20 years.

For more information, contact Al Salci at Sierra Automated Systems: 818-840-6749; fax: 818-840-6751; or circle Reader Service 84.



The Sierra Automated Systems' SAS 32000 stereo audio routing switcher.

the destinations bridging the output of that DA. All routing throughout the plant utilizes Belden 8450 wire punched down on telephone-type 66 punch-blocks. In total, there are more than 4,500 punchings.

While there are many advantages to using telephone-type punch-blocks to interconnect studio installations, the bridging concept associated with this technique requires timely effort to un-punch each circuit to isolate problems such as short circuits.

When the time came to upgrade the physical plant, we decided to replace the bridging distribution system with a cross-point routing switcher to simplify management and reduce the cable requirements.

We ultimately decided on the SAS 32000 audio routing switcher manufactured by

Sierra Automated Systems and Engineering Corp. of Burbank, Calif.

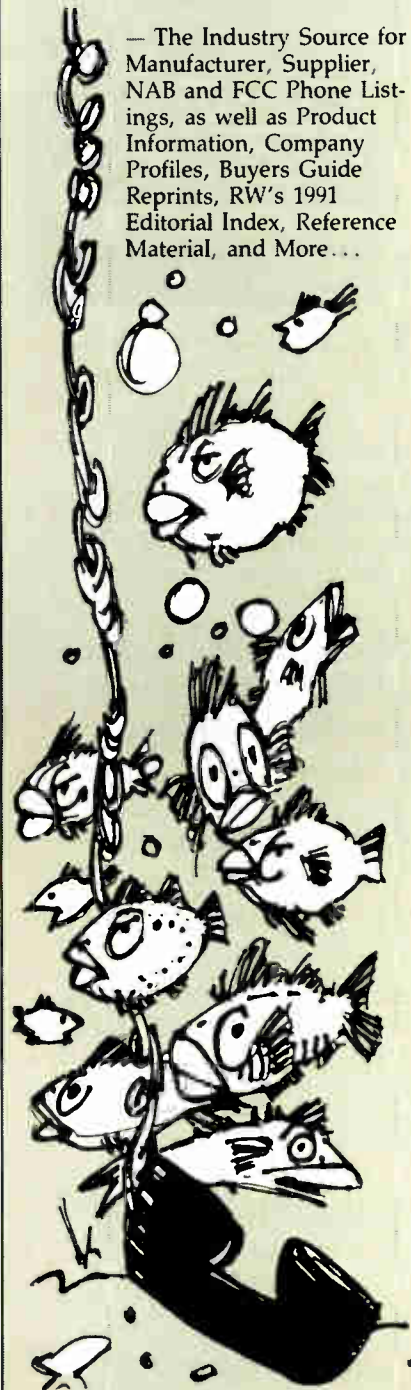
Here at KFWB, since most of our audio sources are mono, we initially installed a 64x32 mono system in December 1990. This system required two SAS 32000 switching frames. We recently installed a third frame to expand the system to 48 mono outputs with the same 64 mono inputs.

The input amplifiers provide electronically balanced and fully floating "transformer-like" characteristics. Maximum input level is greater than 28 dBu, al-

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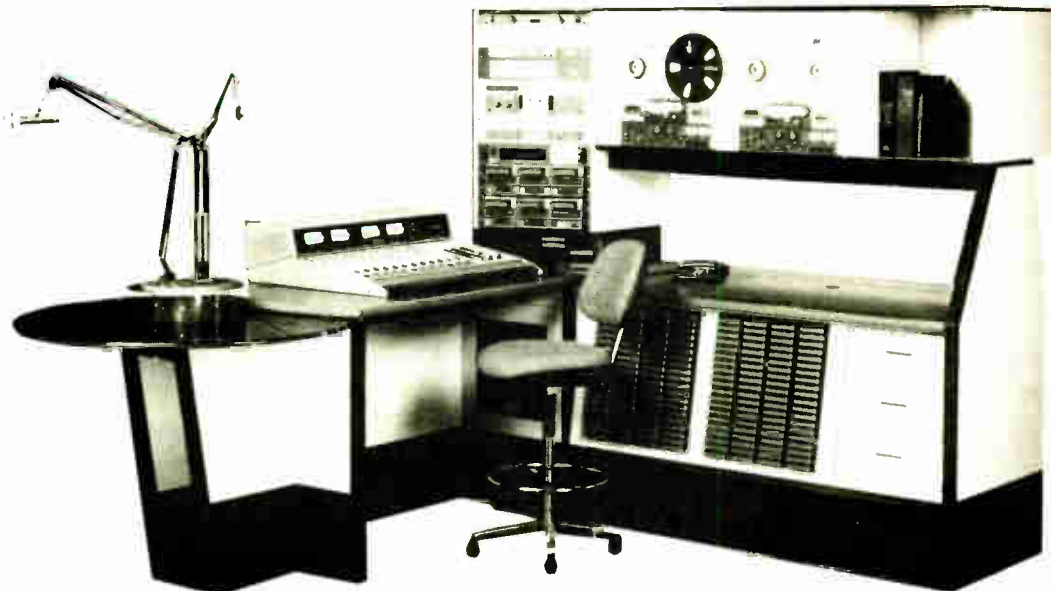
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TECHNOLOGY

Circle (114) On Reader Service Card

Building a Sound Furniture Reputation

Studio Technology Designs Custom Studios for WHP Under Tight Time Constraints, Budget Limitations

by **Scott J. Steffan**
Director of Engineering
Dame Media Consultants

HARRISBURG, Pa. One of the most unusual and sophisticated radio acquisitions I know of occurred in Harrisburg, Pa., in March 1992. The owner of one radio station bought two other local radio stations, moved the facility and changed the format—all in one night.

We needed to construct completely new facilities and new studios in a set time frame. One of the critical elements of the design was the studio furniture. Studio Technology was the one that met our tight time frame and high expectations.

When I started the design process of laying out the floor plan and the on-air studios for WHP(AM) and WRVV(FM), I wanted to design control rooms that would be easy to work on and not get in the way of the announcer every time I wanted to work on the studio equipment.

Custom-built furniture

When I became acquainted with Vince Fiola, director of the company, I was, at first, very hesitant to have custom-built studio furniture. If you've ever bought custom-

built furniture for your studios, you know how it can send your budget right out of this world.

As the beginning stages of studio design began, several bidders contributed in part to the design of the furniture. But when I



Studio Technology met its deadline for WHP and WRVV.

sat down with Vince and we discussed the experience he had to offer—and after he showed me the pictures of the studios he had built in Philadelphia—he quickly became the only bidder and was given the entire project to complete.

This included the design of the FM and

AM air studios and the FM production room.

If you are like me and know what you want, but can't always get it from your brain to the paper, Studio Technology is the one for you. One of the first things you hear from Studio Technology is, "We are here for you. Whatever it is you want done, we want to help you do it."

Those words sum up the quality and excellence of Studio Technology. Among the list of design criteria I wanted were stand-up operation in all the studios and furniture designed with close-up doors that hide virtually all wires.

Normal stance

Another important element in the design of the studios was to have the on-air announcer, in his or her normal stance, have every piece of necessary equipment at arms' reach. I also wanted to be sure that transmitter monitoring was easily seen by the operator on duty.

Not only did Studio Technology take the time to meet my criteria for design, they asked questions about the smallest details of the design that only experience and expertise in the studio industry can prompt. As a result, I think Vince and Studio Technology turned my design ideas into one of the premiere radio show pieces in all of Central Pennsylvania.

If you had the opportunity to attend the NAB show in April, you may have seen the Studio Technology furniture, which incorporated seven of the design ideas implemented in these radio studios.

Not all of our studios are finished. We are planning to build a state-of-the-art newsroom and talk studio within six months to a year. I anticipate Studio Technology will be doing the design additions to our facility.

For more information, contact Vince Fiola at Studio Technology: 215-640-1229; fax: 215-640-5880; or circle Reader Service 115.



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USER REPORT

Stan Ray Cabinets: Open and Shut Case

by Gary Bloodworth
Engineer
Crawford Broadcasting Co.

DALLAS Rather than using off-the-shelf cabinets, we have made it a practice to design our own cabinets, using pencil and straight edge in years past, and CAD (Computer Aided Design) in more recent times. Through this evolutionary process, we have come up with a studio cabinet design that now is standard at all the stations in our company.

The process has always begun with finding a reputable local cabinetmaker to build

to our specifications from drawings we supply. In late 1990, with plans to renovate our company's Chicago-area station, we began looking for just such a local craftsman. Our search led us, through word of mouth, to Stan Ray.

Blue line drawings

We supplied Stan Ray with our blue line drawings; within a few days he worked up a price that was just what we expected to pay. Several months later, when the actual on-site work got underway, Stan Ray delivered the new cabinets on schedule.

These cabinets were exactly what we

wanted. Every detail was right. Sometimes it's difficult to translate two-dimensional blue line drawings into a three-dimensional finished product while keeping the designer's intended concept intact, but this is just what Stan Ray did.

For transport, the cabinet components were individually wrapped in cellophane and carefully packed. There was no shipping damage whatsoever. Stan Ray's people unloaded the components, unpacked them and assembled them on-site. All hardware, such as handles and hinges, also were installed on-site, reducing the possibility of damage during transit.

Once the cabinets were in place, we set all the major pieces of equipment on them, marking the location of holes we wanted cut or drilled to pass wires and cables through. Stan Ray's people were very helpful and made all the cuts and holes exactly as we wanted them, installing custom grommets where needed. They also routed some custom slots to house console power supplies and the like.

When all this was complete, they cleaned up all the sawdust, wood shavings and other mess that was made, then cleaned the cabinet tops with a solvent that left them gleaming.

Last year, when the time came to rebuild the studios of our Detroit station, we set out to find a local Detroit-area cabinetmaker to build our studio cabinets, as had been our practice. When the bids came in, none was even close to what we expected to pay for the job and none of the companies seemed to be "in tune" with what we were after. We then did what we should have done in the first place—we called Stan Ray.

Already there

Several months later, right on schedule, we arrived at the site to begin work. To our surprise, the cabinets were already there, still in their cellophane wrappers. Stan Ray's people arrived a short time later and the cabinets were assembled and complete within a few hours. Once again, the quality, workmanship and installation were excellent. We couldn't be happier with the finished product. Our studios are a real showcase.

Now, with a station in Denver to outfit, we broke with tradition and didn't even call any other cabinetmakers. Stan Ray has already begun work on our Denver cabinets. I have no doubt that they will be there right on time and will meet our every expectation. You can bet that Stan Ray will be our cabinetmaker of choice for all future studio projects as well.

□□□

For more information, contact Stan Ray Productions; 608-986-3481 (phone and fax); or circle Reader Service 187.



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BUYERS BRIEF



SALT LAKE CITY, Utah DigiTech's Vocalist human voice harmony processor promises to deliver vocal harmonies that really sound real.

Designed exclusively for vocal applications, it utilizes a new, proprietary digital splicing system. The system pitch shifts the basic vocal notes without changing the vocal cavity overtones or resonance. You get human-sounding harmonies that duplicate the complex vocal qualities of the original note sung by the singer.

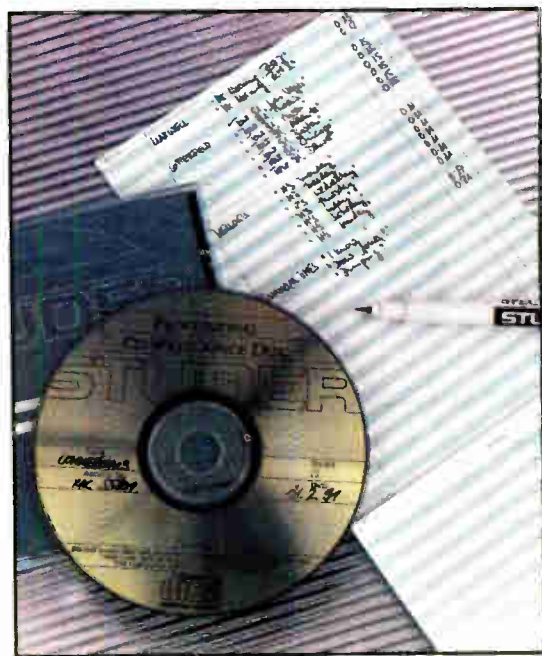
The Vocalist offers five-part harmonies, which can be cut and pasted, programmable portamento, user titling, built-in preamp and headphone jack and full MIDI implementation.

For information, contact Ferd Boyce at DigiTech at 801-268-8400; fax: 801-262-4966; or circle Reader Service 161.



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.

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- LED bargraph meters with switchable peak/VU ballistics (recorders)
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Series 2 machines run so cool, they don't need vents. The one piece outer case keeps out dust, dirt, spilled coffee and other control room hazards. Inside you'll find ITC innovations like a Teflon™ coated solenoid plunger, Kevlar™ tape guides and an advanced hold-down mechanism. All based on a precision-machined, nickel-plated cast aluminum deck, and controlled by microprocessor logic.

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MARKETPLACE

Radio World's Marketplace, a compendium of new and recently introduced radio broadcast products, appears monthly in Buyers Guide.



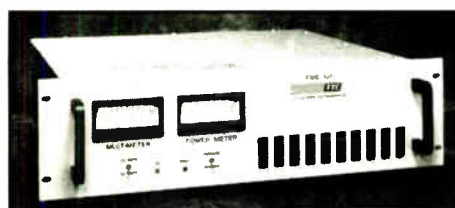
Load Resistors

Bird Electronic Corp.'s new series of MODULOAD RF load resistors for the broadcast equipment market are self-cooled transmission line termination units designed for CW, AM, FM, SSB, TV and pulsed transmission system. The first unit in the series is rated at 15 kW.

The cooling system is entirely self-contained, which is achieved through a heat exchange design that maximizes both air and fluid flow. Heat transfer within the system is optimized by mounting the loads externally. Any of three different orientations can be selected, or the load can be located remotely.

Each RF load resistor is protected by electrical interlocks with a flow switch, a thermoswitch and a variable time delay before application of RF power.

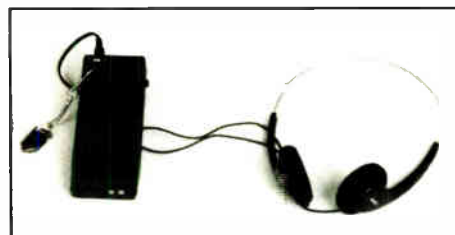
For information, contact Bird Electronic Corp. in Ohio at 216-248-1200; fax: 216-248-5426; or circle Reader Service 17.



FM 100 W Transmitter/Amplifier

Television Technology Corp. (TTC) has added the FMS-100 to its product line. The FMS-100 can function as a stand-alone amplifier or can be used in conjunction with an exciter as a transmitter. The unit uses 5.25 inches of rack space.

For information, contact Russ Erickson at TTC in Colorado: 303-665-8000; fax: 303-673-9900; or circle Reader Service 178.



Compact Headphone Interface

RE America's new d940 headphone interface allows for monitoring of digital audio data streams.

The d940 can monitor AES/EBU and SPDIF digital audio by performing a 16-bit digital-to-analog conversion.

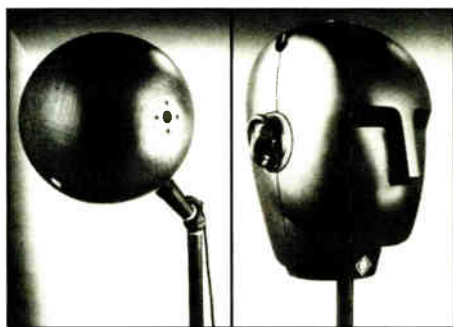
For information, contact John Casey at RE America in Ohio: 216-871-7617; fax: 216-871-4303; or circle Reader Service 109.

Designer Mics

As part of the Tri-Power Series of microphones, the D3600 mic's LF/HF dual transducer system is unique enough to have been awarded international patents on its design. The design provides almost total absence of proximity effect for distortion-free reproduction.

The housing of the D3600 will withstand extreme abuse while protecting the precision transducer assembly inside. Also, all Tri-Power mics have incorporated a mounting adapter into their housing for easy set-up.

For information, contact David Roudebush at AKG in California at 415-351-3500; or circle Reader Service 93.



In Your Face

Neumann's KFM 100 contains two pressure microphones, flush mounted on a wooden sphere, diametrically opposed from each other. The sphere is 20 cm in diameter. This mic reproduces the acoustic depth of the environment particularly well and has an exceptional low frequency response down to 10 Hz.

The KU 100 marks the third generation of the company's binaural "artificial head" microphone system, and features an improvement in both acoustic performance and technical specifications over its predecessor.

It has transformerless circuitry and a built-in battery supply. To support applications for acoustical measurements, single-ended BNC connectors as well as standard XLR-type connectors are provided.

For information, contact Jeff Alexander, product manager, at Neumann (USA) in Connecticut at 203-434-5220; fax 203-434-3148; or circle Reader Service 150.

Exciting Exciter

Continental Electronics 802B FM exciter, available in September, improves upon features that have made the company's 802A exciter one of the leaders in the broadcast industry.

The 802B is completely broadband and may be operated at any level from 5 to 50 W. The operating frequency is selected from a digitally programmed, dual speed, phase-locked synthesizer system in 10 kHz steps. Program inputs provide for a composite signal from any stereo generator, as well as monaural audio and three SCA inputs. LED and digital metering on the front panel provide easily read and accurate indications of all operating parameters.

The entire exciter is mounted on slides for easy access and installation. Program inputs, remote control and remote metering all are available at the rear of the exciter. The 802B is completely modular in design.

For information, contact Steve Claterbaugh at Continental in Texas at 214-381-7161; fax: 214-381-4949; or circle Reader Service 71.

USER REPORT

SDG Tames Studio from Hell

by Lars Hoel
Lars Hoel Audio Productions

NEW YORK It was the studio from hell.

Grimacing, I looked at a shoebox-sized booth that had been partitioned from one corner of an office. With its hollow plaster-board walls and plywood-covered windows, the space was barely adequate as an interview studio for a host and one guest. Add a second guest and the standing waves and flutter echoes made a broadcast-quality recording impossible.

As a free-lance engineer working for the Council on Foreign Relations in New York, my job was to make this room sound good. The organization's locally-produced public affairs program had been picked up by National Public Radio, and its member stations would not tolerate a show that sounded as if it had been taped in someone's bathroom.

I urged the Council to consider some sort of acoustic treatment, explaining that the slabs of open-cell foam someone had nailed over the plywood were not up to the job.

Since the Systems Development Group had impressed me with their friendly attitude at a recent AES convention, I gave them a call.

When the president of the company is available to answer a customer's telephone questions about his product line, I take it to be a good sign. I talked to Skip Warrington about the room, its dimensions and the

peculiar surfaces I was dealing with (an enormous oak sliding door, part of a built-in bookcase that extended from the office into the studio, and of course, the covered windows). Skip suggested the Council fax some room drawings to one of his technical people.

Within two days, SDG called back with suggestions. One long wall would be covered floor to ceiling with inch-and-a-half Cutting Wedge foam. The SDG people suggested Art Diffusers on the two shorter walls (one of which included the bookcase), while the wall with the sliding door would remain untreated.

Once the materials had been installed, I have to admit the room's new decor was startling. The Council goes in for the polished brass and mahogany look, while the gray foam and cubist-inspired diffusers seemed to have been beamed down from the set of "Star Trek."

But open microphones told a different story. The hollowness and annoying frequency spikes were gone, along with the need for hyper-sensitive mic placement. The diffusers (a solution I'd never thought of) gave the illusion of a less boxed-in space.

While it never would be perfect, this studio had come a long way from hell.

□ □ □

For more information, contact Skip Warrington at Systems Development Group: 301-972-7355; fax: 301-698-4683; or circle Reader Service 33.

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ACOUSTICS

Want to Sell

Sonex 200 sq ft, new, \$250. J Morgan, 401-433-1000.

AMPLIFIERS

Want to Sell

RCA BTE-15 w/2 SCA generators, extender board & book. 503-774-0459.

Auditronics AUD-1100DAGLC (2) dist amps in (2) AUD-1100-MF 10-input mainframes w/AUD-PS60 RM external pwr sply, \$1220+s/h. B Lord, Lord Bldg, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

Panaxis Universal stereo preamp for mic, tape, phono w/plans, spare parts, heavy duty pwr sply, impedance converted to 600 ohm balanced line, \$50. Ron, 419-893-7968.

Crown D-75, excel cond, \$150. G Fallus, WZMX, 10 Exec Dr, Farmington CT 06032. 203-677-6700.

Crown D150A pwr amp, \$250; DC300 pwr amp, \$350; Crest P-2501 amp, \$400. B Wilson, 502-789-1505.

Harris/Gates 6169 bdcst stereo pre, \$55; Shure M-64, \$35. R Rushing, Rcdg Studio, 11710 Hoyt Ave, Tampa FL 33617. 813-988-527-1490.

Tascam (2) line, \$275 both; Model 1 head-phone, \$135. D Curtis, Creative Sound, 2810 W 4th St, Appleton WI 54914. 414-733-2299.

Belar RFA-1 FM, RF; Russco preamps, many; Howe turntable preamps. E Hopseker, KBLF, POB 1490, Red Bluff CA 96080. 916-527-1490.

RRCA BTE-15A w/2 SCA generators, extender board & book. 503-774-0459.

RCA, Altec tube mic pre's & tube amps & mixers; Langevin AM-16's, sale or trade. Tracy Eaves, 615-821-6099 (evenings before 10PM EST).

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

ANTENNAS & TOWERS

Want to Sell

Scala HDCA 10-102.3 MHz, 10-element, 250 W, Yagis 7556 input, \$150 ea, 4-50' lgh 1/2" helix w/conns, \$75 ea. D Rose, KAAA, 2534 Huaiapai Mtn Rd, Kingman AZ 86401. 602-753-2537.

Continental ERI G5CPM-2E 2-bay med tuned to 98.3, pole mtg, you pick up, \$2200. S Somet, WZOE, Box 69, Princeton IL 61356. 815-875-8014.

Rohn 45G 200', top beacon, flasher unit & control, BO; Delta TCA-5EX ant current base & remote meters, \$350. A Ibarquen, WKTJ, POB 590, Farmington ME 04938. 207-778-3000.

Andrew/Cablewave (62) 1/2"; (62) 1 5/8" insulated hangers & angle mounting hardware; (100) 1/2"; (50) 1 5/8" non-insulated hanger kits & angle mounting hardware, BO. C Fox, 4853 Manor Hill Dr, Syracuse NY 13215. 315-468-0908.

FM ANTENNAS

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Andrews 465' of 4" air dielectric on spool, conn both ends; Andrews 1861 3 1/8" 1 5/8" reducer, mint; Cablewave, 160' of 1 5/8" air dielectric, conn one 1 end; Kreco SC-155AC VHF remote. C Frodsham, KQSV, E Hwy 24, Beloit KS 67420. 913-738-2206.

Cetec JSLP2R 2-bay FM, tuned to 105.5 w/ant, 1/4 coax conns & radomes, \$2800. M St John, WDLY, Box 4340, Sevierville TN 37864. 615-453-2845.

Gates/ERI CP239 3-bay w/deicers & twr brackets on chnl 240, will deliver close, \$1750. F Vobbe, 419-228-4199.

Scala HDCA 10-102.3 MHz, 10-element, 250 W, \$150 ea; 4-50' 1/2" Helix w/conns, \$75 ea. D Rose, KAAA, 2534 Huaiapai Mtn Rd, Kingman AZ 86401. 602-753-2537.

ERI 37CP6 6-bay FM tuned to 102.1 MHz w/deicers. J Church, WLUM, 2500 N Mayfair, Milwaukee WI 53226. 414-771-1021.

AM directional pkg w/Kintronics 4-twr phaser, 4-chnl dig ant mon, (3) 300' Rohn 450G towers w/Kintronics LTUs towers w/guys, insulators, 1 twr w/lights & painted, 1 RCA FI meter, system in use. 5 1/2 yrs old, will part out, buyer take down & haul. R Meredith, 615-457-1380.

Kintronics 4-twr phaser; (4) ATUs, Gorman Redlich dig ant mon; (3) 300 Rohn 45 G twrs, 1 painted w/lights, all new; 1 RCA FI meter. R Meredith, 615-457-1380.

INVITATION TO BID: Oklahoma State Univ offers for sale by sealed bid a 400' guyed tower, bdcst feedline, a 20'x12' concrete block bldg & 17 acres. Bids will be accepted for individual items or for all items total. For more information, contact Dan Schroeder, KOSU, 302 Paul Miller J/B Bldg, Stillwater OK 74078. 405-744-6352. Bid closes August 17, 1992 at 1:30p.m.

Want to Buy

8-bay tuned to 100.9 MHz, no heaters, gd cond. K Ausin, KFXI, 1101 Hwy 81, Marlow OK 73055. 405-858-9292.

AM loading box only, used, sound, solid steel. P Slatton, WBTV, POB 418, Sheffield AL 35610. 205-381-6800.

AUDIO PRODUCTION

Want to Sell

UREI 535 2-chnl graphic EQ, \$275; Shure FP31 3-chnl mic mixer, \$250. B Aase, 2314 129th Pl, SE, Everett WA 98208. 206-337-6695 or 206-775-1202.

Shure M-675 Bdcst Prod Master, \$75; (2) M-63 Audio Master, \$40 ea; M-64 stereo pre-amp, \$25. E Ribner, Sounds That Matter, 3532-A Wyoming St, St Louis MO 63118. 314-771-2155.

Rane HC6 6-chnl headphone amp, \$300; fast fwd time code reader/gener/re-gener, \$900. K Keller, Chez Flames Rcdg, 1229 Annunciation St, New Orleans LA 70130. 504-595-8623.

CBS FM Volumax 4110 w/manual, working cond, \$250. R Miller, WCNL, 815 W Dean, Virden IL 62690. 217-965-3388.

TEAC AN-180 (2) Dolby prof type-B noise reduc in 19x7" rack, \$75, 19x3.5" rack, \$59. F Vobbe, 419-228-4199.

Complete set up for talk, news & music, late high quality equip, 14'x30', 2-axle mobile studio, less than 5 yrs old w/ A/C & restroom. 503-774-0459.

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Elgin ESC 20721 phone coupler; Eventide H-3000B Harmonizer; Studio Tech AN-2 stereo simulator; Barcus Berry BBE 202R; Orban 111B reverb; CRL Dynafex DX2 noise reduction; dbx 942 Type II decoder cards. E Hopseker, KBLF, POB 1490, Red Bluff CA 96080. 916-527-1490.

SAE T102 tuner, \$120; Orban 536A dynamic sibilance controller, \$250. J Morgan, 401-433-1000.

JVC NR-20 (3) noise reduc units, \$250. D Curtis, Creative Sound, 2810 W 4th St, Appleton WI 54914. 414-733-2299.

Publison Internal Machine 90 stereo in/out, stereo pitch shifting, dig delay, echo, .05 memory, excel cond, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

360 Systems AM-16B 16x16 audio cross-point, \$800. J Church, WLUM, 2500 N Mayfair, Milwaukee WI 53226. 414-771-1021.

Want to Buy

SCMS FM Audimax 4450A stereo, working cond w/manual, would trade for CBS FM Volumax 4110. R Miller, WCNL, 815 W Dean, Virden IL 62690. 217-965-3388.

SAE 5000 phono record noise filter. T Houston, Custom Audio, 929 California Ave, Bakersfield CA 93304. 805-324-0736.

Sony MX-16 audio board for rcdg on location/studio, 8 chnls for input/output, portable, clean, \$450. Jaye, Nimbus Pro, POB 5903, Takoma Pk MD 20913. 301-507-3358.

Stereo mic preamp high end for dig recording, 2 chnl. L Crescenti, 203-799-8785.

AUTOMATION EQUIP

Want to Sell

SMC stereo carousels (2) 350s, \$350 ea; (2) 370s for parts, \$100 ea; (3) 250s, \$350ea; (1) 250 for parts, \$100. F Konwinski, WSOY, 1100 El Pershing, Decatur IL 62524. 217-877-5371.

Schafer, not being used, BO. L Henley, WDAK, POB 95, Opelika AL 36803. 205-705-0368.

IGM EC (5) Go-Cart 24, UPS, 4 BE 2100 carts, set up for Unistar ACII format, gd cond, \$25000. E Duellman, WOMT, POB 1385, Manitowac WI 54221. 414-682-0351.

SMC 350RS Carousel, \$350; RSC-100 random access selector, \$350, both w/manuals. R Miller, WRVI, 815 W Dean, Virden IL 62690. 217-965-3388.

Schafer 903 encode center 1 & 2 cards, In-ton computer, Extel printer, \$250; SMC 350 RS, 24-cart carousel, \$200. D Rose, KAAA, 2534 Huaiapai Mtn Rd, Kingman AZ 86401. 602-753-2537.

IGM Go-Carts (2), 24-trays, excel cond, 1 1/2 yrs in svc. \$1000 ea. C Jenkins, WAVG, POB 1897, Louisville KY 40201. 502-587-0970.

Harris 9000 system, complete. (3) IGM Carousels, (3) SMC Carousels, will sell in pieces or entire system. Ken Dillard/Rick Crago, 502-683-1558.

Sonomag ESP II ESP 2 w/7 Carousels, 5 R-R, 6 single play decks, remote control, great shape. J Miller, ST Bdcst, 908 Frontview, Dodge City KS 67801. 316-227-4444.

SMC 250 Carousel, rblt & aligned, gd cond, \$350+s/h. R McDaniel, KJRG, 209 Meridian Rd, Newton KS 67114. 316-283-5150.

Harris System 90, working w/cables, \$800; Harris 90 for parts, \$400; (2) encoders for System 90, \$100 ea; TI 733 silent printer, \$400; (5) Harris racks, bolt together w/end, \$500; ITC rec delay/play cart deck, \$500; (4) ITC 770 stereo PB decks, \$450 ea; (2) Harris encoders, \$100 ea. F Konwinski, WSOY, 1100 El Pershing, Decatur IL 62524. 217-877-5371.

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

Schafer 903 encode center, 1 & 2 cards, In-ton computer, Extel printer, \$250; SMC 350 RS 24-cart Carousel, \$200; SMC 250 Carousel, extra cards, gd for parts, \$100. D Rose, KAAA, 2534 Huaiapai Mtn Rd, Kingman AZ 86401. 602-753-2537.

Format Sentry FS12C controller, excel cond; IGM Go-Carts, factory recond, \$4000 all. H Royse, WCLU, Box 1620, Glasgow KY 42142. 502-651-9149.

SMC 250RS (3) cart Carousels w/front panels, mounting hdwe & documentation, parts each \$100/3 for \$300+s/h. J Schreck, 315-539-4240.

IGM Basic A; SMC 350 Carousel; SMC 352 RSB Carousel; stereo Instacart; mono Instacart; SMC Mini-Pro controller. E Hopseker, KBLF, POB 1490, Red Bluff CA 96080. 916-527-1490.

MEI 100MP thumbwheel controller, \$500; ABC ntwk controller, blue, \$50; (2) 5' racks, blue, \$100 ea, \$1650 all/will separate. J Morgan, 401-433-1000.

SMC 250 (3) 24-tray mono Carousel; Schafer 903 controller w/books & cables. D Bradsher, WRXO, POB 1178, Roxboro NC 27513. 919-599-0266.

Cetec 7000 (4) ITC 7-70 R-R PBs, (2) 24-tray Carousels, (1) 48-tray Audiophile, (2) terminals batt backup, \$11000/BO. D Greene, WGMM, 3037 Palmer Rd, Big Flats NY 14814. 716-433-5944.

Instacart (2) 48-hole w/Sentry firing systems & IBM-PC w/software; Otari R-R. 503-774-0459.

MEI 100MP 48-chnl, 8 source sequencer w/custom wall cab w/4 Ampex AG445-B machines, preamps & tone detectors. H Kneller, WKII, 3151 Cooper St #56, Purta Gorde FL 33950. 813-639-1112.

Cetec 7000 & 5 Audiofiles w/Hazeltine kybd/screen, BO. A Harle, KTIX, POB 640, Pendleton OR 97801. 503-278-2500.

Want to Buy

Bdct Products AS-10S book for automation brain. M McCutchan, KERI, Box 82225, Bakersfield CA 93380. 805-324-6777.

BUSINESS OPPORTUNITIES

Want to Sell

Music service business w/2 complete format libraries plus recording equipment, tremendous potential, great price. J Gelo, 813-642-6899.

CAMERAS (VIDEO)

Want to Sell

Hitachi FP 50S (2) w/CCU cable & controls, \$500 ea+s/h. F Spinetti, KCEA, POB 2385, Atherton CA 94026. 415-321-6049.

Sony M3 3-tube color w/Fuji 12x9 lens, eng wall access, new cond, \$2800. B Bridges, KCAM, 822 Meridian St, Nashville TN 37207. 615-226-1127.

Canon VC-40A w/Quasar VA546 deck, stereo mic, little gener, VHS deck w/3 spds, 4 HD, hi fi provisions for extra mics, used twice, mint cond, \$600. J Diamond, Blue Diamond, Box 102C Chubbick Rd RD 1, Canonsburg PA 15317. 412-746-3455.

CART MACHINES

Want to Sell

Scully 8300 holds 3 carts, play only, gd cond, \$300. Jaye, Nimbus Pro, POB 5903, Takoma Pk MD 20913. 301-507-3358.

ITC 99B stereo encoder, excel cond, \$3200. B Watson, KSAK, 1384 W Foothill #14, Upland CA 91786. 714-946-6249.

IGM Instacarts (2), very gd cond, mono, \$4300 ea, discount for both. K Roberts, 512-345-9300.

ITC SP (2), R/P, 1 set up w/3 heads for use as tape delay w/3 tones, \$250 ea; (4) ITC 3D triple play, mono w/tones, \$250 ea. S Karwan, KP51, 2100 E Tahquitz Way, Palm Springs WA 92262. 619-325-2582.

ITC 3D mono w/record amp, 3 tones, excel cond, \$1500/BO; ITC R/P, mono, 3 tones, excel cond, \$1000; (4) RCA, \$250 ea, (2) rec amps, \$100 ea. R Mayhugh, KLOA, 731 N Balsam St, Ridgecrest CA 93555. 619-375-8888.

BE 5300C tripledeck, stereo, PB, mint, less than 50 hrs, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

ITC 3D mono, tones, \$850+s/h; ITC PD II, R/P, mono, \$500+s/h; ITC Encore, R/P, mono, \$250+s/h; BE Spotmaster 400B, R/P, mono, \$400+s/h. B Glenn, KOTY, 830 N Columbia Cir Blvd, Kennewick WA 99336. 509-783-0783.

Sparta CH61 4-decker. C Ratcliffe, WADE, 1 Radio St, Wadesboro NC 28170. 704-694-2175.

Fidelipac CTR-12 (4) stereo players, excel cond, \$1100 ea. R Frisch, CERM Bdcst, 6300 Variel Ave #D, Woodland Hills CA 91367. 818-887-4246.

RCA RT-7D w/BA-7B rec elec, \$100. D Davis, KMBA, 5000 Marble Ave NE, Albuquerque NM 87110. 505-262-1866.

Gates ATC Criterion I (5) mono PB units, rack mount, some 3-tone, (1) rec amp avail, BO; UMC/Beaucart 110 (3), 3 tone mono, gd cond, BO. H Kneller, WKII, 3151 Cooper St #56, Purta Gorde FL 33950. 813-639-1112.

CASSETTE & REEL-TO-REEL RECORDERS

Want to Sell

DAT Sony PCM 2500, \$1400; JVC DSDT9000 time code DAT, \$2400, both low hrs. K Keller, Chez Flames Rcdg, 1229 Annunciation St, New Orleans LA 70130. 504-595-8623.

Ampex ATR 800 2-trk for parts only, BO. D Gaydos, NYU, 721 Broadway 11th flr, NY NY 10003. 212-998-1665.

Studer/Revox B77 1/2-trk, 15 ips, 7 1/2 ips, 10" stainless steel hubs, remote, blank tape, \$800. L Crescenti, 203-799-9785.

Tascam DA-50 DAT rec, excel cond, \$800. B Watson, KSAK, 1384 W Foothill #14, Upland CA 91786. 714-946-6249.

Otari MX5050B MKIII stereo rec w/over-bridge, excel cond, \$2900. B Watson, KSAK, 1384 W Foothill #14, Upland CA 91786. 714-946-6249.

Ampex 600/602 (4), 2 good, 2 parts, all w/cases & manuals, blank tape avail, \$250/4 or BO. E Ribner, Sounds That Matter, 3532-A Wyoming St, St Louis MO 63118. 314-771-2155.

Ampex 350 (2), \$150 ea; (2) Scully 280 rec mono, \$200 ea; RCA RT21 stereo rec, \$250. F Konwinski, WSOY, 1100 El Pershing, Decatur IL 62524. 217-877-5371.

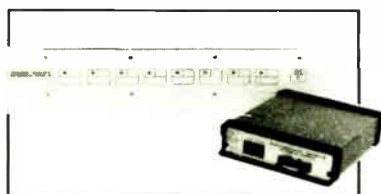
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Otari ARS 1000 (3) 2-chnl w/25 Hz tone sensor, cue tone relays & rack, \$875. R Chambers, KSUE, 3015 Johnstonville Rd, Susanville CA 96130. 916-257-2121.

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Sony TC 153-SD port stereo Dolby cass rec, new, \$150/BO. E Ribner, Sounds That Matter, 3532-A Wyoming St, St Louis MO 63118. 314-771-2155.

TEAC 3340S 1/4-10 1/2" R-R 7.5-15 ips, 4-trk w/simul-sync, very gd cond w/manual, \$550/BO; TEAC 80-8 1/2", 8-trk, multi-trk rec, 15 ips, 1 chnl not working, \$700. B Miller, Grapevine, 250 N Cedar St, Imlay City MI 48444. 313-724-2011.

Otari ARS1000 \$600 ea. J Morgan, 401-433-1000.

Ampex 351 w/roll around cab, full-trk mono, tube elects w/manual. C Kimbrough, WRXO, POB 1176, Roxboro NC 27513. 919-599-0266.

ITC 750s. E Hopseker, KBLF, POB 1490, Red Bluff CA 96080. 916-527-1490.

ITC 850 2-chnl, stereo, R/P, \$550+ish. B Glenn, KOTY, 830 N Columbia Ctr Blvd, Kennewick WA 99336. 509-783-0783.

Panasonic SV-255 port DAT recorder, pro mdl, \$1100; Technics SV-DA10 DAT recorder, \$500. G Kluger, 305-379-8391.

Ampex ATR 800 2-trk, parts only, BO. D Gaydos, NYU, 721 Broadway 11th Flr, NY NY 10003. 212-998-1665.

Ampex 602 pro old in case, gd cond. L Wise, KNEO, POB 845, Neosho MO 64850. 417-451-5636.

RCA RT-21B (3), fair cond, \$200/BO; (6) Revox A77, 4 work, 2 need rblt/parts, \$1500 all. R Mayhugh, KLOA, 731 N Balsam St, Ridgecrest CA 93555. 619-375-8888.

Ampex AG-440B 1" 8-trk, multi-trk in roll around console, gd cond, BO; Otari Mark II-IV 1/2" 4-trk, multi-trk, mint, less than 50 hrs, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

Panasonic SV-3500 (2), new, DAT w/wire remote control, rack mount, balanced in & out, \$1000 ea. S Karwan, KPSI, 2100 E Tahquitz Way, Palm Springs CA 92262. 619-325-2582.

Technics RS1500 2 trk; Sony/MCI JH110C on roll around metal cabinet, both excel cond. J Gelo, 813-642-6899.

Scully 100-16 w/8-trk heads, \$2900. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

3M M79 24-trk, excel cond, \$9950. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

Otari MX-70 16-trk 1", mint cond, \$10,500. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

Want to Buy

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

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

Tascam 112 cassette deck. Chuck Spencer, Radio Resources, 800-547-2346.

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

CD's

Want to Sell

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Want to Sell

Yamaha CXSM midi/music w/many software programs, excel cond, \$150; AVL Show Pro V multi-image AWC/AV, version 8, \$125/BO. B Miller, Grapevine, 250 N Cedar St, Imlay City MI 48444. 313-724-2011.

CONSOLES

Want to Sell

Gates Gatesway 80 partially stripped, w/pots, switches & gd wiring harness & cabinet, BO. E Smith, POB 1341, Florence MS 39073.

Interface 16x8 expandable to 24 inputs, gd cond, light use w/manual, \$1000/BO. Bob, 212-219-3670.

Neotek Series I 16x4x2 w/patchbay, \$3500. D Gaydos, NYU, 721 Broadway 11th flr, NY NY 10003. 212-998-1665.

Arrakis 500SC 8-chnl, 21 input w/pwr sply, nds tune up, \$1000+ish. F Spinetti, KCEA, POB 2385, Atherton CA 94026. 415-321-6049.

MCI JH-618 non-automated, 18-input, 16-output, vgc w/patch bay & VU meters, \$8200/BO. B Petruzzi, A-Z Music, 5050 Tamarus #269, Las Vegas NV 89119. 702-736-2303.

RCA 76-C 1948 vintage 6-chnl bdct, \$500. L Wise, KNEO, POB 845, Neosho MO 64850. 417-451-5636.

Tascam 5-A 8 in, 4 out, like new, like new, \$800. D Curtis, Creative Sound, 2810 W 4th St, Appleton WI 54914. 414-733-2299.

Ramko DC8MS 8-chnl, 18-input stereo, excel cond w/manuals, \$2500. R Trumbo, 800-397-4146.

Neotek Series I 16x4x2 w/patch bay, \$3500. D Gaydos, NYU, 721 Broadway 11th Flr, NY NY 10003. 212-998-1665.

Auditronics 110 A-4 10-input, \$1000. S Karwan, KPSI, 2100 E Tahquitz Way, Palm Springs CA 92262. 619-325-2582.

Ramko DC3810S. E Hopseker, KBLF, POB 1490, Red Bluff CA 96080. 916-527-1490.

Collins Rock 10 10-chnl, similar to AC-10, remote start panel, \$3500; (2) RCA dual chnl, 5-pot, 15-input w/extra mods, solid state, great cond, \$400 ea/BO. R Mayhugh, KLOA, 731 N Balsam St, Ridgecrest CA 93555. 619-375-8888.

Gates 31-A, mint, \$400. D Parsons, KLUH, POB 1313, Poplar Bluff MO 63901. 314-686-1663.

Russco 505 mono, \$500+ish; BE 4M150 mono w/XLR conns, \$600+ish. B Glenn, KOTY, 830 N Columbia Ctr Blvd, Kennewick WA 99336. 509-783-0783.

Broadcast Audio System 16 series IV, stereo, w/most access, 18 mos old, excel cond, \$9000/BO. R Mayhugh, KLOA, 731 N Balsam St, Ridgecrest CA 93555. 619-375-8888.

Ramko 5C-5M 6-chnl control board, solid state, mono, \$300. P Statton, WBTG, POB 418, Sheffield AL 35610. 205-381-6800.

Ramsa WRS-208 8x2x1 mixer, last 2 chnls will accept phono inputs, very high quality, \$650. G Kluger, 305-379-8391.

Trident 65 32 in-16 out, oak cab w/base, wiring harness, extender mod, new, \$10000. J Diamond, Blue Diamond, Box 102C Chubbic Rd RD 1, Canaanburg PA 15317. 412-746-3455.

MCI 428 28x24, 336 pt patchbay, prod desk, \$7500. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

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Yamaha MM 10 production console. Chuck Spencer, Radio Resources, 800-547-2346.

Langevin AM4A w/documents. J Gangwer, 942 32nd St, Richmond CA 94804. 415-644-2363.

DISCO & SOUND EQUIPMENT

Want to Sell

Whirlwind 24-chnlx3 send snake, \$450; Altec 12" spkrs, \$75 ea; Rane RE27 EQ, analyzer, \$450. B Wilson, 502-789-1505.

Multivox Strings 'n' Grass keyboard, excel cond, \$85. B Miller, Grapevine, 250 N Cedar St, Imlay City MI 48444. 313-724-2011.

Klipsch Lascas horns in road cases, will handle 300 W per chnl, excel cond, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

Century D-70 (2), \$250 both. D Curtis, Creative Sound, 2810 W 4th St, Appleton WI 54914. 414-733-2299.

Roland TR-909 studio drum machine, excel cond w/manual, \$250. B Miller, Grapevine, 250 N Cedar St, Imlay City MI 48444. 313-724-2011.

Dolby 361 (4) NR units, \$550 ea. W Gunn, POB 2902, Palm Springs CA 92263. 619-320-0728.

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LIMITERS

Want to Sell

Gates Solid Statesman (2) AM, \$100 ea; CBS Audiomax, \$100 ea; (2) CBS FM, \$100 ea; (2) Gates STA-level, \$50 ea. F Konwinski, WSOY, 1100 El Pershing, Decatur IL 62524. 217-877-5371.

dbx 160, \$325; (5) Scamp S31, \$325 ea; (2) Scamp S30 exp/gates, \$325 ea; Scamp rack/pwr sply. K Keller, Chez Flames Rcdg, 1229 Annunciation St, New Orleans LA 70130. 504-595-8623.

UREI LA-4 comp/limiter rack mounts, XLR adaptor, excel cond, \$425. D Meyer, 818-785-2324.

Mod Sci comp clipper, mint cond, \$300. T Noordyk, WTIQ, 1501 Deer, Manistique MI 49854. 906-341-8444.

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Gentner RCF-1 for Orban 8100A, never used, \$170. G Faltus, WZMX, 10 Exec Dr, Farmington CT 06032. 203-677-6700.

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Moseley TFL-280B (2), \$300 pr. Joe, 508-548-3102.

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Otari ARS-1000 (2), \$875 ea. Joe, 508-548-3102.

Nagra #4 hi fi, full-trk, excel cond, \$800. Jaye, Nimbus Pro, POB 5903, Takoma Pk MD 20913. 301-507-3358.

Revox PR-99 (4) MKII 1/2-trk stereo, play w/25 Hz sensor, \$1100 ea. D Peluso, 2680 E Flamingo Rd Ste E, Las Vegas NV 89121. 702-732-2200.

ITC 750 P/B only, \$100 ea. S Karwan, KPSI, 2100 E Tahquitz Way, Palm Springs CA 92262. 619-325-2582.

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Harris Solid State AM & Gates StaLevel AGC, \$200/BO. R Mayhugh, KLOA, 731 N Balsam St, Ridgecrest CA 93555. 619-375-8888.

Moseley TGR340; UREI BL-040; Pacific Modulator & Multilimit S. E Hopseker, KBLF, POB 1490, Red Bluff CA 96080. 916-527-1490.

Orban 8100A1 current mdl Optimod, like new, \$3000. Dick, 512-333-0050.

Loft 410 2-chnl comp/lim/gate, \$225. R Robinson, 203-269-4465.

Collins 26U-1, \$50. D Davis, KMBA, 5000 Marble Ave NE, Albuquerque NM 87110. 505-262-1866.

CBS 4110 FM Volumax; CBS 4450A Audimax; Inovonics Map II Processor. E Hopseker, KBLF, POB 1490, Red Bluff CA 96080. 916-527-1490.

CBS Labs 411 FM stereo Volumax modified for flat audio response, clean, \$150. H Kneller, WKII, 3151 Cooper St #56, Purta Gorde FL 33950. 813-639-1112.

Modulation Sciences CP803 composite clipper, \$250; Gates Solid Statesman, \$150; UREI BL-40, \$200; Dorrough DAP-310, \$250. B Aase, 2314 129th Pl, SE, Everett WA 98208. 206-337-6695 or 206-775-1202.

Sony ECM 21 (7), \$100 ea; (7) ECM-22, \$150 ea; (2) C-22, \$150 ea; (6) ECM-33, new, \$200 ea; Fostex M55R8, new, \$300; (2) Peerless MB-520 w/pwr sply, \$500 pr w/sply; (5) AKG D2000E, new, \$125 ea. J Diamond, Blue Diamond, Box 102C Chubbick Rd RD 1, Canonsburg PA 15317. 412-746-3455.

AKG The Tube very gd cond, capsule, pwr sply, cable & holder, \$1100; John Hardy M1 preamp w/LED display & Jensen xformer, \$1100. P Trembley, Downtown Sound, 23715 Via Rosa Linda, Valencia CA 91355. 805-254-5213.

Shure SM-81 condenser, \$350 pair; Shure SM-7, \$240; Sennheiser K2U w/cardioid capsule, condenser, \$300 pair. G Kluger, 305-379-8391.

RCA 77DXs/44BXs ribbon, chrome/TV grey, gd cond., BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

Telefunken U-47, Neumann U-67, KM-54 mint; RCA ribbon mics (2) KU3As 100001, (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, Sylvania; 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.

Sony SRF-41 AM stereo walkmans, new, several, \$89. C Fox, 4853 Manor Hill Dr, Syracuse NY 13215. 315-468-0908.

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AZP-4 blue (32) 2x2 squares of acoustical foam, \$12.50 per sq. M Tait, Tait Rodg, 1347 S Capitol St SW, Washington DC 20003. 202-488-3905.

Panasonic WV-LK11 studio conversion kit for VW 6000 camera. G Hill, 408-749-0784.

Teletypes: 15RQ, 15KSR, 28KSR, 33ASR, BO. D Davis, KMBA, 5000 Marble Ave NE, Albuquerque NM 87110. 505-262-1866.

AM864U Army 1954 peak limiting amp, mint cond., never used w/manual, \$50+s/h. J Schreck, 315-539-4240.

Atlas MS-25-C (2) stands, \$110; 300' mic cable w/XLR conn, \$75. D Curtis, Creative Sound, 2810 W 4th St, Appleton WI 54914. 414-733-2299.

UTC LS-33 20 W line to line xformers, \$120 pair. R Robinson, 203-269-4465.

Rack, 6', black, \$140. J Morgan, 401-433-1000. Tellabs 4008 line EQs, (2) w/housings, \$100 ea. A Garren, 503-231-7800.

Want to Buy
5-100W AM 530-1610 kHz, used, tunable. F Smith, WBSV, 2408 Chamberlain Ave, Chattanooga TN 37404. 615-624-7126.

Macintosh stereo tube components, disc rec equip by Fairchild, Neumann, Westrex, 45/78 records. K Gutzke, Custom Rodg, 7134 15th Ave S, Minneapolis MN 55423. 612-866-6183.

Jazz record collections, 10" LP12" LP be-bop, swing, dixie, highest prices paid. B Rose, Program Recdgs, 228 East 10th, NUNY 10003. 212-674-3060.

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Step attenuators, audio, for Gates & RCA, \$50; Simplex, analog, master clock +8 slaves, \$400. F Konwinski, WSOY, 1100 El Pershing, Decatur IL 62524. 217-877-5371.

Up timers (3) new, 2" readouts, counts to 9:59 & resets, momentary closure resets to 0:00, \$57.50 prepaid; Audio Dig mdl TC-2 dig delay unit, new, \$1345; misc 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.

Want to Buy
UREI LA3 & LA4 & dbx 165, pairs only. Dave, 212-956-0967.

MICROPHONES

Want to Sell
AKG BX-10 reverb w/19" mount, like new, \$750; Sony ECM-50 condenser, new, \$195; Sycron S-10 for pipe organ only, \$300; EV 636 & 664 dynamic, \$35 ea. D Curtis, Creative Sound, 2810 W 4th St, Appleton WI 54914. 414-733-2299.

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

Program/news public svc director exper in board/remote ops. J Lipenski, 904-683-9059.

GM/News Director w/over 25 yrs bddt exper seeking GM/News Dir pos in SE. Bill, 803-245-3128 AM/803-245-2127 PM.

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

Director of Engineering in search of a new home. Over 12 yrs of Top 20 Market exper including high power AM & FM directional antennas & multitrack studio design. Send inquiries to Radio World, POB 1214, Falls Church VA 22041. Attn: RW07-08-01.

Talented unemployed morning man, newsman, copy, PD, prod, 23 yrs exper, team plyr, prefer mgmt post, lld announcer duties. Larry, 717-653-2500.

Sharp, sultry prof w/9 yrs on air/prod/news exper seeks pos in Tampa/Sarasota/Orlando area, any format/shift. Mary, 616-784-9215.

Recent budget cut seeks PD/on air pos w/11 yrs exper in prod, copy, promotions, prog & on air. Brad, 407-262-2713.

Larry Branot, voice of AC/oldies, exper DJ/BC seeking AM/FM pos in OH valley reg. Award winning! Loves prod/remotes/sales, keen mind, quick wit. 7083 Wes Ct, Newcomerstown OH 43832. 614-498-8507.

Prod/Personality exper creative talent, unltld voices/accents, solid & conversational w/winning attitude & team spirit. S Matthews, 615-526-7099.

Goal-oriented personality avail, exper team plyr, prefer AM/afternoon, drive-in rated mkt in USA. J Reynolds, 919-671-1162.

Newlywed & unemployed air talent w/7 yrs exper from board monkey to ops mgr, will relocate anywhere & consider any opportunity. Randy, 704-596-4864.

1 yr & 2 wks exper on the air & 1 month Prog Dir exper, seeks pos in radio anywhere in USA, 814-266-1173.

Engr w/heavy duty exper for any job, anywhere w/great refs, audio, RF, automation, xmtrs, anis/construction, domestic/intl, freelance, 813-849-3477.

DJ/trainee/volunteer seeks pos in AZ/CA/CO/AL, any format except news, any shift. J Benjamin, 602-280-9070.

Air talent w/7 yrs exper seeking pos country, AC, oldies, C/R CHR, west/northern states, responsible team plyr. J Edwards, 602-215-1039.

Recent college grad BS/EE, looking for tech/engr opportunity, hardworking, motivated, computer lit, eager to be involved w/bddt/prod, will relocate. Dan, 617-729-0828.

Major mkt CE w/mgmt skills & business savvy seeking CE pos at large mkt AM/FM w/solid group owner. 708-369-8483.

DJ/AMD in modern rock, looking for warmer climate, will bring 3000 alternative titles as well as exper w/multi-trk prod, computers & bddtg. Patrick, 815-338-0448.

CE w/big prod voice & over 15 yrs hands-on eng exper seeks CE pos w/prod/air shift in competitive top 100 mkt. G Morgan, 704-563-8676.

Engr w/22 yrs exper seeks FT perm pos w/stable, well managed organization. Engr, POB 17502, Colorado Springs CO 80935.

Seeking responsible, challenging position w/company or association that can provide opportunities to match my qualifications & experience as Corporate/Association Exhibit Manager or Marketing Events Meeting Planner. With 20 yrs exper, my strongest assets are interpreting work situations, coordinating effectively w/all levels of mgmt, organizing & guiding projects to completion & providing team leadership. Will relocate if necessary. Robert Schwartz, 10934 Woodchuck Ct, Penn Valley CA 95946. 916-432-4722.

HELP WANTED

Engineer - 50K AM - Studio & Trans., fast growing western city, experienced pro will be compensated accordingly. Start in July. Send resume to Radio World, POB 1214, Falls Church VA 22041. Attn: RW 7-22-01.

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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.

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Contact Radio World Newspaper for availabilities.
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MONITORS

Want to Sell

Belar AMM-2B, \$500. A Ibarquien, WKTJ, POB 590, Farmington ME 04938. 207-778-3000.

Mod Sciences Sidekick SCA-186; McMartin TMB-2000B SCA freq/mod monitor. J Michaels, WCOW, 113 W Oak St, Sparta WI 54656. 608-269-3307.

Want to Buy

AM mono mod meter tuned to 1570 kHz, working cond, Belar pref; EBS rcvr/one gener, pref TFT 7604/equiv, AM, working cond. R Miller, KUAW, POB 575, Lahaina HI 96767. 808-572-5534.

Any older McMartin mod monitors. C Goodrich, 11435 Manderson, Omaha NE 68164. 402-493-1686.

Modulation Sciences Sidekick. Chuck Spencer, Radio Resources, 800-547-2346.

MOVIE PROD EQUIP

Want to Sell

Arriflex S 16mm movie camera, (2) 500' magazines, lens, mic, (2) motors, crystal sync, batt cable, \$3500. Jaye, Nimbus Pro, POB 5903, Takoma Pk MD 20913. 301-507-3358.

RECEIVERS & TRANSCEIVERS

Want to Sell

Magnum Dynalab FT-101 tune made in Canada, fact refurb w/FM-SCS modification, \$425+\$8 s/h; GE 7-2885 Superradios modified w/FM-SCS, tunable from 57-92 kHz, \$100 postpaid. B Elving, Box 336, Esko MN 55733. 218-879-7676.

Com-Spec SS-32P tone encoders, (3) Osi-tis, (3) Vega, (2) encode-decode, \$10 ea. P Russell, Bowdoin Coll, Sills Hall, Brunswick ME 04011. 207-725-3066.

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708-513-1386

GE MVP (11) 4-chnl freq boards for MVP mobile, works on LB, HB & UHF, \$10. P Russell, Bowdoin Coll, Sills Hall, Brunswick ME 04011.

Gorman Redlich CEB EBS encoder/decoder, excel cond w/manual. Dick, 512-333-0050.

SCA decoder, high quality micro-miniature 6792 kHz, prewired & ready to install, \$15. D Jackway, Background Music Eng, 5742 Fair-oak, Springfield MO 65810. 417-881-8401.

Want to Buy

1936 Zenith Stratosphere radio, top dollar, serious buyer. D Hauff, Box 16351, Minneapolis MN 55416.

ICOM R-71A mint cond. J Glass, 815-784-2179.

REMOTE & MICROWAVE EQUIP

Want to Sell

Telos 10 10-line phone system, used 6 mos, storage, \$975+s/h. B Lord, Lord Bldg, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

RENTALS

COMREX
3-line extender
Frank Grundstein 215-668-6434
Audio/Video Consultants 215-642-0978

TFT 7610, 7630, 7640, 7832, 7840, 7841, ADS-01 & PSU-01, gd cond. G Jablonski, WHMI, POB 935, Howell MI 48844. 517-546-0860.

TFT 7610-C w/7630 chnl, expander remote control unit & spare parts, \$1300. George, WWCR, 1300 WWCR Ave, Nashville TN 37218. 615-255-1300/77.

Marti RPT 15, RPT 30 & CR10 at \$455.65/450.05. T Noordyk, WTIO, 1501 Deer, Manistique MI 49854. 906-341-8444.

Collins 212H-1 mixer, \$100. C Ratcliffe, WADE, 1 Radio St, Wadesboro NC 28170. 704-694-2175.

Gentner VRC-2000 complete VRC-2000 pkg w/relay interface & batt backup, \$3000. Dick, 512-333-0050.

Moseley MRC 10T 10-chnl remote, relays built-in, gd cond, \$400/BO. R Mayhugh, KLOA, 731 N Balsam St, Ridgecrest CA 93555. 619-375-8888.

Comrex LX-T & LX-R extender system, BO. J Michaels, WCOW, 113 W Oak St, Sparta WI 54656. 608-269-3307.

Rust RC 1000 w/manuals, \$100. H Kneller, WKII, 3151 Cooper St #56, Punta Gorda FL 33950. 813-639-1112.

Want to Buy

SCPC ntwk nds equip for expansion, Harris, Adcom, Avcom etc. M Sagnelli, Great Lakes Media, 2929 Covington Ct, Lansing MI 48912. 517-371-2142.

Scala paraflectors for 950 MHz STL; 1/2" helix. K Austin, KFXI, 1101 Hwy 81, Marlow OK 73055. 405-658-9292.

Rust OC & IC system. J Sassak, WXEE, Box 1340, Welch WV 24801. 304-436-4191.

Any Marti or Moseley type accepted STL gear; Any Marti RPT equipment in 450 band. Chuck Spencer, Radio Resources, 800-547-2346.

SATELLITE EQUIP

Want to Sell

Wegener 1601 mainframe & (2) 1610 cards, excel cond. K Anderson, WBVN, POB 1126, Marion IL 62959. 618-997-1500.

Prodelin 1 mtr kV dish w/mount & LNB, excel cond, \$80+s/h. G Fallus, WZMX, 10 Ex-ec Dr, Farmington CT 06032. 203-677-6700

TFT EBS rcvr w/FM rcvr, encode, decode mods, nds repair, \$150. K Austin, KFXI, 1101 Hwy 81, Marlow OK 73055. 415-658-9292.

STATIONS

Want to Sell

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WLLN, 5000 WAM non-comm educ, full pwr from sunrise-sunset, 24 hr license to operate at 49 W at night, directional w/3 towers. Located on approx 10 acres in Harnett Cty, Lillington NC, \$200,000. Dr. O Talmade Spence, 919-892-9322.

AM/FM C3CP in central Michigan w/real estate, \$350,000. L Henley, WDAK, POB 95, Opelika AL 36803. 205-705-0368.

KMCM 92.5 FM, KMTA 1050 AM, Miles City MT, reg cvg, excel equip, steady economy. Paul, 612-222-5555.

1 kW AM KRRU in Pueblo, highest bidder over \$99000 w/gd terms. G Erway, KRRU, 4211 N Elizabeth St, Pueblo CO 81008.

Pacific Pipeline 50 kW, non DA, clear chnl, avail, partner considered. R Miller, KUAW, Box 575, Lahaina HI 96767. 808-572-5534.

Suburban Atlanta AM lic/equip w/gd long-term lease on studios & land, \$150,000. POB 52682, Atlanta GA 30355.

Mid-Ohio 24-hour AM in fastest growing market. Discount for quick sale to cash buyer. Write PO Box 1314, Lima, Ohio 45802.

Want to Buy

Veteran Christian radio mgr, engr, DJ seeks AM/FM station, no down, owner financing, any situation. E Smith, POB 1341, Florence MS 39073.

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Broadcaster with 13+ years experience looking to buy AM or FM station in Richmond, Virginia or Norfolk, Virginia area with no cash down, owner financing. Call H. Pollard (804) 748-2399 or (804) 747-7000, New Visions Broadcasting, PO Box 37282, Richmond VA 23234.

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Want to Sell

Deico/GM 12.5 kW, 230 V AC gener, diesel eng, recently rebilt, \$2500. H Pearce, WTVG, 142 Skyland Blvd, Tuscaloosa AL 35405.

Marti SCG-10 subcarrier gener; SCG-10 demod w/companding, like new, \$350 ea. C Scott, EME Comms, Rt 3 Box 485C, Moultrie GA 31768. 912-890-2506.

Sparta 682. E Hopseker, KBLF, POB 1490, Red Bluff CA 96080. 916-527-1490.

SWITCHERS (VIDEO)

Want to Sell

Gentner Signal 10 2x10. E Hopseker, KBLF, POB 1490, Red Bluff CA 96080. 916-527-1490.

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Want to Sell

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Capitol Audiopak A-2 1400 A-2s, most 2:30 & 3:30 length, some 5 mins, 3 yrs use, rec woldies, \$1500/BO. C Hahh, WAHZ, POB 640, Westfield MA 01086. 413-562-7666.



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VHS video tapes (16) sales training, 30 lessons, excel series, \$1500. R Trumbo, 800-397-4146.

100 approx mostly new, Gold Fidelipac, 4 1/2 min lengths, \$1.50 ea. C Ratcliffe, WADE, 1 Radio St, Wadesboro NC 28170. 704-694-2175.

audiopak A-2 (1000), various lengths, gd cond, \$1000/BO. R Mayhugh, KLOA, 731 N Balsam St, Ridgecrest CA 93555. 619-375-8888.

CBS STR-100, 112, 120, 130, 140, 151 & 170 test records, \$50 ea+s/h; STR-101, \$25+s/h; CTC-300, 310, 330, 340 & 350, new, \$50 ea+s/h; SQT-1100, quadraphonic, \$50+s/h. F Barr, APEL, Box 355, Ridgefield CT 06877. 203-791-0500.

Want to Buy

10" heavy duty record jackets for old 78s such as Cohoes/Noteworthy Recordenvelopes. L Jones, JSA Radio Ntwk, 8250 S Akron Ste 205, Englewood CO 80112. 303-799-4010.

TAX DEDUCT EQUIP

Non Profit School AM station nds used mono STL for new station, will pay s/h. E Smith, POB 1341, Florence MS 39073.

Non prof low power station nds any donation, working/repairable equip. J Benjamin, 602-280-9070.

Eng student desiring donation of old bcdt equip (anything) in repairable cond, will pay all shipping charges, EE student at Purdue. C Gill, POB 371, Indianapolis IN 46206. 317-923-2800.

GR1606A RF Bridge, excel cond, \$350. F Spaulding, 415-961-5018.

Tek 2710 RF spectrum analyzer w/batt pak & inverter, \$10000. S Karwan, KP5I, 2100 E Tahquitz Way, Palm Springs CA 92262. 619-325-2582.

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Potomac AA-51 audio analyzer & AG-51 audio gener. E Hopseker, KBLF, POB 1490, Red Bluff CA 96080. 916-527-1490.

Potomac FIM-21 AM field intensity meter, great cond, \$1500+s/h. B Glenn, KOTY, 830 N Columbia Cir Blvd, Kennewick WA 99336. 509-783-0783.

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 VU amp & Neuman lathe 131 disc cutter. Mr. Oliver, 212-874-7660/0274. Call afternoons till 10PM.

Hewlett-Packard 403B AC voltmeter, \$250; HP 209A audio oscillator, \$400; Bird 4304 thru-line wattmeter \$300; Bird 8085 50-ohm load, \$50. B Aase, 2314 129th Pl, SE, Everett WA 98208. 206-337-6695 or 206-775-202.

Want to Buy

Potomac AT-51 audio test set. Chuck Spencer, Radio Resources, 800-547-2346.

Tektronix or H/P spectrum analyzer. Chuck Spencer, Radio Resources, 800-547-2346.

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20 kW FM	1974 RCA BTF 20E1	2.5 kW AM	1982 CCA 2500D
25 kW FM	1988 TTC 25,000	2.5 kW AM	1976 McMartin BA2.5K
30 kW FM	1981 BE FM-30	5 kW AM	1968 Harris BC5H
		5 kW AM	1972 CCA AM5000D
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TRANSMITTERS

Want to Sell

Burk Tech TC-8 remote xmtr & studio control unit w/manual, 8 metering sources on dot matrix array, push button set up, \$1295. R Chambers, KSUE, 3015 Johnstonville Rd, Susanville CA 96130. 916-257-2121.

Gates BC1J 500 W/1 kW AM on 1430 kHz w/manual & gd sply of spare parts. D Bradsher, WRXQ, POB 1176, Roxboro NC 27573. 919-599-0266.

Gates BC1J 1 kW AM w/manual & spares, dual pwr 500 W/1 kW. D Bradsher, WRXQ, POB 1176, Roxboro NC 27513. 919-599-0766.

GE BT-20A 250 AM w/xtals & cab, \$150+s/h. P Russell, Bowdoin Coll, Sills Hall, Brunswick ME 04011.

TRANSMITTERS

- 10 watt FM Versa-Count V-322
- 30 watt FM B-E FX-30
- 250 watt FM 1979 Wilkenson 250E
- 1 kW FM 1975 Harris 1H3
- 1.5 kW FM 1966 Bauer 607
- 3 kW FM 1975 Harris 3H3
- 5 kW FM 1967 Gates 5G
- 25 kW FM 1977 AEL 25 KG

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Harris FM 2.5 H3, 2.5 kW w/TE3 exciter tuned to 95.9 MHz, \$8000; TTC XLFM, (2) TVK 1-code identifier boards, (2) modulator boards, \$200 ea. D Rose, KAAA, 2534 Huaiapai Mtn Rd, Kingman AZ 86401. 602-753-2537.

Wilkinson 10 kW FM 3-phase, tuned to 105.3 MHz, used 1 yr, \$20000; McMartin 1 kW tuned at 106.3 MHz. B Smiley, 305-743-3740.

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JT Communications
 579 N.E. 44th Ave., Ocala FL 32671
 904-236-0744

RCA TT25FL tuned to Channel Six. RCA TT17FH tuned to Channel Twelve. Both are in good condition. J.S. Broadcast Service 915-772-2243.

Marti studio xmtr link, dual system w/STL-8 xmtrs & R-200 rcvrs, excel cond, \$3900. R Chambers, KSUE, 3015 Johnstonville Rd, Susanville CA 96130. 916-257-2121.

Plate xformer for TTC 10 kW, 3 phase, \$500; Harmonic filter for 40 kW, full band SUT, 3 1/2" conns, \$400. K Austin, KFXI, 1101 Hwy 81, Marlow OK 73055. 405-658-9292.

McMartin 10 kW FM (used), completely reconditioned, tuned & tested to your freq. Goodrich Ent, 11435 Manderson St, Omaha NE 68164. 402-493-1886.

DEMOED EQUIPMENT

BEXT Inc. has a few demoed exciters, amplifiers and STL's for sale. All demoed systems are sold first come first served and have the same 2-year warranty as BEXT's new equipment. For information: **619-239-8462**

McMartin BA-1K (used), one kW AM xmtr tuned & tested on your freq, guaranteed, excel cond. Goodrich Ent, 11435 Manderson St, Omaha NE 68164. 402-493-1886.

WE 189D xformers, new, \$35/pair; UTC LS-141 hybrid xformer, new, \$50. R Robinson, 203-269-4465.

Gates BC-5B 580 kHz; RCA BTA-5T 1380 kHz, BO, both gd for parts, you pick up. J Batten, WCHS, 1111 Virginia St E, Charlestown WV 25301. 304-342-8131.

LPB RC-25B 20W, works well w/books, \$100. Ron, 419-893-7968.

Kintronics 5 kW AM dummy load wammeter & chngover relay, \$1000. Dick, 512-333-0050.

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.

NEC HPA 4736A 25 kW uses 4CX15000A, on 101.1, 67 kHz, \$25000/BO. R Miller, KUAU, Box 575, Lahaina HI 96767. 808-572-5534.

Gates FM-1G 1 kW FM, solid state exciter, uses single tube, 4CX1000, excel cond, \$5000/BO. R Mayhugh, KLOA, 731 N Balsam St, Ridgecrest CA 93555. 619-375-8888.

QEI 675 FM, new. G Davis, Univ of VT, 308 D Votey, Burlington VT 05405. 802-656-1916.

NEW 6 kW FM transmitters for under \$18,000.
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Bill Hoffman
518-583-9490

Bauer 707 1 kW; Sparta 680 exciter; Potomac phase monitor, 2 tower. E Hopseker, KBLF, POB 1490, Red Bluff CA 96080. 916-527-1490.

Harris FM 2.5 kW, 1975 w/TE3 exciter on 95.9 MHz, \$8000; TTC XLFM TVK 1-code identifier boards & 2 modulator boards, \$200 ea. D Rose, KAAA, 2534 Huaiapai Mtn Rd, Kingman AZ 86401. 602-753-2537.

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Want to Buy

10 kW gd cond, prefer single phase. K Austin, KFXI, 1101 Hwy 81, Marlow OK 73055. 405-658-9292.

UTC LS series xformers; schematic for Western Electroacoustic Labs Cond Mic PS#20A. R Robinson, 203-269-4465.

5-100W AM 530-1610 kHz, used, tunable. F Smith, WBSV, 2408 Chamberlain Ave, Chattanooga TN 37404. 615-624-7126.

Collins 21E manual, will pay copy costs. J Poole, KWHN, 423 Garrison Ave, Ft Smith AR 72901. 501-782-8888.

Christian Radio station nds (2) type-accepted 250 W for FM translator svc, donations pref. J Teel, KFWB, POB 2672, Roswell NM 88202. 505-623-9433.

AM low pwr for PSSA/PSA svc, gd cond, any freq. B Niekamp, KXEN, POB 8085, Mitchell IL 62048. 314-436-4550.

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

Collins 830-D 1 kW FM, \$1500-3000; Versa Count exciter #322, \$500-1000. R Vinikoor, WNTK, POB 2295, New London NH 03257. 603-526-9464.

5 kW for 970 AM. C Jenkins, 812-283-3577.

Collins 830-D FM xmtr & a Versa Count Mdl 322 exciter. R Vinikoor, WNTK, POB 2295, New London NH 03257. 603-526-9464.

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

TUBES

Want to Sell

RCA 6806 (1) new, (2) used, (1) conversation piece (dvd), 25 kW for RCA TTU-12 & TTU-25; UHF-TV xmtrs, BO. C Fox, 4853 Manor Hill Dr, Syracuse NY 13215. 315-468-0908.

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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.

TURNTABLES

Want to Sell

Technics SP-15 gd cond w/Harris PX-91 pre-amp, \$300. G Faltus, WZMX, 10 Exec Dr, Farmington CT 06032. 203-677-6700.

Technics SL1015 DD quartz, 33/45/78 w/+10% spd adj, Technics arm, Rosewood base, dustcover, \$900. B Rosenberg, W'VXU, 3684 Saybrook, Cincinnati OH 45208

RTS-405 stereo phono preamp, used 6 mos, storage, \$125+s/h. B Lord, Lord Bdctg, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

Technics SP10 MK2 (2) w/o cart, w/SH10E preamp, \$300 ea; Akai APB10C w/cart, \$225. J Morgan, 401-433-1000.

Technics SP-15; Russco, many. E Hopseker, KBLF, POB 1490, Red Bluff CA 96080. 916-527-1490.

Gray Rsch (4) 16" transcription tone arms, fair-gd cond. C Kimbrough, WRXQ, POB 1176, Roxboro NC 27573. 919-599-0266.

Want to Buy

Disc rec equip by Fairchild, Neumann, Westex, Macintosh stereo tube components, 4578 records. K Gutzke, Custom Rcdg, 7134 15th Ave S, Minneapolis MN 55423. 612-866-6183.

VIDEO PROD EQUIPMENT

Want to Sell

Leader LVS-58508/LBU-5860A vectorscope & wavelorm mon, \$2400; (2) JVC TM-22U 5" port mons, \$300 ea; (2) Microtime T-100 TBCs, \$1500 ea; Paltex ABR-1A A-B roll editor w/Panasonic TR-930 mon, \$3500; Chyron VP-2 char gener, \$2800, all in new cond. B Bridges, KCAM, 827 Meridian St, Nashville TN 37207. 615-226-1122.

Everex Vision 16 board, 16-bit frame grabber, Targa clone w/Colorscheme software, new, \$900/BO. R Mayhugh, KLOA, 731 N Balsam St, Ridgecrest CA 93555. 619-375-8888.

Vital VT-500 stabilizing amps (2), \$200/both. B Aase, 2314 129th Pl, SE, Everett WA 98208. 206-337-6695 or 206-775-1202.

VIDEO TAPE RECORDERS

Want to Sell

Sony VO-5800 front loading, search knob, low hrs, excel cond, dub, \$1900. Jaye, Nimbus Pro, POB 5903, Takoma Pk MD 20913. 301-507-3358.

Sony 5850 edit/rec, new cond, \$3500. B Bridges, KCAM, 827 Meridian St, Nashville TN 37207. 615-226-1122.

Sony SL series 5800 & 2300, 1/2" Beta machines for parts, gd heads, \$20 ea. P Russell, Bowdoin Coll, Sills Hall, Brunswick ME 04011. 207-725-3066.

ACTION-GRAM

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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.

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*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 listee.

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