

*****3-DIGIT 857
 J750737 D11 9007 9503 539
 BARRY MISHKIND
 2033 S AUGUSTA FL
 TUCSON AZ 85718

RadioWorld®

**Test and
 Monitoring
 Buyers Guide**
 pp. 43-53

Vol 17, No 2

Radio's Best Read Newspaper

January 20, 1993

FCC Creates EBS Work Group

by Alex Zavistovich

WASHINGTON The FCC has established a new working group to test emergency alerting equipment's compatibility with new EBS standards, which are on track to be completed later this summer.

According to Helena Mitchell, the director of the Field Operations Bureau (FOB) Emergency Broadcast System project, the working group was formed

following a Dec. 10, 1992 demonstration of emergency alerting systems sponsored by the FOB. The working group is under the authority of the FCC's EBS Advisory Council. At press time, a group head had not been named.

Included in the group are members of the cable, television and radio segments of the industry—more than 20 people in all, Mitchell said. System proponents on hand at the December meeting will have input for the work-

ing group as well, she added.

Mitchell said that the tests will determine whether various pieces of emergency alerting equipment are compatible—and if so, to what degree—with "black box" standards to be set by the Commission. The tests will be conducted in two locations. Although final venues have not been selected, a Washington, D.C. site is likely.

The Commission is staying close to projections on EBS action made last fall

by former FCC Chairman Al Sikes, Mitchell said. Sikes had anticipated release of a memorandum opinion and order for an overhaul of EBS by the summer.

Comments on the FCC's notice of proposed rulemaking—which combined two earlier notices of inquiry regarding EBS—were due on Jan. 15. Reply comments have a Feb. 16 due date.

The FCC's Dec. 10 alerting system demonstration was "informative" for the Commissioners and staffers who attended, Mitchell said. Attendance for the event was good, she added—despite inclement weather earlier in the morning that had shut down schools throughout the metropolitan area.

On hand at the event were Larry Krudwig, of the National Weather Service, showing the WRSAME (Weather Radio Specific Area Message Encoder), Sage Alerting System's Gerald LeBow, who demonstrated the Sage 1 RDS-based alerting technology (complete with a combination RDS alert/smoke detector prototype); Marty Callahan of the HollyAnne Corp., with a description of the SAM safety alert monitor for use with cable TV systems; and Fred Baumgartner and Joe Wu of TFT, who described their Model 911 emergency information system manager, a hybrid of the WRSAME system and the Improved Colorado EBS plan.

Dynatech Cable Products Group's Ken Lawson displayed the company's PC-based all-channel message system for video and audio alerts on multiple chan-

continued on page 3 ▶

RAB MSC Comes to Dallas

by Lucia Cobo

DALLAS Radio managers and sales executives will convene in Dallas for the Radio Advertising Bureau's annual Managing Sales Conference, to be held at the Loews Anatole Hotel, Feb. 4-7.

"Managing Out of the Box," is the theme for the 1993 conference, with workshops, forums and keynote speakers all designed to challenge the old ways of doing business.

Forums

The RAB is presenting "Executive Symposium," an exclusive session limited to the first 200 managers to register. The session will be taught by NewCity Communications President and CEO

Richard Ferguson, and Bill Moyes, chairman and CEO, The Research Group. The session will prepare managers for the changes in electronic communications. Attendees will learn techniques in strategic broadcast problem-solving and corporate survival tactics.

Oren Harari, a senior consultant with the Tom Peters Group, will present "Cutting Edge Services: Creating a Customer-Obsessed Organization." Harari will discuss his view that today's chaotic business world demands bold and radical approaches to management and how that concept applies to radio.

Jim Newman, a communications counselor to a number of celebrities,

continued on page 11 ▶



Acorn Out of EIA Tests

by John Gatski

LOS ANGELES Five potential digital radio systems were submitted to the Electronics Industries Association (EIA) Digital Audio Radio Subcommittee in December for consideration as a possible U.S. standard, but the system that has garnered the most publicity is not among them.

Although it filed a statement of intent to have its system tested by the EIA subcommittee last summer, USA Digital's Project Acorn, a consortium of broadcasters including Group W and Gannett Broadcasting, said it will not submit its in-band, on-channel system for testing at this time because of broadcaster opposition to the EIA testing process.

The systems slated to be tested starting April 15 are: AT&T Bell Laboratories, AT&T and Amati Communications, Thomson Consumer Electronics/EUREKA 147, Jerrold Division of General Instrument and NASA/Voice of America.

In a Dec. 16 letter to the EIA, Gannett Radio Vice President of Engineering Paul Donahue said trade press reports "have raised uncertainty about the appropriate forum for DAB (digital audio broadcasting) testing and standardization efforts in the U.S."

"The press reports (that) broadcasters are concerned that the EIA is premature in initiating the DAB testing process without adequate support from the broadcast industry," the letter continued. "Until this uncertainty is resolved, we

continued on page 6 ▶

TOWER OF POWER

38.5 KW ■ GROUNDED GRID
 SINGLE CABINET ■ SMALL FOOTPRINT

CCA TRANSMITTERS

P.O. Box 426 • Fairburn, Georgia 30213 • USA
 (404) 964-3530 • FAX: (404) 964-2222

NEW!
 FM35000G

CCA

| | |
|---|-------|
| Running Radio | |
| RAB MSC Comes to Dallas by Lucia Cobo | 1, 11 |
| Create a Winning Work Environment by Sue Jones | 13 |
| Low-Dollar Accounts Build Revenues by Alan Fendrich | 14 |
| Marketing Is the Future for Radio by John Cummuta | 16 |
| Radio AAHS: Niche Programming for Kids by Charles Taylor | 19 |
| Wall, Floor and Ceiling Treatments by Ed Bukont | 17 |

Circle (74) On Reader Service Card

NEWSWATCH

Digital Manufacturers Alliance Mails Out Surveys to Companies

TOLUCA LAKE, Calif. The industry group known as the Digital Manufacturers Alliance is moving forward on compiling information to help equipment manufacturers with digital I/O problems or questions.

The group predicts that it will likely assess \$200 annual dues for members. The dues will generate revenue to develop a comprehensive database of manufacturers' staff people who can answer technical questions about digital I/O for-

mats and protocols. A survey of companies already has been sent out by the group.

For more information, contact the Digital Manufacturers Alliance, 10201 Riverside Drive, Suite 201, Toluca Lake, CA 91602, or phone 818-753-9510.

Scientific Atlanta, Harris Allied Enter Distribution Agreement

ATLANTA Scientific Atlanta has entered into a national distribution agreement with Harris Allied.

Harris Allied will now distribute the complete lines of Scientific Atlanta analog and digital satellite equipment through its network of suppliers.

Kent Malinowski, Scientific Atlanta's vice president of broadcast radio and data systems, said radio stations using Scientific Atlanta products can now benefit from quicker delivery, more credit availability and innovative product leasing.

Harris Allied's Ridge Retires

QUINCY, III. Roy Ridge, Allied Broadcast Equipment's founder and a

pivotal figure in the merger of Harris Allied in 1988, has retired from the company to pursue outside business interests.

Jim Woods, formerly Harris Allied's manager of ATV development, will assume Ridge's duties as director and distribution product line manager.

Ridge will continue to advise Harris Allied in duplicating its broadcast equipment distribution business in Europe, where he concentrated efforts for the company for more than a year.

Ridge established Allied Broadcast in the mid-1960s, and by the mid-70s, offered an extensive radio broadcast equipment catalog. Under Ridge's guidance, Allied also made successful forays into international multi-brand radio equipment distribution and integrated radio studio systems.

After the Harris Allied merger in 1988, Ridge increasingly became involved with public relations and international distribution, including the establishment of Harris Allied Europe.

continued on next page ►

A Little Bit of MAGIC...



Revealed!

THE R-10 IS BASED ON A SIMPLE PREMISE: Low cost does not have to be synonymous with low quality (as is so often experienced). When you've got Audioarts' experience and expertise, value engineering becomes a task of carefully defining the features required and manufacturing in an efficient manner, utilizing the best of computer and machine technology.

THE RESULTS ARE SELF-EVIDENT: the R-10 is a fully modular console, with the componentry you'd expect to see in a much larger design. *No other console in its price range can even come close!*

The R-10 has gold audio switches, gold edgcard connectors, conductive plastic faders, conductive plastic monitor pots, fully burned-in socket-mounted ICs, industry standard machine control switches and, of course, documentation and instructions that make installation really simple.

With the R-10 you can take advantage of Audioarts' reputation and experience, and be assured that quality and performance will be yours.

AUDIOARTS ENGINEERING

6720 V.I.P. Parkway, Syracuse, NY (tel 315-455-7740/fax 315-454-8104)

RUNNING RADIO

| | |
|--|----|
| RAB MSC Comes to Dallas by Lucia Cobo | 1 |
| Create a Winning Work Environment by Sue Jones | 13 |
| Low-Dollar Accounts Build Revenues by Alan Fendrich | 14 |
| Marketing Is the Future for Radio by John Cummuta | 16 |
| Radio AAHS: Niche Programming for Kids by Charles Taylor | 19 |
| Wall, Floor and Ceiling Treatments by Ed Bukont | 17 |

FEATURES

| | |
|---|----|
| Arbitron Touts Passive People Meter by Frank Beacham | 28 |
| The FCC Creates Another Fine Mess by Harry Cole | 30 |
| The Ultimate Promotion: WLAD Promises the Moon by Al Peterson | 31 |
| Understanding Inductive Reactance by Ed Montgomery | 32 |
| Low Power Translators, Then and Now by Howard Enstrom | 35 |
| Workbench by John Bisset | 37 |
| COMDEX Show a Computer Wonderland by Barry Mishkind | 38 |

BUYERS GUIDE

USER REPORTS

| | |
|---|----|
| KIIS Test Set Is All in System One by Mike Callaghan | 43 |
| KCRW's Job Is Made Easier with OEI 691 by John C. Huntley | 44 |
| WGBH Maximizes with the ModMinder by Peter Swanson | 46 |
| WPR's Demands Matched with Wohler's AMP-1A by Dave Harris | 47 |

TECHNOLOGY UPDATES

| | |
|---------------------------------|----|
| Dorrough Electronics | 48 |
| John Fluke Manufacturing | 48 |
| Neutrik | 48 |
| Inovonics | 48 |
| Narda | 50 |
| Belar Laboratories | 50 |
| AVCOM of Virginia | 50 |
| Maxwell Safety Products | 50 |
| RE America | 51 |
| Server Technology, Inc. | 51 |
| TFT | 51 |
| Potomac Instruments | 51 |
| ESE | 51 |

► continued from previous page

FCC Meetings Via Phone

WASHINGTON The FCC has authorized the National Narrowcast Network's "Hearings on the Line" service to carry live audio via telephone of the FCC's open meetings and other public proceedings.

The FCC provides an audio feed and "Hearings on the Line" sets up and provides a phone feed for the clients who want it. For fee and schedule information, write to: Hearings on the Line, Box 9597, Friendship Station, Washington, D.C. 20016, or call 202-966-2211.

Benchmark Media Systems Introduces Jr. Controller

SYRACUSE, N.Y. Benchmark Media Systems has introduced the Jr. Audio Director, a low-cost audio controller.

The stand-alone controller features balanced inputs and outputs, left only, right only, mono, stereo and stereo reverse control. It also inverts the right channel's polarity in cases where source material results in sum-difference swapping in stereo broadcasts.

The unit is rack mountable and is powered by the PS-1 wall-mounted 18 volt power supply.

AES Calls for Papers

NEW YORK The Audio Engineering Society (AES) has announced a call for

technical papers to be presented at the 95th AES Convention, scheduled for Oct. 7-10 at the Jacob Javits Convention Center.

The theme of the convention is "Audio in the Age of Multimedia." Interested authors should submit a proposed title, 60-word abstract and a 300-word precis of the technical paper(s). Session and submissions information for papers in various categories are as follows:

Group A: Architectural acoustics (theory), architectural acoustics (applications), audio-related computer software, auralization, loudspeakers (theory), loudspeakers (applications), measurement,

microphones, recording and production, and transmission.

Group B: Digital electronics (theory), digital electronics (applications), digital music, digital signal processing (theory), digital signal processing (applications), digital equipment interfacing, perceptual coding, psychoacoustics and multimedia.

Submit Group A materials to Robert Finger, Matsushita of America, Business Engineering Center/1E-6, One Panasonic Way, Secaucus, N.J. 07094.

Submit Group B materials to Ken Pohlmann, University of Miami, College of Engineering, Dept. of Electrical/

Computer Engineering, Coral Gables, Fla. 33124-0640.

NAB Insurance Clients Get Premium Dividend

WASHINGTON Broadcasters who participated in the NAB property casualty insurance program will have lower premium costs in 1993 as a result of a 15 percent dividend payment, according to the association.

Stations received the dividend payment for their 1991 participation in the insurance program, underwritten by Royal Insurance. The NAB program provides coverage for station property, such as towers, antennas and other special equipment.

Andrew Corp. to Develop Fiber Along Russian Rail Corridor

ORLAND PARK, III. The Andrew Corporation has formed a joint stock company with a Russian partner to design and develop a long-distance fiber optic communications system between Moscow and St. Petersburg.

The partner, Oktyabrskaya/VSM railways, will provide right-of-way along the existing October Railway line for the project. The 400-mile project will provide the main communications link between the two cities, according to Andrew President Floyd English.

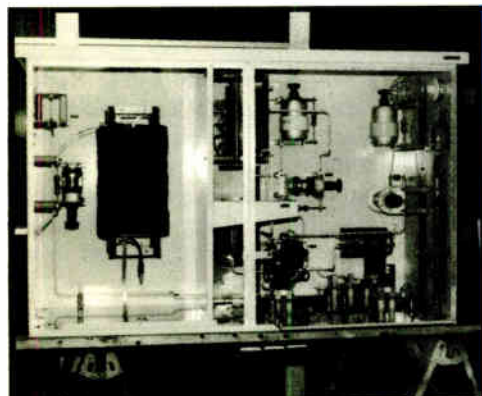
FCC Creates EBS Working Group

► continued from page 1

The spectators attending the demonstration included a delegation from Gallaudet University, a Washington, D.C.-based college for the hearing impaired. The presence of the delegates, along with a sign-language interpreter who translated the proceedings, silently underscored the need for an alerting system that works with all media, rather than just audio.

Other equipment manufacturers included Scientific Atlanta, with a range of alerting systems, including cable-based equipment; StormWATCHER Systems' radar system that provides local mapped weather information; and Gorman Redlich Manufacturing, also a manufacturer of EBS broadcast equipment.

Of the demonstration, Mitchell said, "it showed that there are more options for alerting available than even we had expected." She noted that the displays proved to the FCC that "whatever standards we come up with will be in tune with the times."



Antenna Tuning Unit and Isolation Inductor
KABC Radio, Los Angeles

A GREAT DEAL

more than phasors

From rigid transmission line components, RF parts and AM/MF dummy loads to complete antenna systems, Kintronic Labs offers high quality products at competitive prices.

PRODUCTS

- Broadband Antenna Tuning Units • Omni or Directional AM Antenna Phasing Systems •
- Multiplexed AM Antenna Systems • AM/MF Dummy Loads •
- Custom RF Switching Systems •
- Transmitting Mica or Vacuum Capacitors • Fixed and Variable Inductors •
- Rigid Transmission Line Components & RF Patch Panels • Standard Equipment Racks •

SERVICE

- 24 Hour Service • Handcrafted Quality • Custom Parts • 40 Years Experience •

Call Us Today For Innovative Solutions To Your Broadcast Antenna Requirements!



P.O. Box 845 • Bristol, TN 37621
(615) 878-3141 • FAX (615) 878-4224

Circle (176) On Reader Service Card

ARE YOU IN CONTROL OF YOUR RF?

Get TranStat™

The complete transmitter control and monitoring system.

TranStat™ provides for control of RF system functions, daily monitoring and meter readings and annual statistical information for budgeting. TranStat™ also provides programmable functions that allow you to customize its operation to your specific installation.



To get complete control of your RF system contact Continental first.



Continental Electronics Corporation

P.O. BOX 270879 DALLAS, TEXAS 75227-0879
214-381-7161 TELEX: 73-398 FAX: 214-381-4949

Circle (55) On Reader Service Card

Who's running the ship?

Unattended operation is one way to keep your station profitable, but you still have to mind the store.

The acclaimed Burk Technology ARC-16 Remote Control System is the first step. You can control transmitter and studio from any phone.

But wait. There's more!



Introducing AutoPilot™ from Burk Technology.

AutoPilot is break-through computer software that makes automatic operation of your studio/transmitter facility a dream come true.

- Automatic power changes
- Automatic pattern changes
- Automatic site changes
- Automatic power trim
- Automatic fault recovery
- Automatic logging

Now your imagination is the only limit.

The new FCC fine schedule is imposing. Why risk a big penalty when AutoPilot can help you stay within the rules?

Call us at 508-433-8877
or toll free at
1-800 255-8090
for more information
and a FREE DEMO.

BURK
TECHNOLOGY

Circle (15) On Reader Service Card

Mixing Mimes and Management

by Alex Zavistovich

WASHINGTON I've been thinking a lot lately about mimes.

That's right, mimes. You know the routine: White-faced, bug-eyed mute clowns stand on a stage in your basic black Danskin™. With outstretched arms, they press against the imaginary walls of a box that continually shrinks around them. Just as the space gets uncomfortably close, they create a door-knob in the middle of one wall, step out and make good their escape.

Sure they're annoying, and they make terrible radio guests, but Our Friends the Mimes (doesn't that sound like a public TV special?) know it takes imagination and creativity to get out of that box. Apparently, so does the Radio Advertising Bureau (RAB).

"Managing Out of the Box" is the theme for the RAB's Management Sales Conference (MSC), Feb. 4-7 in Dallas. This year's theme refers to a puzzle in which nine dots are arranged in a box-



shaped grid. The nine dots have to be connected by drawing four lines, while never lifting your pen off the page.

It's not as easy as it sounds. In fact, you may find yourself completely frustrated unless you approach the puzzle from another frame of reference. When you stop thinking about staying inside the box for an answer, it becomes easy.

In fact, there are a number of correct solutions to this puzzle, but they all involve *stepping out of the box*—taking a course of action outside rigid preconceptions.

These days, that kind of creative problem-solving is an important skill to have. For proof, you need look no further than the predictions for 1993

There are a number of correct solutions to this puzzle, but they all involve stepping out of the box—taking a course of action outside rigid preconceptions.



included in this issue of RW. We asked broadcasters from different aspects of the industry to share their opinions of the hot topics for the coming year. Their answers had much in common.

The revised ownership rules, increasing use of local marketing agreements, new technology—all these factors point to new ways of getting things done in broadcast management in 1993 and beyond. The trick is to free yourself from the burden of the box *concept*. Once outside its limiting influence, being free of the box itself is easy.

Don't think that this "out of the box" stuff is only a management or sales gimmick, either. Many engineers will recall a story (maybe it's just a modern myth) about a radio station trying to squeeze the last few hours out of an ancient transmitter. The problem was that as soon as the transmitter built up to a certain temperature, it would shut itself down.

While waiting for assistance from the manufacturer, the chief engineer had to

come up with some way to keep the station on the air. He decided to attach a thermometer to the transmitter, to ensure that it wasn't being run too hot.

Unfortunately, all he could find on such short notice was a meat thermometer from the station's kitchen. Undaunted, he put it to work immediately, and taped a note to the transmit-

ter: "Never run this thing any hotter than 'veal.'"

Creative thinking, right out of the box.

★ ★ ★

Radio people are all a little leery of the "AMization of FM." In fact, I think a possibility looming on the horizon is something I'll call "the cable-ization of radio."

While watching cable television the other day, I came across an ad for Digital Music Express. Yes, the cable system for the nation's capital is picking up DMX, the multiformat jockless digital audio service.

Both DMX and Digital Cable Radio (DCR) are toying with the idea of adding local radio stations to their services—at the request, they maintain, of the stations themselves. Being carried on cable is just the thing some of these stations may need to fill in areas their signal can't reach.

That's fine. But let's think down the road a little. Let's say these cable services really start to take off, and the radio stations they carry benefit from the extra coverage. I can foresee the start of a trend toward "superstations" like those in TV that were spawned when cable television penetration reached a certain level. I mean, why stop at the local service when you can enter an attractive financial agreement with one of the top stations in a large market and pump its signal out nationally?

National radio superstations. That would really stand the media reps on their heads. And it might open up the other growing pain cable dealt with in the '80s: must-carry for non-commercial educational stations.

Of course, the cable guys have said they aren't competing with local radio, by the very nature of their services. Still, they may be adding the local signals before long, and I don't think you have to stretch your imagination too far to buy into the concept I've just outlined here. Is it a possibility? You tell me.

That's it for me. I'm off to find a door-knob before these office walls close too tightly around me. Tune in next time,

Alex

**Now
over
750
units
sold!**



-Proven Technology

Facilities world-wide have adopted the DCR1000 Digital Cart Machine by Fidelipac, with over 750 units in use. The DCR1000 reduces maintenance costs, media expense and delivers spectacular on-air audio. Can you afford to wait any longer?

Order now and get 100 digital diskettes FREE!

**BROADCAST
SERVICES CO.**

The Davis Communications Group, Inc.

**Call for details:
Eastern & Central
800/525-1037
Mountain & Pacific
800/523-1037**

Circle (61) On Reader Service Card

World Radio History

READERS FORUM

If you have comments for Radio World, call us at 800-336-3045 or send a letter to Readers Forum (Radio World, Box 1214, Falls Church, VA 22041 or MCI Mailbox #302-7776). All letters received become the property of Radio World, to be used at our discretion and as space permits.

Transmitter "logic inversions"

Dear RW,

It was a pleasure to read Richard Haskey's article on the CCA FM4,000G transmitter in the Nov. 25, 1992 issue. I last worked with Richard in 1971 or 1972 when we were making measurements on a 250 W AM, trying to figure out why it couldn't be heard in Cuyama.

Anyway, Richard's article touched on a subject I've told transmitter manufacturers many times: *Please* make the control circuits accept open collector inputs, and *please* make status outputs open collector.

Most of the recently manufactured transmitters I've worked with have expected momentary contact closures to some control voltage to activate a control. I've seen control voltages of +12, +15 and +28 volts. In each case, after examining the schematic of the transmitter control circuitry, it would have been a simple matter for the transmitter manufacturer to slightly rearrange the circuitry to accept a closure to ground instead of a closure to supply. The changes would not require any more parts or increased cost. Such an input could be driven by a relay, an opto coupler, or an open collector transistor, allowing the user greater flexibility. Most recent transmitter control systems provide open collector control outputs. This substantially increases circuit density and decreases costs. If the transmitter requires an external relay interface panel, several hundred dollars can be added to the system cost.

Similarly, many transmitters provide remote output of the front panel LED indicators. It would be simplest to connect these to remote control systems if the remote outputs also appeared to be open collector outputs. The driver transistors that are driving the front panel LEDs could be used, with isolation diodes, or separate driver transistors (often open collector TTL outputs or open drain CMOS outputs on chips) could be used.

These simple "logic inversions" would

vastly simplify the interface between transmitters and remote control systems.

Harold Hallikainen, President
Hallikainen & Friends, Inc.
San Luis Obispo, Calif.

Kudos to CCA school

Dear RW,

I have just returned from the CCA Electronics transmitter school held in Atlanta (Fairburn) Ga. on Dec. 7-8. The event was very informative and enjoyable. Ron Baker, Steve McElroy, Hugh Anderson, Jerry Meier and Glen Clark put together a superb program.

I can certainly recommend this school to other broadcasters as money well invested. When the next class is announced, GO!

Lloyd Spivey
GM and CE
WLLS AM/FM
Hartford, Ky.

Thanks for a valuable lesson

Dear RW,

All of the publicity about the economy, lack of jobs for recent college graduates, and downsizing the broadcast industry has had great impact on students in the Radio-Television-Film discipline at West Texas State University. Many of the juniors and senior in the Broadcast Management class at WTSU are particularly concerned about their chances for a career in the media in general and the opportunities to become a member of management in particular.

These problems are combined with the usual desire for a guest speaker to share his/her experiences in managing a local radio or television station. I contacted Ray Poindexter, former general manager of KAMR-TV, the NBC affiliate in Amarillo. To my great delight, Mr. Poindexter arranged for my class to interview Pierson Mapes, president of NBC. Len Martinez, chief engineer for the student radio station KWTS-FM, set up three microphones and a telephone in one of our classrooms so that we could do a live conversation with Mr. Mapes.

The students were free to ask any questions that they wanted, and Mr. Mapes was extremely open, honest, and insightful in his responses. Topics ranged from job market entry and the validity of ratings to the value of a degree in broadcasting and the free trade agreement's effect on the industry. Mr. Mapes spent almost an hour answering questions and commenting on the media after a very long day on the job. He had just returned from lighting the Christmas tree at Rockefeller Plaza and concluded the interview with us about 9:00 p.m., Eastern Standard Time.

I would like to challenge the students and faculty of this country's colleges and universities to seek the very best speakers and guest lecturers for their classes. Even the smallest schools can afford a phone call or two, and the worst they can say is no. Professional expertise like Mr. Mapes shared with my class is invaluable, especially when you are not located in a major broadcast center.

Compromise Is the Key to U.S. DAB

Dissension in the radio industry threatens to slow down the process of selecting a digital audio broadcasting standard. Broadcasters and receiver manufacturers each must remember that the process moves forward best when compromise accommodates opposing interests.

The latest schism in the standard-setting saga is USA Digital Radio's decision to

pull out of the Electronic Industries Association (EIA) Digital Audio Radio Subcommittee testing process. Dissent deepened with the NAB DAB Task Force's recent recommendation that DAB testing be undertaken by the National Radio Systems Committee (NRSC) rather than the EIA. The issue was further complicated by the task force's endorsement of the in-band concept.

For its part, USA Digital said it pulled out of the testing because broadcasters are concerned that the EIA is driving the process with inadequate broadcaster input, and that the process is moving too quickly.

Perhaps the EIA's testing deadline is ambitious, but broadcasters must remember that the U.S. is already out of step with most of the rest of the world in its approach to digital audio radio service. The development of a U.S. DAB system cannot afford to lose momentum at this point.

The EIA is well qualified to test digital radio systems. Past EIA standard-setting efforts, such as MTS TV stereo, have worked quite well. Prolonging the process by introducing even as respected a body as the NRSC serves only to widen the gap between U.S. broadcasters and the rest of the world.

Also, despite NAB's recent enthusiasm for in-band technology, the association ought not to endorse a standard until unbiased, scientific testing is undertaken to determine the merits and flaws of all proposed systems.

Of course, the onus of compromise should not rest entirely on the backs of broadcasters. The EIA must accommodate broadcaster concerns—including subcommittee vote allocations—and perhaps delay the start of testing for a short time until the divisive issues have been addressed.

If disagreements between broadcasters and manufacturers continue to escalate, selection of a DAB transmission standard could be extended indefinitely—giving alternative digital audio service providers a sizeable head start in the marketplace.

Before the process comes to a halt or is so splintered that there is no consensus, the NAB and EIA need to call a truce and work out their differences without severely altering standard-setting activities already underway.

—RW

Simply saying thank you seems insufficient to those who worked so hard to accomplish this lecture. The students learned a great deal about their chosen profession, and I discovered that even the giants of the media will graciously take their valuable time to help guide our future leaders. Perhaps these students' contributions to the industry in coming years will serve as the thanks that I cannot seem to adequately express.

RuNell (Rudy) Coons
West Texas State University
Canyon, Texas

Rule compliance revisited

Dear RW,

Several readers have commented recently on the sad state of FCC rule compliance in some small (and not so small) stations. We should remember that while the Commission has gotten rid of a lot of the "chicken" stuff like logging every half hour, the basic rules are still there. Our power and frequency must be correct, our antenna pattern in, etc.

I have noticed that the Commission is using its power to exact "administrative forfeitures" (that's a bureaucrat's word for *hefty fine!*) frequently and freely. I have wondered if the inspector must collect enough on each field trip to cover the cost of the trip if he wishes to get paid. No more "advisories," now it's *money* time.

Back when the Commission got rid of the "first phone" license, I commented

that they were licensing the wrong person: The midnight man in the boonies needed a first phone; the Vice President and General Manager of a major market AM-FM-TV (50,000 watts all around) needed only a good sales record. I still believe that the manager should be the licensed one.

Next, I have seen very little in these pages about the Commission's current Notice of Proposed Rule Making on the EBS system. They seem intent on preserving the weakest part of the present system, the "Daisy Chain" handing down of the alert from the CPCS-1 originating station to the subsequent stations at lower levels in the chain. Only this time they are going to make it work!

Make it work by requiring each station to install a "device" (their term) that will monitor two stations, an AM and a FM, and automatically seize your air signal when it receives an alert. It is expected that this "device" will only cost between \$2,000 and \$3,000.

For three thousand dollars, it may work almost as well as a Radio Shack Weatheradio Alert...if we are lucky. The current two-tone signal with its tuned reed detectors was a triumph of high technology over reality—it can do in 26 seconds what a DTMF (touch tone) pad can do in 1/200 (one two-hundredth) of a second. I am afraid that they are now trying to outdo themselves—and they will, unless they get lots of flack, like *lots*, from real broadcasters.

Lee S. Parr
Monroe, Va.

Radio World

Vol. 17, No 2 January 20, 1993

Editor.....Alex Zavistovich
Managing Editor.....Lucia Cobo
International Editor.....Alan Carter
News Editor.....John Gatski
Assistant Editor.....Mary Ann Dorsie
Contributors.....Frank Beacham/N.Y.
Bruce Ingram, Pamela Watkins, Nancy Reist
Technical Editor.....John Bisset
Technical Advisor.....Tom McGinley



Radio World (ISSN 0274-8541) is published semimonthly by Industrial Marketing Advisory Services, Inc., 5827 Columbia Pike, Suite 310, Falls Church, VA 22041. Phone: 703-998-7600, Fax: 703-998-2966. Second-class postage rates are paid at Falls Church VA 22046 and additional mailing offices. POSTMASTER: Send 3579 forms and address changes to Radio World, P.O. Box 1214, Falls Church VA 22041. Copyright 1993 by Industrial Marketing Advisory Services, Inc. All rights reserved.

**Next Issue of
Radio World
February 10, 1993**

NAB DAB Task Force Endorses In-Band

by John Gatski

WASHINGTON As expected, the NAB's Digital Audio Broadcasting (DAB) Task Force officially has thrown its support behind in-band, on channel digital radio, but the endorsement has drawn opposition from at least one receiver manufacturer.

The DAB Task Force said testing should focus on in-band technology because there is little chance of getting a spectrum allocation for an out-of-band system in the U.S.

Many broadcasters support in-band because it would likely be cheaper and easier to implement than an out-of-band, entirely new system, such as the European-designed Eureka 147 project that Canada is implementing.

Currently, only one digital radio system proponent currently is pursuing in-band research: USA Digital's Project Acorn, which demonstrated over-air FM and AM in-band signals at the NAB Radio Show in September. (On Dec. 16, USA Digital Radio officials said the consortium was not going to submit Project Acorn to the EIA's Digital Audio Radio Subcommittee, which is scheduled to begin testing systems hardware in April. See related story, this issue.)

Despite the demonstrations of Project

Acorn, Denon of America President Robert Heiblim said there is still uncertainty about in-band and whether it will work under real-world conditions.

When asked about his misgivings regarding the task force's endorsement of in-band, Heiblim said, "It isn't proven yet. I think it is foolish to put all your eggs in one basket."

Gary Shapiro, vice president of the EIA's Consumer Electronics Group, said broadcasters should not favor one system over another until objective testing is done. "It is premature to embrace any system, in EIA's view, before you have the facts," Shapiro said.

In its December meeting, the DAB Task Force also stated it wants the National Radio Systems Committee (NRSC), the joint radio/consumer electronics industry workgroup, to test digital radio systems instead of going through the EIA's Digital Audio Radio Subcommittee.

Putting the digital radio system testing under the authority of the NRSC rather than the EIA's testing group was supported vocally by NAB officials and many broadcasters at the NAB Radio Show.

The task force believes that the EIA is driving the testing process to the exclusion of broadcasters, and that the

timetable EIA has scheduled for testing digital radio systems is too soon.

One source said that the NAB was pursuing a delay of the EIA testing, which tentatively is scheduled to begin April 15, although could start later, according to EIA.

Despite the task force's recent actions and broadcaster opposition to the EIA's planned testing, EIA officials said the scheduled process is suited to objectively test the digital radio systems and make a recommendation for a standard. EIA has developed numerous electronics standards, including the TV stereo standard in the early 1980s.

And, the EIA added, its 1993 testing timetable is necessary to get a digital broadcast system in place as soon as possible, to compete with upstart cable and satellite services.

Denon's Heiblim also took issue with the NAB's opposition to the EIA testing digital radio systems. "I don't understand why everyone is opposing it," Heiblim continued. "People feel that this a political process. This process is only about finding out technically what works."

As a receiver manufacturer, Heiblim said he does not care what system is chosen—be it in-band or some other technology. "We're not the enemy. We just want to make radios."

The NAB Radio Board will evaluate the task force's positions at its annual winter meeting.

Acorn Out of EIA Tests

► continued from page 1

will continue to attend EIA proceedings, but must decline to submit USA Digital Radio...for testing at this time."

Although USA Digital demonstrated FM and AM on-air digital radio signals at the NAB's Radio Show in September, some insiders speculate that USA Digital decided not to participate, because the system would not be ready for testing in time for the April 15 deadline.

Donahue denied that assertion. "Ready is a relative term," Donahue said. "Our developers said it can be ready (by April 15). That is our target date."

Donahue noted that the AM research is behind the FM, because it started later.

But Donahue reemphasized that Project Acorn's decision not to participate is based on broadcaster concerns, and the EIA needs to acknowledge those concerns. "The FCC makes the final determination. The EIA needs broadcaster support," he said.

NAB officials and broadcasters have said that the EIA forum is inappropriate for conducting the tests because the receiver manufacturers would be driving a process in which broadcasters have more at stake.

In December, the NAB DAB Task Force voted to support the in-band concept, and to urge the testing be carried out by the National Radio Systems Committee (NRSC), an industry workgroup comprised of electronics industry representatives and radio broadcasters.

The task force also said that the April 15 EIA testing timetable is too soon, and there may be an official request to EIA for a delay.

Gary Shapiro, vice president of the EIA's Consumer Electronics Group, said the EIA is "disappointed, but not dismayed" about USA Digital's decision.

"We're excited about the number of systems that were proposed for the testing," he said.

Shapiro added that USA Digital's decision not to participate now could make it "difficult" for the consortium to be part of the EIA testing process if it reconsiders later.

As for EIA's ambitious timetable to begin testing by April 15, Shapiro has said that the schedule has some flexibility built in, but that EIA would like to conclude the process as quickly as possible, without compromising the quality of testing.

Don't let their size fool you.



STEREO HEADPHONE AMPLIFIERS

HD-1000 MASTER

- Drives Four Independent Headsets
- High Output for 8 to 600 ohm Headsets
- Stereo Balanced Line Inputs
- Panned Microphone Input for Announcements
- Stereo or Left Only-Mono Output
- Balanced Line Out to HD-100
- Half Rack or Desk Mount

HD-100

- Drives Single Headset
- High Output for 8 to 600 ohm Headsets
- Stereo Balanced Line Inputs
- Loop-thru Inputs Feed Multiple Positions
- AC Powered, Compact
- Ideal for Offices and Study Carrels

CALL OR WRITE NOW FOR FREE DETAILED BROCHURE.

ATI AUDIO TECHNOLOGIES INCORPORATED

328 Maple Ave. Horsham, PA 19044, USA
(215)443-0330 • FAX: (215) 443-0394
1-800-959-0307

Circle (140) On Reader Service Card

Clark Listens...

Clark listens to its customers and designs its complete line of audio/video cable accordingly. Now you can listen to Clark's new 700 Series snakes that are designed, as usual, with the customer in mind.

Why not give Clark a listen?



Cables available cut to length and terminated to your specs.

CLARK CABLES

1-800-CABLE-IT!

1801 Holste Road • Northbrook, IL 60062

Listen to Clark!

Circle (21) On Reader Service Card



November 25, 1992

Mr Ron Oler
Harris/Allied Broadcast Division
3712 National Road West
Richmond, Indiana 47375

Dear Ron:

I wanted to express our extreme satisfaction with the Audio Metrics CD-10 compact disc players. In a national broadcast environment such as Jones Satellite Networks, we demand only the most reliable equipment with state-of-the-art performance. Jones Satellite Networks is known for the finest audio quality in the business, so we were not ready for any compromises.


My experience with other compact disc players (cart based and standard) created a concern for reliability. The CD-cart system was the only choice. We cannot afford any damage to our discs.

Unfortunately, every other CD-cart player which we tested has skipped on perfect discs. Additionally, other CD-cart players allow the talent to eject a disc as it is playing! The CD-10's eject inhibit during play feature is simple, and very effective.

After an extensive testing period, we have used the CD-10 players on the air for over six months. Without one skip! Our affiliates appreciate the digital quality, I appreciate the lack of on air "glitches".

The CD-10 is clearly superior to other units. I say this as I order another six players. Every type of broadcast equipment has a leader, and Audio Metrics leads the way into the next century with a first rate product.

Well done!


Eric M. Wiler
Jones Satellite Networks

8250 SOUTH AKRON ST., SUITE 205
ENGLEWOOD, COLORADO 80112
800.766.3251 FAX 303.799.0551

Love Letter.

We've been telling you how great our Audiometrics CD 10 Compact Disc Cartridge Machine is. But you don't have to take our word for it.

Proof of a product's worth is in its performance. And these CD 10 machines outperform all others. We've sold more CD cartridge players than all other dealers combined. We know what we're doing.

The CD 10 is the natural evolution of a great idea. We simply made it better.

The CD 10 is the only broadcast-ready CD player

that features cartridge autolock, programmable EOM indicator, instant start with music, and true broadcast standard construction.

The CD 10 won't let you mess up on the air. The cartridge is secure within the machine until you make a conscious effort to remove it.

Now you can take CDs direct-to-air with confidence.

The CD 10 will make the move with you to DAB. Buy now with no fear of obsolescence. CD-quality in a world standard package.

You'll find the CD 10 a friendly, likeable programming tool that will encourage you to take compact discs direct-to-air.

\$1,395 each and we'll give you a CD 10 rack mount (\$145 value) and 175 ACD5B CD caddies (\$840 value) FREE!



For the best way to air CDs, there's only one place to call: Harris Allied. And there's only one place to offer this special starter package: buy three Audiometrics CD 10s at

8:00 a.m. to 8:00 p.m. EST
1-800-622-0022
Fax 317-966-0623
Canada 1-800-268-6817
Toronto 416-731-3697

 **HARRIS
ALLIED**

© 1993 Harris Corp.

Industry Makes Predictions For 1993

Unistar Radio Networks Executive Expects Economic Upturn, Increased Activity in Station Trading

**Bill Hogan, President/GM,
Unistar Radio Networks**

I think we're seeing a turnaround in both the national economy and the radio economy. The state of our national economy was so important in these recent elections that



Bill Hogan, President/GM Unistar Radio

Bill Clinton was able to unseat incumbent George Bush in a significant political upset. If Clinton makes the healing of the economy his first priority, which he said he would do, then industries and people will begin to believe that the worst is behind them and free up spending and expansion. There are already signs that this is happening.

In the network radio industry, which was hard hit in 1992, we saw a definite increase in December activity for upfront buying for 1993. National spots also saw improved activity in the fourth quarter, which is another positive sign that national advertising dollars are beginning to free up.

Furthermore, if we see the financial institutions loosen up the reins on the money supply, we should once again see an increase in station trading, especially in view of this year's new legislation on ownership limits and duopoly.

We haven't seen the full impact of either the new

group ownership limits or duopoly, mainly because financing has been so difficult over the past few years. Ask any group owner, big or small, and they can describe dozens of expansion scenarios. What they can't describe is the plan to obtain the financing to do it. With several thousand radio stations, it's safe to say that there are millions of ideas, but not the millions of dollars needed to make most of these ideas come true.

LMAs (local marketing agreements) will continue to grow in 1993. All radio executives are looking at the recent moves in the Boston market as an example of what things will be like as we continue through the '90s.

Satellite delivery has really changed radio programming over the last several years and should continue through the '90s. Our own

Unistar satellite-delivered, 24-hour formats have seen steady growth since they started as Transtar. More and more stations rely either in whole or part of various satellite programming because it works. Because of either economic conditions or a simple competitive advantage, stations are using product that, simply stated, they could not afford to produce themselves.

Satellite delivery will continue to grow and improve. Like everything else, the quality of satellite delivery is constantly improving. Also, the reliance of broadcasters on national product continues to grow.

DAB will continue to be a big topic, although the jury is still out on the impact that digital broadcasting will have on the average listener if and when the dust settles.

Washington Radio Attorney Foresees Proliferation Of LMAs and Cashless Deals, Fueled by Tight Credit

**James Weitzman,
Washington Counsel
Kaye, Scholer, Fierman,
Hays & Handler**

Because of this, non-cash deals and LMAs will continue to proliferate. The

continued on page 23 ▶

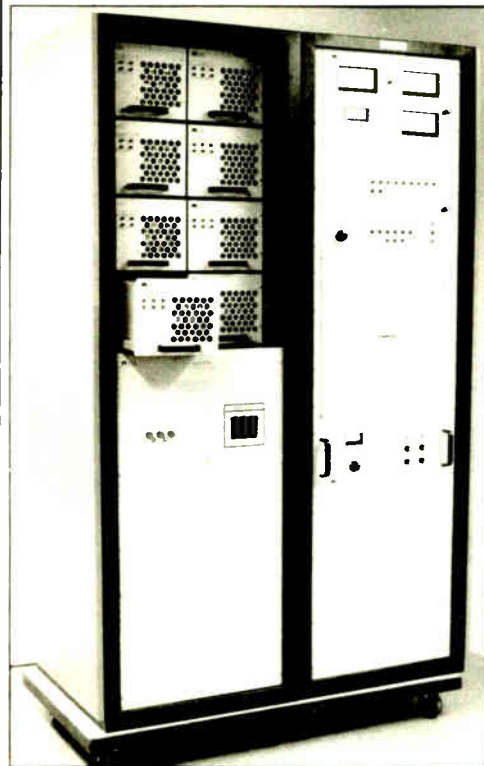
1993 will see the continuing impact of developments from 1992. FCC liberalization of duopoly will probably bring with it as much change as did the opening of the FM band to broadcasting. The economics of our business stink due to overpopulation of stations and concentration of listeners in the top few stations of each market.

Specialized lending that fueled the run-up in prices has been wiped out, and the return of bank financing to permit new players' purchase of failing properties is not on the horizon.



James Weitzman, Washington Counsel
Kaye, Scholer, Fierman & Handler

For the world's strongest AM transmitters, look to Nautel



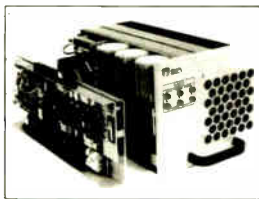
Totally solid state AMPFET ND 10 10kW AM

Nautel AM transmitters keep you on the air with an unmatched combination of value, performance and reliability

Low cost of ownership - with typical efficiency ratings up to 80 percent, a totally solid state Nautel transmitter pays for itself in tube replacement and utility

Superior audio transparency - Nautel AM transmitters utilize inherently linear digital Pulse Duration Modulation for the cleanest sound you can broadcast. Audio is ruler-flat throughout the range and distortion is typically less than 0.5%

Field-proven reliability - Nautel transmitters give you multiple protection systems for both power line and lightning transients, VSWR protection, soft failure design, reserve cooling and safe on-air servicing



Removable AM Power Module

Make a strong transmitter choice. Call us today for all the facts on our totally solid state AM and FM transmitters.



Nautel Maine Inc.
201 Target Industrial Circle
Bangor, Maine 04401 USA
Phone: (902) 823-2233

Nautel
(Nautel Electronic Laboratories Limited)
R.R. #1, Tantallon, Halifax County,
Nova Scotia, Canada B0J 3J0
Fax: (902) 823-3183

Coast to Coast The Preferred Source

The very best broadcast equipment and service at the very best prices.

▶ **Equipment Lease Specialists** ◀

**BROADCAST
SERVICES CO.**

The Davis Communications Group, Inc.

Eastern & Central
VOICE 800/525-1037
FAX 919/934-1537

Mountain & Pacific
VOICE 800/523-1037
FAX 805/266-1695



THE WORLD'S
OLDEST DISC RETRIEVAL SYSTEM

VS.

THE WORLD'S
NEWEST DISC RETRIEVAL SYSTEM

No matter how technologically advanced an industry may become, it's always a good idea to keep things simple. Well, what could be simpler than programming audio by hand? The Pioneer CAC-V3200 Compact Disc Autochanger.

As a professional audio user, you'll be impressed that it provides access to 300 CD's with uninterrupted playback thanks to dual CD players. And they can be connected together to program thousands of



CD's. You'll also appreciate that its built-in interface makes it pre-programmable for error-free playback by almost any computer. And its fade-in and fade-out capabilities, pitch control, and analog and digital outputs make it a remarkably ingenious piece of equipment.

However, if you just want to get practical about the whole thing, you can look at it this way, too. The CD Autochanger makes audio programming so absolutely efficient and error-free that your life will be made easier and your business could become more profitable. Which makes it seem rather impractical not to find out more.

Call Pioneer and ask about the CAC-V3200 Compact Disc Autochanger. You'll find it to be a simple decision that deserves a big hand.



 PIONEER

Good News for Radio Stations

Increase Business Coverage . . . Without Spending a Dime

No matter what your format, we have news for you! And it's news your listeners want to hear. News about the economy in a form they understand. How do we know? We asked them. In a national survey more than 60% of the respondents told us they are paying more attention to business news now than they were six months ago. We also learned that a majority of them use the stock market as an indication of the health of the economy.

Where are they turning for this information?
More than a quarter of the respondents cited radio as a viable source of business and economic news ... making stock market information a key way to reach listeners, particularly the much sought after high SES listener.

So who can give you the most complete stock market information available to radio stations? We can. We're the Nasdaq Stock Market, the second largest market in America. For years, we have been providing television stations with daily customized market reports. Now Nasdaq has developed a variety of services that provide radio stations with this same type of information.

Best of all, all of our services are free!
Just call 1-800-777-NASD, and let Nasdaq develop a custom market report to fit your needs. It's a unique way to add to the service you provide without spending a dime.

THE NASDAQ STOCK MARKET
NASDAQSM
The Stock Market for the Next 100 Years

Radio World®

FREE Subscription/Renewal Card

I would like to receive or continue receiving Radio World
FREE each month. YES NO

Signature _____ Date _____

Please print and include all information:

Name _____ Title _____

Company/Station _____

Address _____

City _____ State _____ ZIP _____

Business Telephone () _____

Please circle only one entry for each category:

I. Type of Firm

- | | |
|------------------------------|---------------------------------|
| D. Combination AM/FM station | F. Recording studio |
| A. Commercial AM station | G. TV station/teleprod facility |
| B. Commercial FM station | H. Consultant/ind engineer |
| C. Educational FM station | I. Mfg, distributor or dealer |
| E. Network/group owner | J. Other _____ |

II. Job Function

- | | |
|---------------------------|--------------------------|
| A. Ownership | G. Sales Manager |
| B. General management | E. News operations |
| C. Engineering | F. Other (specify) _____ |
| D. Programming/production | |

III. Purchasing Authority

1. Recommend 2. Specify 3. Approve

Reader Service **A13**

Jan. 20, 1993 Issue Use until Apr. 20, 1993

Please first fill out contact information at left. Then check each advertisement for corresponding number and circle below. NOTE: Circle no more than 15 numbers, otherwise card will not be processed.

- | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 001 | 023 | 045 | 067 | 089 | 111 | 133 | 155 | 177 |
| 002 | 024 | 048 | 068 | 090 | 112 | 134 | 156 | 178 |
| 003 | 025 | 047 | 069 | 091 | 113 | 135 | 157 | 179 |
| 004 | 026 | 048 | 070 | 092 | 114 | 136 | 158 | 180 |
| 005 | 027 | 049 | 071 | 093 | 115 | 137 | 159 | 181 |
| 006 | 028 | 050 | 072 | 094 | 116 | 138 | 160 | 182 |
| 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 |
| 016 | 038 | 060 | 082 | 104 | 126 | 148 | 170 | 192 |
| 017 | 039 | 061 | 083 | 105 | 127 | 149 | 171 | 193 |
| 018 | 040 | 062 | 084 | 106 | 128 | 150 | 172 | 194 |
| 019 | 041 | 063 | 085 | 107 | 129 | 151 | 173 | 195 |
| 020 | 042 | 064 | 086 | 108 | 130 | 152 | 174 | 196 |
| 021 | 043 | 065 | 087 | 109 | 131 | 153 | 175 | 197 |
| 022 | 044 | 066 | 088 | 110 | 132 | 154 | 176 | 198 |

Subscription/Reader Service Card

**Place
Stamp
Here**

RadioWorld®
PO Box 1214
Falls Church VA 22041-0214

Running Radio

Your Resource for Business, Programming & Sales

January 20, 1993

Teamwork:
Create a winning,
focused staff
page 13.

RAB Managing Sales Conference Set in Dallas

► continued from page 1

will unveil a new personality analysis program. PACEPALETTE System is designed to help you understand yourself and others quickly with a new sensitivity as to why they think, act and talk the way they do.

Nancy Friedman will lead a forum on telephone "do's and don'ts." Friedman and her husband developed a customer service department while operating their own radio stations. That concept has evolved into "The Telephone Doctor," a system to improve sales and service over the telephone.

Creative personalities Dick Orkin (of

Department Stores, will teach attendees what they need to know to make radio a permanent major medium for retailing in the coming years. The two will talk about database marketing and how stations can utilize this tool to generate retail revenue.

The Metro Radio Group of England will present a strategy they have successfully employed to generate revenue: "The World's Greatest Salesperson." The World's Greatest Salesperson is a department of the station that generates millions for the company.

A keynote address sure to be well-attended is Mimi Donaldson's "How Women Think." Donaldson is a management and training development specialist who will discuss some key differences between the way men and women think and communicate. She will teach attendees techniques to avoid saying the incorrect thing when communicating with members of the opposite sex.

Workshops

The MSC will also offer attendees any number of workshops to help sales managers manage out of the box. Sessions include:

- "Making Money Without Using Inventory and Other Out of the Box Sales Ideas," led by Ronnie Hanna and Julie

Lomax-Brauff of Breakthrough Marketing, a company specializing in promotions that use limited or no inventory;

- "Micro Marketing," how to emphasize specific markets, neighborhoods and consumers;

- "Verbal Presentation and Business Communications," detailing how to communicate better in any number of situations, including one-on-one with clients or salespeople, convincing the boss, and making speeches;

- "New Compensation Systems," new ways of doing business demands new ways to motivate, compensate and keep good salespeople;

- "Managing LMAs," in which four managers currently running LMAs share their successes, their ideas and experiences on what to do (or not);

- "How to Make a National Sales Call," national sales managers teach the right way to make a national sales call, and make your sales effort more productive and cost efficient;

- "Manipulating Manufacturer's Reps." Manufacturer's reps are controlling more and more discretionary promotion spending money—find and exploit these sources;

Keynote speakers will discuss ways to make radio a permanent medium for retailers.

- "The Impact of New Technologies on Broadcasting," John Abel, NAB's executive vice president/operations, will provide a detailed description of some of what the future has in store for radio;

- "OES—One Year Later," Pierre Bou-

vard and Steve Marx take a look at the first year of OES;

- "What You Don't Know May Get You in Trouble," Barry Umansky, NAB Deputy General Counsel, talks about laws, rules and regulations and some money-saving and problem-solving tips;

- "How Do I Start a Vendor Department?," a basic course in what vendor promotion selling is about;

- "Motivating After the Money Runs Out," how to maintain a motivated staff when money is tight;

- "Selling Radio Abroad," a South African AM that bills \$30 million using U.S. techniques, a Scottish FM with money-making ideas.

Other sessions will deal with recruitment and training issues as well as the importance of change.

MSC 93
RADIO'S SALES MEETING
MANAGING
OUT OF THE BOX

Connect the dots. Use only four lines.
Your pencil can't leave the page.

Orkin's Radio Ranch and Home for Wayward Cowboys) and Chuck Blore (Chuck Blore & Co.), along with Barbara Goldman, vice president and senior radio producer, Backer Spielvogel Bates, New York, will discuss the nuts and bolts of what makes good radio creative—what sells and what doesn't.

Keynotes

RAB President Gary Fries will lead the opening session of the MSC with his 1993 "State of the Industry" address.

CBS Radio Network broadcaster Charles Osgood will deliver a luncheon keynote address. The NAB Hall-of-Famer will share his views on radio and its role in America's daily life.

Tapping retail dollars successfully is essential to radio's survival. Two retail experts, Paul Leblang, former senior vice president, director of marketing, Saks Fifth Avenue Department Store, and Fred Newell, president, Seklemian & Newell, and former CEO of Rhodian Southwest

**The Five Most Trusted Words
In Broadcast News...**

"According To The Associated Press."

When news breaks, your station's reputation is on the line. So turn to AP for accurate, up-to-the-minute coverage of news as it happens.

Only AP has bureaus in all 50 states and every major international city. That means more reporters closer to

the source, for firsthand coverage and fast delivery.

Give your listeners the news and information you can trust.

Call 800-821-4747.

AP

Radio's Most Reliable Resource.

Circle (185) On Reader Service Card

World Radio History

PURE DIGITAL.



Bottom Line Orientation.

Creating a "sound" that attracts and holds the largest possible audience is the bottom line in the radio business. And the new OPTIMOD-FM Digital 8200 is a technological breakthrough with bottom line impact.

Digital Makes the Best Even Better.

The power of digital propels the 8200 to new levels of performance and functionality. OPTIMOD-FM 8200 is a *true* digital audio processor—the audio is digitized and all control functions are digital.

What is the value of digital processing and control? In addition to a better sound, digital makes the OPTIMOD-FM more user-friendly, more programmable, more flexible. Simply put, because the OPTIMOD-FM is easier to adapt to a station's programming needs, it will produce more benefit, more of the time.

The Processor with Multiple Personalities.

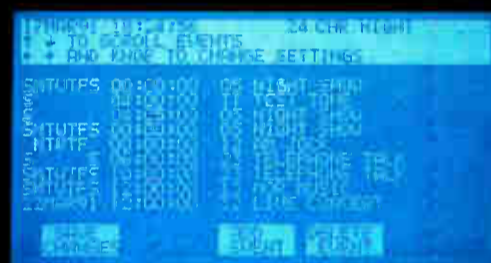
With most conventional processors, multiple processing configurations require multiple boxes. With the 8200's Multiple Variable Processing (MVP) architecture, processing configurations can be

changed with the push of a button—select the protection MVP for total transparency, or the two-band MVP for an improved version of the traditional open, bright and natural OPTIMOD-FM sound which helped make thousands of stations successful. Choose the optional multi-band MVP and meet the challenge of competitive major-market processing with selectable speeds to match any format.

Power. Potential. Profitability.

Take advantage of the power, potential and profitability of the OPTIMOD-FM 8200. Call your dealer now for a personal, hands-on evaluation of the 8200.

The OPTIMOD-FM 8200 is a technological breakthrough with bottom line impact. The power of OPTIMOD—in pure digital.



Use the 8200's Automatic Preset Switching to automatically change the processing on a programmed schedule. Ideal for dayparting or multi-format stations.

OPTIMOD-FM

D I G I T A L

© 1991 AKG Acoustics, Inc.
Orban and Optimod are registered trademarks of AKG Acoustics, Inc.
AKG is a registered trademark of Akustische U. Kino-Geräte Ges.m.b.H. Austria.

orban

A Division of AKG Acoustics, Inc.
1525 Alvarado Street
San Leandro, CA 94577 USA
Tel: (415) 351-3500
Fax: (415) 351-0500

Create a Winning Work Environment

by Sue Jones

BURKE, Va. One of the most difficult management tasks is blending people with different personalities and abilities with diverse tasks into a cohesive group that is working toward the station's goals and objectives.

Building such a team requires combining several advanced managerial skills such as motivation, information dissemination, incentives and fine tuning. It is a continuing process. The following points will give you a suggested framework to help enhance your efforts.

Build the concept

Most employees want to meet or exceed the station's expectations for their work. It is management's responsibility to provide the direction and focus for the group. The focus begins with management explaining, "we are in this thing together." This can be conveyed in new employee orientation, the personnel handbook, or through discussions in staff meetings.

Management must convey to employees how each group or position contributes to the success or failure of the station, and how important a successful inter-relationship is for the employees.

The receptionist's skill and manner in handling incoming telephone calls is of paramount importance to a business. The caller may be a potential advertising client seeking information. If the call is courteously and efficiently transferred to the correct sales representative, the caller is immediately impressed with the professionalism of your station.

However, if the caller is disconnected, transferred to the wrong person, or treated as if it was an inconvenience to answer the telephone, he or she will get a very different impression of the station. You may have the most popular DJs in the area and the best programming, but if

the receptionist is performing poorly, you could be losing advertising revenue to a competitor and giving an impression of ineptitude to callers.

The receptionist should understand how important his or her "link" is to the whole station. If the receptionist's task is "communications management" (directing, routing and/or recording telephone messages, incoming/outgoing mail/fax/messages/packages), that position takes on a new dimension. The receptionist now understands his part of the station's success and the other staff members understand the importance of that role. Aside from the programming, he is the first point of contact for your station.

Train, Train, Train. Staff training is often the last item to be considered in the team building process. However, it can be one of the most effective team building tools. Specialized technical training for staff members can make them more valuable to your organization as well as assist them in their career development.

Courses available

Consider your engineer's improved repair skills after spending a week at one of the Harris Transmitter Courses. Or, how impressive it will be to your clients to boast that all of the sales executives are Certified Radio Marketing Consultants (CRMC). (Editor's note: The CRMC certification program is available through the Radio Advertising Bureau.)

One benefit that is commonly found in other industries is tuition reimbursement. Some stations offer tuition reimbursement to staff who successfully complete university courses in the broadcast/communication fields. Some require a certain amount of service to the station in return for the training reimbursement. Other requirements may include a proportional repayment of the tuition if they resign before the end of the service period.

This type of training is very targeted, self-motivated, and cost effective. Training benefits such as these motivate employees and assist them in their own career development while increasing the station's talent.

Another type of training is off-site or on-site seminars. Subject matter and quality vary widely. Ask the training group for references of those who have completed the seminar. Talk with them to determine if this is the type of training you need. Off-site seminars may be best for training one or two people for specialized areas such as transmitter training or traffic computer operation.


On-site might be appropriate for first-line supervisory skills training for your management team from all of the departments. From a budget perspective, it may be more cost effective to bring the trainer to five people than sending five people to the trainer.

If you use motivational speakers for the sales staff, invite all of the department heads to participate. The managers will gain a better perspective of the sales effort and learn how to better deal with clients and co-workers.

Learn from each other

A training opportunity that is the most overlooked is staff cross-training. The most valuable staff members are those

continued on page 20 ▶



Super Gospel Country
RADIO NETWORK, INC.™

HOT!! NEW!!
CHRISTIAN COUNTRY
MUSIC

MAKE THE MOVE IN '93 TO AMERICA'S HOTTEST NEW RADIO FORMAT!

"SINCERELY, I CAN'T FIND ENOUGH WORDS TO EXPRESS MY FEELINGS ABOUT ASSOCIATING WITH SUPER GOSPEL COUNTRY, BOTH ON A BUSINESS AND PERSONAL LEVEL. SINCE AFFILIATING WITH S.G.C. IN SEPTEMBER, 1992, MY BILLING HAS INCREASED 100%, GAINING NEW CLIENTS THAT I BELIEVE WOULD NOT HAVE ADVERTISED WITH ANY OTHER GOSPEL FORMAT."

DOC HOLIDAY, GM
WALD-FM
WALTERBORO, SC

**CHRISTIAN COUNTRY...
"COUNTRY WITH A HAPPY KICK"**

DON'T MISS OUT!
BE THE FIRST & EXCLUSIVE STATION
IN YOUR MARKET TO CAPTURE THIS 25+ AUDIENCE.

For Air Check & Affiliate information, call:
1-800-877-1950
Also available - free weekly syndicated
"Primetime Playlist" Show



**DO YOU KNOW YOUR MARKET?
YOUR COMPETITION DOES!**

DATAWORLD MAPS CAN
Depict your coverage!
Market orient your sales people!
Target your ethnic/demographic markets!
Identify marginal signal areas!
Plot any special requirements!

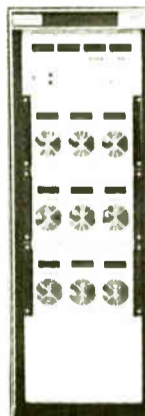
MAP OPTIONS

- SHADOWING (TERRAIN SHIELDING)
- CONTOUR COVERAGE
- POPULATION DENSITY
- ZIP CODE BOUNDARIES
- RECEIVED SIGNAL LEVEL
- SPECIAL REQUIREMENTS

dataworld
A Service of DW, Inc.

(301) 652-8822 (800) 368-5754

1 kW FM Solid State Transmitter \$13,200 list includes Exciter!



LEGEND 1000 Features

- Automatic Power Output Control
- VSWR Foldback and Protection
- Remote Control Ready
- Full System and Individual Module Metering
- Motorola MRF151G MOSFETS

Legend 4000 pictured

• PLUS MANY MORE FEATURES

"The Transmitter People"
Energy-Onix

752 Warren Street, Hudson, New York 12534
(518)828-1690 FAX(518) 828-8476

Low-Dollar Accounts Build Revenues

by Alan Fendrich

NEWPORT NEWS, Va. Searching for a "new bag of tricks"? A new way to increase sales and prop up your sagging revenue line?

One often overlooked area is low-dollar ad budgets. Small advertisers run every day in shoppers, dailies and weeklies—yet most radio stations do virtually nothing to get these dollars.

Why bother to get low dollar schedules? After all, what good is an \$80 or \$100 schedule?

Small change adds up

Ignore low dollar advertisers at your expense! Twenty-five of those \$80 schedules a week add up to an extra \$104,000 a year. Plus, any station can go after low-dollar ad money.

Obviously, the bigger the market, the more small-dollar ad budgets are out there. Stations in markets of 75,000 population, however, are making \$6,000 to \$8,000 a month off this strategy as well.

Stations we deal with in the top 50 markets average an extra \$15,000 a month—one station reported averaging \$26,000 a month. Remember too, this market segment isn't interested in your ratings. In fact, higher ratings actually work against you because of higher spot costs. In other words, this strategy can

work well for stations with smaller audience shares.

Tighter ad budgets make small-dollar advertisers more valuable than ever. Even stations that get agency buys are now

finding fewer buys out there—with fewer dollars available. So, stations with good numbers also can benefit from going after low-dollar schedules.

However, low-dollar schedules pose a



Alan Fendrich

Tighter ad budgets make small-dollar advertisers more valuable than ever. Even stations that get agency buys are now finding fewer buys out there.

problem. How do you contact the sheer volume of those advertisers? Since only a fraction of sales calls ever result in a sale (whether low- or high-dollar) how do you convince your sales department to track down \$80 sales?

Reach out and call someone

A method we employ at Radio Profits Corp. is the telephone. If at first glance that seems too labor-intensive, take another look. We recently developed a product designed to do in-station automated telemarketing.

Our firm, a national database marketing consultancy, has created a division to help radio stations implement in-station telephone-based sales systems.

The software, (Automated Radio Profit Generator) allows a salesperson to make twice as many calls compared to a

manual "index card" system. Our product is designed to generate a 100 percent increase in the number of calls dialed. Telemarketing is a "numbers" game, plain and simple. Call more, sell more.

In today's business climate, two-thirds of radio stations are operating in the red. The good old days are a thing of the past. Only the smart marketers will prosper. The name of the game is quality service to the client.

What it offers

The software package is delivered loaded with a station's local database of businesses—up to 5,000 separate listings. The station literally

just plugs it in.

There's a section called "The Hiring Module," a step-by-step guide for stations to select the right type of person to sell. Hiring the right person is critical for telemarketing. We provide a five-page personality test in the Hiring Module. We've licensed the test for our radio clients to use.

We rent the Automated Radio Profit Generator on a revenue sharing basis that is "extremely fair and modest." We offer what we call a "no-risk" decision for a station. Put it in for a trial period. If you make money with it, you agree to a year's contract. No new profits—no cost.

□□□

Alan Fendrich is a former radio sales manager with 10 years experience. For more information, circle Reader Service 31, or contact Fendrich at Radio Profits Corp., 813 Forrest Drive, Suite 400, Newport News, VA 23606; telephone: 800-743-3460; fax: 804-596-3324. The company distributes a video to demonstrate its system.

THE LINEAGE CONTINUES...

Today's 1900 Series Antenna Monitors



FEATURES

- 2 to 12 towers—Modular construction
- Fully Compatible with AM Stereo
 - Suited to diplexed arrays
 - Moveable Control & Display Panel option
- Jitter-free "True Ratio" Display
 - Unambiguous positive or negative angle sign display
 - Continuous remote outputs of all phase and ratio measurements
 - Microprocessor remote control system compatibility
- From the world's leading antenna monitor manufacturer

For complete information, contact your authorized Potomac distributor, or

**POTOMAC
INSTRUMENTS**

932 Philadelphia Avenue • Silver Spring, MD 20910
Phone: (301)589-2662 • FAX: (301)589-2665

...THE STANDARD FOR THE NEXT GENERATION

\$146,000+ In 3 Days

In Lancaster-Palmdale, CA

Custom jingles for your clients!

Let our jingles make money for your station... NOW!

RADIO CONCEPTS INC.®

(612) 656-9259 Fax: (612) 656-0626

DIGITAL AUDIO FOR THE LIVE BROADCASTER FROM SMARTS BROADCAST SYSTEMS

By John Schad
President - SMARTS Broadcast
Systems

Hard drive digital audio has swept through the radio industry in the past couple of years. Starting first with satellite automation systems, companies soon began expanding into control of conventional open reel systems and compact disks.

In the rush to build new and better automation equipment, the live broadcaster, who represents the greatest majority of station in the country, was the last to be considered.

Now, SMARTS Broadcast Systems has developed the first totally integrated system for live broadcasting, combining accounting, traffic, billing, and a myriad of digital audio functions into a single, cohesive system.

Each element in the system works independently, so that a system can change and grow with station needs. But seen as a whole, the system brings a

level of organization and sophistication to a live operation that is often lacking at all levels of broadcasting.

Here's how the system works. Work stations are set up at key points within the radio station. The traffic department, the copy desk, the newsroom, the production room, and of course, the AM and FM control rooms, anywhere access to the system is needed.

SMARTCASTER digital audio units are installed in production, control room and newsroom facilities. Network nodes are installed in standard computers at other locations.

An inexpensive SMARTKIT can be installed in the office computer. The copy and traffic director can use this system normally, but also audition and delete spots, change stop dates, write copy and send it to the production rooms, and generally administrate the entire station from that on location. We are vesting system control, including traffic and spot inventory control, where

it belongs in the traffic department.

The station now has a smooth flow of electronic "paperwork" without the paper. The incoming traffic order is entered into the machine. The copy desk is now aware that copy must be written. Once written the copy is lined up in the production room — and production knows what has to be produced. Once produced, the digital audio, all part of the same system, is transferred to the control room for play on the air. Traffic knows when spots become outdated, and can audition, change stop dates, or delete all from the traffic desk. Each entry triggers the next to create a check and balance system throughout the entire operation. This greatly reduces the problems of outdated copy, copy not available, copy not produced, or the wrong copy getting on the air.

Only SMARTS Broadcast Systems has the software — both billing and traffic and digital audio, and the expertise to make such a complex yet reli-

able system work.

You also can implement the system a little at a time, purchasing modules as your needs grow.

The modularization makes each system individual and unique, tailored to the precise needs of every station, yet supportable because each module is standardized. The system functions the way you want it to function, and grows as you need it to grow.

SMARTS Broadcast Systems has continuously broadened its line of products and services to provide something for every broadcaster from the large to the tiny market. We specialize in working with you to make your station operation more efficient through digital audio, digital automation, and computerization. We're also available 24 hours a day, 7 days a week when you need help. Give us a call at the toll free number below so we can find ways to bring more dollars to your bottom line.



SMARTS BROADCAST SYSTEMS
BOX 263, EMMETSBURG, IA 50536
(800) 747-6278
(712) 852-4047 FAX (712) 852-3061

MARKETING & MANAGEMENT

Marketing Is the Future for Radio

by John Cummuta

ALGONQUIN, III. Last month we began a discussion about your station becoming more than just a source of airtime for your advertising clients, and about your salespeople becoming more than just time sellers. I suggested that your sales force could become marketing consultants to your advertisers, and that they could bring total marketing solutions to each client's needs.

I also suggested that such an increase in the scope and value of your service to advertisers would give you a quantum advantage over competitive stations. This approach is admittedly of less value to stations who sell almost exclusively to agencies, who see themselves as providing the Marketing Consultation to the advertiser. But, for the bulk of stations who must go out into the market and sell their services directly to advertisers, these ideas will help them bring "value added" to potential advertisers, by being able to help with their total marketing campaign.

Integrated marketing

The idea is based on what is now being called "integrated marketing." In his book, "Integrated Direct Marketing," Ernan Roman gets right to the point: "Those companies that were deploying multiple media in planned, carefully structured campaigns generally achieved

success. Those that did not use this methodology (the overwhelming majority) experienced only marginal response rates overall.

"The underlying problem was that companies able to employ the finest resources of direct marketing were not getting the most from any of them because they were not using all of them according to an integrated, coordinated strategy," Roman said.

What a window of opportunity Mr. Roman just described for you. He is saying that businesses that are using a variety of media are not achieving the level

For developing customer relationships, nothing is as efficient and cost-effective as database marketing.

of results (response) that they should, because there is no synergy or coordination among the messages they are expressing through the various media.

It's just common sense. Think of it as a directional antenna array. The phasing (focusing) of the radiated energy causes it to have an effect (at least in the major lobe direction) greater than the actual power fed into the system—the old idea

of "the whole is greater than the sum of the parts."

Just the opposite effect is being realized by most of your advertisers. A lack of focusing or coordination of their advertising energy is causing a diffusing or even canceling effect in their results. Many times even those who work through an agency are not enjoying the coordination among media that they should.

Fill the void

This means that there is a void, a need in the marketplace that your station can fill. And you fill that need by simply helping your advertisers get the most "bang" for their marketing buck.

The way to get them that maximum "bang" is to help them develop a marketing strategy, then help them execute that strategy, *regardless of what media is needed to maximize the results.* Of course, you wouldn't bother with this exercise for a business whose strategy would never require *any* radio.

Effectively executing what I am talking about here does demand that you get rid of the idea that radio is the be-all and end-all of advertising media. This will be particularly tough for radio sales professionals who have made a career of selling against newspapers, TV, matchbook covers, airplanes towing banners and so on. All these media have their place, and their individual strengths and weaknesses—just like radio.

Most advertising, through whatever medium, is designed to either bring in new customers or let current and old customers know about a new offer.

For attracting new customers to sample a business, mass media such as radio, TV and newspapers is usually effective. But

for developing customer relationships, and for letting current and past customers know about new reasons for their patronizing a given business, *nothing* is as efficient and cost-effective as database marketing. And the best medium for this "back-end" communication is direct mail.

Develop a marketing staff

To be a true wizard of marketing, your salespeople will need to prepare in order to offer their clients the "front-end" advertising coordination to integrate a marketing campaign. The salespeople should also learn enough about database marketing and direct mail to help clients develop a customer database—so they can execute the relationship marketing components of an overall marketing strategy.

This may well sound like I'm asking you to go far beyond the call of duty, but my intention is to simply begin laying out a game plan for progressive owners and managements to get their broadcast businesses out ahead of the crowd.

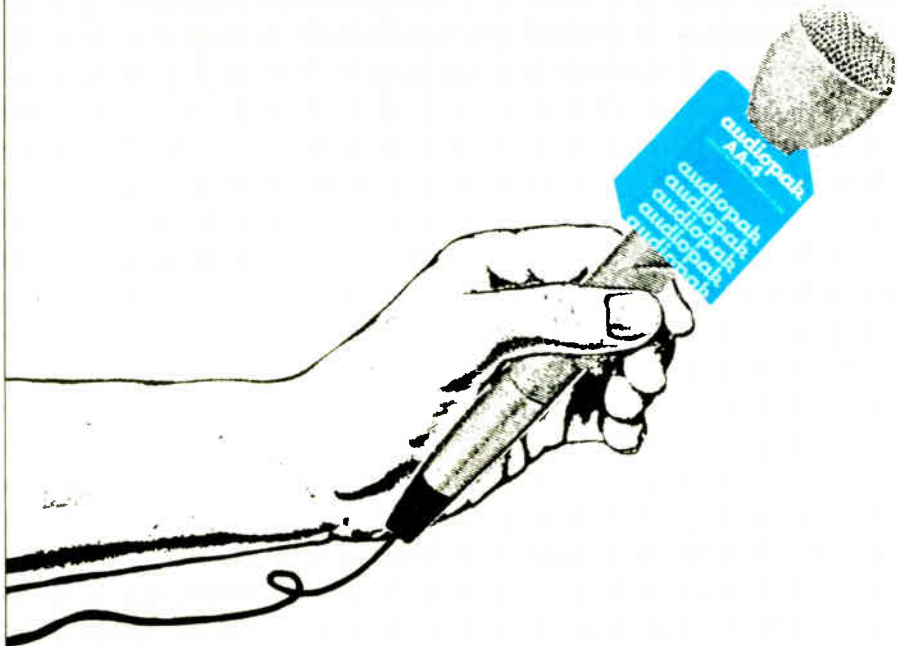
I firmly believe that advertising professionals who have enough foresight to stop trying to hold back the tide will eventually enjoy the opportunity to ride that tide. Advertising clients will respond favorably to them as consultants who are selfless enough to actually recommend newspapers, TV, direct mail, free-standing inserts and other media where they are appropriate. A sales/marketing consultant can solidify relationships with clients, building a position that will be impossible for competitors to attack—especially competitors who are just selling time.

Obviously, if your sales people are going to become these wonderful marketing consultants, they'll need to learn a little more about marketing. How about we start that educational process next month?

□□□

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

TRUE BLUE FOR THE NEWS.



For top reliability, put your news cuts on the cart more stations count on.

audiopak
BROADCAST CARTRIDGES

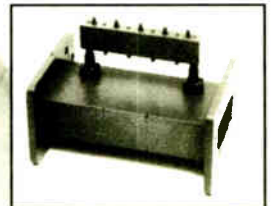
P.O. Box 3100 • Winchester, VA 22601
Tel: (800) 522-CART or (703) 667-8125
Fax: (703) 667-6379

Circle (96) On Reader Service Card

Satellite Interference Filters

Remove unwanted terrestrial interference at your C-band TVRO. Suppression filters available for interference problems at the dish, feedhorn, downconverter (both block and standard) and receiver.

Ask for catalog MTV/91: Terrestrial Interference Filters, Traps & Services



Model 7892 removes radar interference.

Background Picture: Model 5552 microwave absorbers reduce interference that diffracts into the TVRO.

"The Leader For 25 Years"
Providing Fast Filter Service For Our Customers



Microwave Filter Company, Inc.

6743 Kinne St. • E. Syracuse, NY 13057

Toll Free (US/Can): 1-800-448-1666 • Collect (NY/AK/HI): 315-437-3953

FAX: 315-463-1467 • Telex: 249-613

Circle (170) On Reader Service Card

Wall, Floor and Ceiling Treatments

by Edwin Bukont

GREENBELT, Md. This, the last in a series of articles on studio building, will cover treatment of ceilings, floors, windows and some furniture concerns.

Windows must be at least double-pane, but preferably triple-pane. Each window is mounted in its own casing and the gap between casings is filled with heavy rubber or neoprene gasket.

Window glass, regardless of wall construction, should float on a rubber gasket and not touch the frame. Adhesives or caulk are not a good substitute for gasket. Use at least a two-pane window regardless of the wall construction and angle the glass—no two surfaces, such as a wall and a glass pane, nor the panes themselves, should be parallel.

Space permitting, a minimum angle of 10 degrees is desired for the glass panes, but they should not touch nor share the same rubber gasket. Windows should be as small as practical and only used where necessary. Avoid having a window in every wall.

Outside windows present two unique problems, both of which can be expensive to rectify. The first problem occurs if in modifying the windows, you modify the outside appearance of the building. If you are higher than five stories above the outside surroundings, and those surroundings are fairly quiet, away from airports and highways, you can probably forego the window treatment.

The second problem is condensation. As you may have already surmised, the window treatment consists of adding another pane of inner, or outer glass, mounted in a suitable frame with rubber gaskets and not touching the existing frame. As the air space between the panes will be subject to different heating and cooling on each side, condensation will occur.

To reduce these effects, place silica packets on the frame inside the window cavity. Provide a means to remove the panes for cleaning and replacement of the silica packets (which should last for at least 10 years). Silica packets are available at photo supply stores and packaging supply companies.

Proper ceiling treatment is critical to good acoustic control and creating a proper listening environment. It is desirable to maintain a 24-foot clearance between the top side of the ceiling and the next higher deck. In some facilities, especially those with common plenums or unusually high ceiling clearances, it may be necessary to build an artificial "roof" over the studios from which the ceiling will hang.

Ceilings should be of general purpose acoustical tile. The ceiling grid should be hung with neoprene or similar isolators between the hanger wire and the ceiling grid members. Place insulation batts across the top side of the ceiling.

I caution against using the expensive-but-attractive tiles that contain a "feathered" or stucco look to create the appearance of a continuous ceiling. These tiles shed rapidly and will clog the throat of your on-air talent and wreak untold horrors upon tape heads, disk drives, cooling ducts, CD player lenses and any other surface sensitive to large air-borne particles.

Avoid constructing the ceiling on existing overhead beams that may cross into

other rooms. If you must share ceiling members with another room or the floor above, and there is sufficient height available, finish the existing ceiling and then suspend an acoustic ceiling from the above members.

Floors are generally the least problematic of studio acoustic concerns, unless you are above a noisy tenant or on the ground floor. In general, it is no longer necessary to build the fancy floating or isolated floors that have been traditionally used.

If you are in a high-rise office building that was erected in the past 20 years, it probably has metal decking and poured

concrete floors. Do some research about the noise generated by other tenants two floors above and below yours to determine possible conflicts. Remember to check for after-hours and weekend activities.

If you are on the ground floor adjacent to building entrances, roadways, parking areas or service entrances, you will probably need the isolated floor. Try to avoid abutting HVAC or elevator equipment rooms and shafts. If you do not require isolation, use a layer of carpet mat under the finish material and seal around the edges.

This should provide an adequate treatment. In the event that an isolated floor is

required, there are many approaches, all of relatively the same cost.

Here is one I have often used. Place a vapor barrier on the original floor, then cover the floor with a vinyl, rubber or similar mat material. Place 2 x 4 beams, on edge, atop this mat, at appropriate spacing for your local codes. Do not secure these to the existing floor. Fill the space between beams with thick insulation batts. The batts keep the beams in place and provide acoustic isolation.

These unsecured beams are referred to as "sleepers" because they are designed to support the room load above and transmit it to the original floor, but you can not build additional wall or other load construction on these sleepers. Along the

continued on page 20 ►

We Won't Let You Forget.



Tell Us When Your AP Contract Expires And Try Zapnews Now For One Week Free...

Five years is a long time to be tied down to your AP wire service contract. But don't wait one day longer: Just tell us when your contract expires, and we'll give you plenty of lead time to sign up with Zapnews.

With Zapnews, you pick and pay for only the news you need, so it costs you up to 80% less than AP. With convenient delivery to your FAX. Complete world, national, and state news, business and features. All written exclusively for broadcasters. Best of all, our contract term is just 30 days, not five years. So you won't get crushed.

Don't forget: Call us today with your expiration date and try Zapnews for a week free — and see what you've been missing.

1-800-800-5100

ZAPNEWSTM
The News You Need.
No More. No Less.

4002 University Drive ■ Fairfax, VA 22030 ■ FAX: 1-800-800-9450

Circle (93) On Reader Service Card

World Radio History

Products & Services Showcase

For more information on the products shown below, circle the appropriate Reader Service No.(s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.

Obstruction Lighting That's Not Sky High

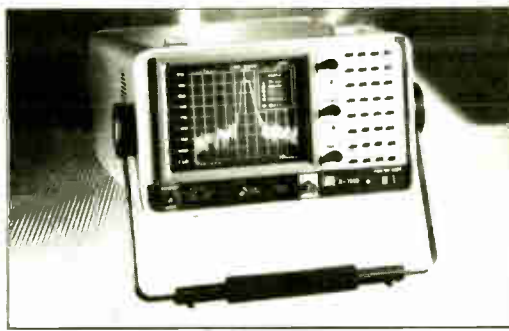
ElectroFlash™ Aviation Lighting Systems

- Medium and High Intensity Obstruction Strobe Lighting
- ETL Certified. FAA, Transport Canada and ICAO Approved
- Compatible with Dual Installations—Auto Restart
- Available with AC, DC, or AC/DC Combo Input Voltage
- Installation and Service Maintenance Available
- Equipment Warranted for 24 Months—Includes Flash Tube

P.O. Box 329
Nashua, NH 03060
Phone (603) 883-6500
Fax (603) 883-0205



READER SERVICE NO. 167



A-7550...10 kHz to 1 GHz PORTABLE SPECTRUM ANALYZER

Synthesized tuning and phase locked frequency stabilization enable accurate swept frequency measurements over calibrated span widths from as wide as 100 MHz/div to as narrow as 1 kHz/div. A standard 300 Hz resolution bandwidth filter and peak hold mode provide NRSC measurement capability. Other A-7550 features include:

- +30 to -120 dBm measurement range
- DC operation from 12 to 30 volts (Built-in battery optional)
- Optional built-in tracking generator
- Optional built-in AM/FM/SSB receiver
- Optional IEEE-488 or RS-232 interfaces.

For more information or a demonstration of the A-7550 contact:



IFR SYSTEMS, INC.
10200 West York St., Wichita, Kansas 67215
Phone (316) 522-4981 Ext. 207. FAX (316) 524-2623
DIRECT FACTORY RENTAL PLAN AVAILABLE

READER SERVICE NO. 53

PORTABLE OFF SITE EBS MONITOR \$350⁰⁰

Tuneable AM/FM Receiver and FCC Certified Decoder Model C.D.



Ideal for use during hours of unattended operation at the studio and transmitter site. With modern remote control equipment the alert message can be put on the air with a telephone.

Decoder in a minibox (price \$250⁰⁰) is available for use with receiver of your choice, or the decoder can be driven by phone line audio.

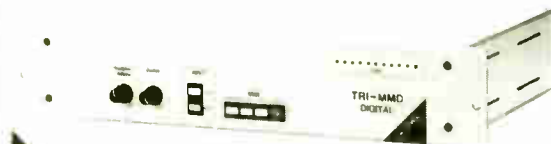
Gorman Redlich Mfg. Co.
257 W. Union St.
Athens, Ohio 45701

FAX 614-592-3898 Phone 614-593-3150

READER SERVICE NO. 35

TRI-MM DIGITAL

DIGITAL TELEPHONE INTERFACE SYSTEM



"The analogue version beat the best in the world. The new digital version is even better with improved digital PABX performance and instant call to call optimisation."

- MIXERS - RTLs - OB AMPS - HYBRIDS - LIMITERS -



79 LITTLE OXFORD STREET, COLLINGWOOD VIC 3066, AUSTRALIA
TELEPHONE 613 417 1835 FACSIMILE 613 417 7704

READER SERVICE NO. 191

Dielectric Transmission Line...

The Best Line...



Just Got BETTER!

Call For Details.

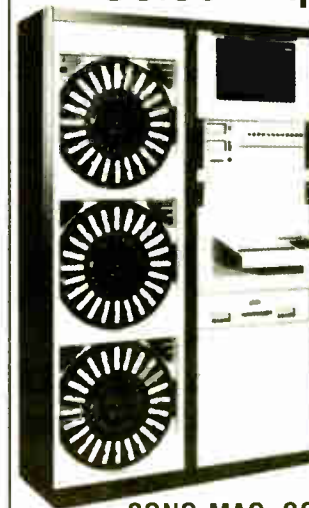
The cost of a single failure wipes out any savings by cutting corners in materials, design and manufacture. We build it right.....for you.

DIELECTRIC COMMUNICATIONS GS

1-800-585-4500 P.O. Box 949
Fax 207-655-7120 Raymond, Maine 04071

READER SERVICE NO. 16

Save up to 40% on Select Equipment



- Our Systems are P.C. Compatible
- Comparable In Price to Digital Storage Devices
- Provides Audio Switching
- No Monthly Software Maintenance Fees
- No Need for a U.P.S. Power Supply
- CD Live Assist Systems
- Satellite Programming Systems
- Carousels*
- Music Systems

SONO-MAG CORPORATION

1833 Hovey Ave Normal, IL 61761 4394
Phone 309 452 5313 FAX 309 452 2521

READER SERVICE NO. 84

Shively

A good FM antenna is crucial to quality broadcasting. An antenna that is merely adequate will compromise the performance of even the best studio equipment and transmitter.

Shively regularly includes standard features that other companies either provide only as options or simply do not offer.

At Shively, we design and build antennas of uncompromising technical quality and performance. And, we build them to last.

call or write for more information

Shively Labs

A Division of Howell Laboratories, Inc.
19 Harrison Road, Bridgton, ME 04009
207-647-3327 FAX 207-647-8273

READER SERVICE NO. 124

DJ-Lite™ Digital Satellite System \$2,995.00!

SMN - ISA - UNISTAR

DJ-Lite replaces all your old audio Cart sources with high quality digital audio from a computer hard disk. It's simple: We supply the digital audio cards and constol hardware and software, you supply a 386 PC computer and color monitor. Wire up to your satellite receiver and console audio in and our and you're on the air.

DJ-Lite doesn't have a lot of bells & whistles. It's designed for 24 hour satellite music operation with limited live assist and simple audio new insertion on closures.

Multi-day Satellite programming is a snap. Full ID, Jingle, Magic Call & Liner rotation and live assist options. Auto spot Set fill, Subs for illegal spots. Real Time operation with auto update after power failure. Easy installation and operation.

- ☐ Multi-day walkaway on Satellite music formats
- ☐ Full live Assist included

The Management

1-800-334-7823 - 1-817-625-9761 - Fax 817-624-9741
P.O. Box 1-36457 Ft. Worth, TX. 76136
Our 13th Year - 1200+ Stations

READER SERVICE NO. 34

NEW!

Composite Audio DA and Switcher!



APPLICATIONS

- Switching Between Composite STL's
- Main/Alternate Processing Switching
- Feed Up to 3 Transmitters with Identical Audio
- SCA or SAP Generator Switching
- Non-Intrusive Composite Testing/Monitoring

FEATURES

- 2 Input Switcher
- 3 Isolated Outputs
- Individual Level Control for Each Output
- Front Panel and Remote Control with Full Status
- Power Fail Memory with Bypass Mode
- Inputs Selectable for Balanced or Unbalanced Operation

SPECIAL INTRODUCTORY PRICE (LIMITED TIME ONLY) \$ 695



Broadcast Devices, Inc.
5 Crestview Avenue Peekskill, NY 10566 (914) 737-5032

READER SERVICE NO. 70

USAirplay

Radio AAHS: Niche Programming for Kids

by Charles Taylor

WASHINGTON Forget Madonna. These days, "3 Little Pig Blues," "Googoplex" and "Put Down the Duckie" are where it's at.

But you aren't likely to find them on your local urban or top 40 radio outlet. These songs, along with a roster of highly targeted programming, are part of an imaginative niche format working its way across the U.S. airwaves.

Children's radio is aimed at the 20 percent of Americans under age 12. According to research facility American Demographics, the purchasing power of children ages 4 to 12 totaled \$14.4 billion in 1991. Overall family spending decisions add up to a whopping \$132 billion a year.

"The timing is right for this format with the push of family values in America. It's not just kids, it's not just adults we program to. It's families," says Bill Barnett, president of Children's Satellite Network (CSN), the format's leading contender.

Strength of one

The network's flagship station, WWTC(AM) in Minneapolis—known as Radio AAHS (as in "Oz")—has been on-air since 1990. CSN's intention was to prove the strength of one outlet before offering its 24-hour satellite feed to affiliates.

At year-end 1992, believers included WNTR in Washington; KIDR in Phoenix; KKDS in Salt Lake City; and WEW in St. Louis. According to CSN, additional stations in six other states are on the way. And strategically, all are on the AM band.

"I think that an experimental format such as this can only take place on the AM band, where they're searching for whatever is next that would keep the station alive," says Andy Denmark, programming director for media giant Westwood One. "A broadcaster knows it would never be the No. 1 station in town. But it certainly seems like an experiment worth undertaking."

WWTC advertisers certainly seem convinced. Among regular Radio AAHS sponsors are McDonald's, Blockbuster Video, Tonka and General Mills; as well as endorsements from Revlon, Star Tribune, First Eyecare Center and Richfield Bank & Trust, whose ads target parents.

Adds Lawrence Kessner, president of Capital Kids Radio, which operates CSN affiliate WNTR in Washington, "Billions of dollars are spent toward reaching children. We'd like to see some of it go to radio."

Traditional programming

WWTC's 24-hour programming parallels traditional stations, only with a children's slant. The morning show includes music, traffic

and weather. Other shifts are filled with songs aimed at improving listening, learning and interpersonal skills; stories; and special programming such as "Families Today." Each shift is personality-driven.

In late November, CSN won the participation of Walt Disney Co., which agreed to provide programming for the daily "Storytime" hour, while Sebastian, the singing

crab from Disney's "The Little Mermaid" will host CSN's Friday night request line.

Audience interaction also is a significant factor in the format's success strategy. In November, WWTC hosted Kidstock, a two-hour concert that drew 9,000. The program included live performances from musicians heard on the station, as well as clowns, jugglers and mimes.

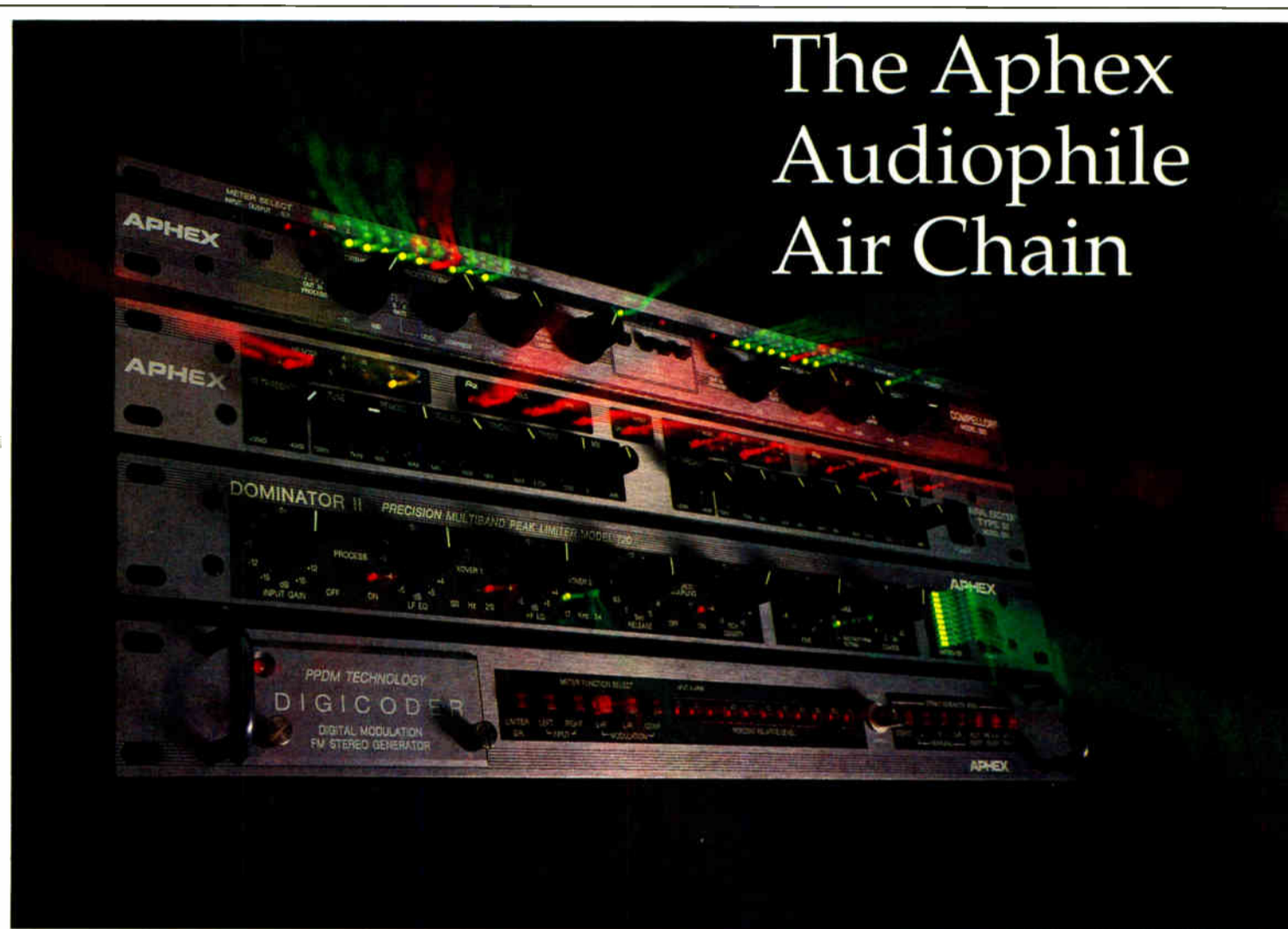
"Kids want to be involved," Barnett says. "And we talk to a child of 7 or 8 exactly like we would talk to any adult. Because the kids know we're not talking down to them, they look at us as a confidant, someone they can talk to."

That service aspect works in hand with the station's 24-hour programming, he says. "If you have a kid who's had a bad dream or has a fever or sore throat,

Radio AAHS is kind of like a surrogate parent. There are also a lot of kids from dysfunctional families who can't count on their father or mother, but they can always call Radio AAHS."

CSN now is counting on that kind of trust to translate into a successful commercial venture for the nation's airwaves.

"Nobody expects this to be the next country music or rock of the '90s," Kessner says. "But 17 percent of the population is not being served by radio, and we can reach them in a positive way."



Smart broadcasters know that quality sound is essential to attract and keep loyal listeners ... and advertisers.

That's why premier stations around the U.S.A., and around the world, rely on the Aphex Audiophile Air Chain.

This powerful combination of the Aphex *Compellor*[®] Model 320, *Aural Exciter*[®] Type III and *Dominator*[™] II Model 720 has been improved in several ways with new features and enhanced performance. And, after six years of development, the Chain is complete with the *new Digicoder*[™] digitally controlled stereo generator.

The Aphex Audiophile Air Chain allows maximum loudness and modulation while maintaining the natural dynamic feel of the program. Quick and easy to set up, it maintains the same high quality regardless of the type of programming or who is controlling the board. By contrast, other processors need to be tuned for almost every song, and achieve loudness by homogenizing or crunching to the point of pain.

If you want to be a winner in the "no win modulation wars", contact your dealer to arrange a demonstration of the Aphex Audiophile Air Chain. You can't buy better quality at any price.

ARGENTINA—AG Electronica; AUSTRALIA—East Coast Audio; AUSTRIA—AKG Acoustics; BELGIUM—Trans-European Music; CANADA—Erikson Pro Audio; CZECHOSLOVAKIA—Audiopolis Studio Systems; DENMARK—SC Sound; EGYPT—Alpha Audio; FINLAND—Nores; FRANCE—Cineco; GERMANY—AKG Acoustics; GREECE—Omikron.; HOLLAND—TM Audio; HONG KONG—Ace; HUNGARY—ATEC; INDIA—Pro Sound; INDONESIA—PT Multi Audio Perkasa; ISRAEL—Sontronics; ITALY—Audio Equipment; JAPAN—Otaritec; KOREA—Young Nak So Ri Sa; MEXICO—Audioacustica y Electronica; NEW ZEALAND—Maser Broadcast Systems; NORWAY—Audiotron; PERU—ABBA Trading; POLAND—Europe Sound System; RUSSIA—MS-MAX; SAUDI ARABIA—Halwani Audio; SINGAPORE—Auvi Private; SOUTH AFRICA—Tru-Fi Electronics; SPAIN—Lexon; SWEDEN—LEAB; SWITZERLAND—Audio Tech; TAIWAN—Advancetek; U.K.—Stirling Audio

APHEX
SYSTEMS

11068 Randall St.
Sun Valley, CA 91352
(818) 767-2929

Aphex is proudly American ...
100% owned, engineered and
manufactured in the U.S.A.

©Aphex Systems

Studio Wall Acoustics

► continued from page 17

top edge of the sleeper, apply a layer of caulking. Then, using screws and glue, secure two overlapping layers of plywood atop the sleepers. The edges of the plywood should not touch the wall boundary nor should the seams be parallel; they must overlap. Your carpet mat and carpet are then mounted on the plywood. Except at the edges, use glue, rather than carpet tacks to secure the carpet to the floor.

Furniture concerns will vary greatly depending upon budgetary and functional limits. Here are a few ideas that I often incorporate. The biggest "we wish we

had thought of that when we built it" area concerns access for maintenance and repair. New technology brings new problems during the testing and burn-in phase and cannot always be done later if you are going to be reliably on the air and offer a competitive product.

Build your furniture so that installation and removal of new or malfunctioning equipment can occur at all hours and at a minimum of distraction to the operator and operations. Provide rear or side access panels as appropriate to all equipment mounting enclosures and wiring accesses.



Stop Talking Dirty.



Clean up your act with a Harris DX Series transmitter. Our patented digital modulation delivers the strongest, cleanest AM signal yet. With over 145% positive peak capability. As well as the lowest THD and IMD ever.

What's more, you get 100% solid state reliability. Along with patented lightning protection that's proven itself at more than 200 sites worldwide. And with typical AC to RF efficiency of 86% or better, you'll get the lowest power cost of any AM transmitter.

If you're ready for some more sweet talk about the DX Series 10-50 kW* transmitters, call Harris Allied today.

USA 217-222-8200
FAX 217-224-1439
Canada 800-268-6817
FAX 416-764-0729

HARRIS ALLIED

* DX 100 to 1000 kW-plus transmitters also available. ©1992 Harris Corporation

"Call me, I'm interested." Circle (18)

"Send me literature." Circle (165)

If a rack must be mounted into a corner, provide some form of turntable that allows the rack to swivel and a latch that keeps the rack stationary both when in use and when rotated for service. Lazy susan turntables are perfect for this and can be found at larger hardware and cabinet supply shops.

With all pieces of equipment, allow for the mounting of wiring interconnects, AC power distribution, control devices such as relays and interfaces and pass-through holes large enough for AC power and control cables with their usually large connectors. Mount wiring interconnects to allow as much access as possible without bothering the operator.

Most major broadcast furniture manufacturers offer a wide selection of well-

designed enclosures to meet every need. Keep in mind the weight and dimensions of equipment and allow for wiring behind the equipment.

Allow 19 inches plus the thickness of the rail when designing front openings. For sit-down operators, the standard height from floor to work surface is 28 inches. For stand up operation, the standard height is 36 inches. Depending upon the pile of your floor coverings, you may have to add a 1-3 inch to account for settling of the furniture's weight into the carpet.

□ □ □

Edwin Bukont is the CE at WPGC-AM-FM Morningside, Md. (Washington). He can be reached there at 301-441-3505, ext. 8213; address: 6301 Ivy Lane, Suite 801, Greenbelt, MD 20770.

A Winning Workplace

► continued from page 13

who can perform several tasks. An enthusiastic DJ who wants to increase his or her salary and learn more about sales is an excellent choice for cross-training. This can be achieved by placing the DJ with a trained sales person to make sales calls one or two hours a week.

Another way to accomplish the objective is to switch senior managers' roles. Put the sales manager in charge of programming and the program director in charge of sales a couple of days each week with the understanding that the former incumbent will provide any necessary back-up support until the new incumbent completes the learning curve.

After a few months in the new role, the new incumbent will have a much different perspective about that position, its importance to the station, and the former incumbent. Alternatively, rotate the department heads through the general manager's position on a quarterly basis. The value added with this type of training is that it prepares several senior managers for broader management responsibilities. A side benefit is the development of camaraderie and understanding by those who have shared experiences.

Keep it fun. Most of the day is spent in the work space. If employees look forward to their work day, they will be more

productive and contribute to the upbeat atmosphere. The physical work environment should meet or exceed the Federal safety standards and be comfortable.

Make sure that each staff member has the right tools to do the work. This would include anything from office supplies to test equipment for the engineer to software for sales or accounting.

Management attitude and approach will set the tone of the creative working environment. Open doors and managers who wander around invite contributions and discussions from staff members. Closed-door managers who direct via memo will establish a restrictive environment.

Give staff members an avenue to contribute to the team effort by encouraging them to discuss new ideas. Some of the most innovative changes come from the front line staff. They are the first to encounter problems and see opportunities. By tapping that resource, you may resolve problems or find an idea that will improve your competitive position. In the meantime, your employee has become a team member contributing to the overall success of the station.

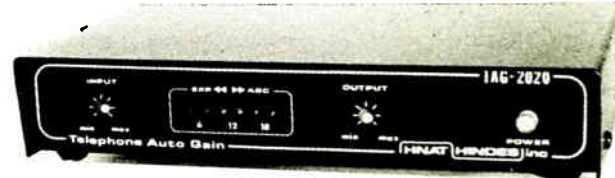
Next time we will discuss goals and objectives and motivating the employee.

□ □ □

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

TAG 2020

TELEPHONE AUTOMATIC GAIN



A PROCESSOR FOR ALL SEASONS

- ★ BASEBALL SEASON
- ★ BASKETBALL SEASON
- ★ FOOTBALL SEASON
- ★ HOCKEY SEASON

FEATURES: BROADBAND OR BANDPASS FILTERED MIC OR LINE INPUT (SELECTABLE)
OPTIONAL AUTO-ANSWER BOARD
DIFFERENTIAL LINE OUT

HNAT HINDES Inc

42 ELAINE ST. THOMPSON, CT 06277 TEL203-935-9066/9242/9919FAX

Circle (183) On Reader Service Card



SYSTEM 12



SYSTEM 16



SYSTEM 20



SYSTEM 24



SYSTEM 8

Broadcast Audio Series VI Dependable, Affordable, Practical

Broadcast Audio consoles sound great, are easy to use and employ proven reliable electronics for absolute dependability. What's more, they offer blue chip value at new economical list prices with an extended warranty.

Top quality construction is a hard and fast rule. Double-sided ground plane motherboards assure minimum noise and cross-talk as well as superior RFI immunity. Premium Penny & Giles faders are standard. VCA's are not used. Ribbon cables aren't used for audio signal paths. The no-nonsense design doesn't cut corners.

All mixer modules can be interchanged freely

because console logic is not programmed on the module and each module is switchable between mic and line levels. Mixers and output amplifiers can be removed or inserted with power on. Additional flexibility is provided by three stereo busses and a mono mix-minus bus which are standard in all units. In short, high-grade construction and audio performance are uncompromising.

Broadcast Audio consoles are installed in every one of the 50 states in the USA. During the past 13 years, over 1,400 consoles have been delivered and virtually every one remains in use today. A 5-year warranty is provided on all new units.

Call Fidelipac for the name of your authorized Broadcast Audio dealer.



Fidelipac Corporation P.O. Box 808 Moorestown, NJ 08057 U.S.A. TEL 609-235-3900 FAX 609-235-7779

Circle (198) On Reader Service Card
World Radio History

STATION SERVICES

News and Services for Business, Programming and Sales

Satellite Music Networks Launches Hot AC Format

DALLAS Chuck Boozer of WWNK-FM Cincinnati, (on-air name, Ryan Chase) is the morning drive DJ for ABC/SMN's new format, Hot AC. Chase's co-host, Robin Jones, is the program director for the satellite-delivered format. Jones was on-air personality at KGMC-FM Dallas.

Hot AC targets listeners 18-44 without playing hard rock or rap. Core artists

include Michael Bolton, Amy Grant, Phil Collins, Genesis, Mariah Carey, Bonnie Raitt and Rod Stewart.

Specials scheduled to air on the format include "The Music Magazine," airing noon to 3 p.m., Sundays. Music Magazine will take a look at health and lifestyle features, count down the top 20 artists of the week, and play new music by core artists.

For information contact Patricia Evans at SMN at 214-991-9200; or circle **Reader Service 41**.

Valentine's Day and Bay Area Rock Specials Available from Unistar

NEW YORK Unistar Radio Networks is distributing a three-hour classic rock special, "The Best of the Bay," set to air Feb. 19-21. The line-up of artists includes Journey, Jefferson Airplane, Santana, the Steve Miller Band, Creedence Clearwater Revival, the Grateful Dead and the Doo-bie Brothers.

Earle Bailey of WMMR(FM) Philadelphia hosts the special, which includes interviews with members of the bands as well as selections from their music.

"A Country Valentine," will be distributed Feb. 12-14 by Unistar. The three-hour special will spotlight artists such as Reba McEntire, Clint Black, Garth Brooks, Alabama, Vince Gill, Randy Travis, Ricky Van Shelton, Travis Tritt and Wynonna.

Both programs are available on a barter basis.

For information, contact Rene Cassis at Unistar at 212-373-4977; or circle **Reader Service 159**.

CBS Radio Network Adds New Programs

NEW YORK "The Dave Ross Show" joined the CBS Radio Network's program line-up this month. Ross, on air at KIRO(AM) Seattle, has been heard on CBS before as a guest anchor of "The Osgood Files." Ross can be heard Monday through Saturday at 12:25 p.m., ET.

CBS also added a new host and producer to two of the network's programs, "Healthtalk" and "Growing Up: Parenting in the '90s." Healthtalk is now produced by Lou Adler and hosted by Dr. Marvin Moser, a cardiologist who also is clinical professor of medicine at Yale University. "Growing Up: Parenting in the '90s" is now hosted by Julie Vaughn and produced by Lou Adler.

For information, contact Helene Bleiberg at CBS at 212-975-3774; or circle **Reader Service 87**.

CDs and Tapes Available Via Direct Mail to Radio Listeners

ST. PAUL, Minn. RADIO MusicSource debuted its direct marketing of CDs and tapes to radio station audiences this month. RADIO MusicSource is a subsidiary of St. Paul-based Rivertown Trading Co.

The company is offering a direct response, on-air music shopping service for radio listeners that provides a direct revenue stream to participating radio stations. Radio stations promote the service and its toll-free number, both on the air and in station promotional material, in return for a royalty on gross sales for each customer order.

For information, contact Kyle Jackson at RADIO MusicSource at 612-659-3739; or circle **Reader Service 75**.

R&B Radio Special Produced

GREENVILLE, S.C. Radio Production Services Inc. is making "Shake Rattle and Roll" available to oldies-formatted radio stations, on a barter basis. The three-hour, weekly program is hosted by Leighton Grantham and Ken Rogers, and features the music of and interviews with the greats of early rhythm and blues: Fats Domino, Little Richard, Bo Diddley, James Brown, The Clovers, The Drifters and The Coasters, among others.

For information contact Glen Rice, Jr. at RPS at 803-859-7930; or circle **Reader Service 27**.



Clearly Digital.

Moseley's DSP 6000 Digital Transmission System...
the clear solution to your STL problems is now a reality.

- ▼ Convey up to four 15 kHz audio channels with CD quality specifications over a single STL.
 - ▼ Interface to any composite STL, preserving the capital investment of your existing STLs.
 - ▼ 25 dB system gain improvement over analog STLs reduces new antenna & transmission line costs.
 - ▼ Low coding delay of 3.8 ms keeps the air talent happy.
 - ▼ Fade and co-channel intermod problems have no effect on SNR, so even quiet passages remain crystal clear and noise free.
 - ▼ A built-in V.35/RS-422 interface opens the door for utilizing the DSP 6000 with Fractional T1 digital Telco circuits.
 - ▼ AES/EBU digital I/O allows direct digital interface to other digital hardware.
- To learn more about the digital transmission advantage, call today for our free color brochure.*

Moseley

MOSELEY ASSOCIATES INC. • 111 CASTILIAN DRIVE • SANTA BARBARA, CA 93117 • (805) 968-9621 • FAX (805) 685-9638

Circle (29) On Reader Service Card

World Radio History

Industry Makes Predictions For 1993

Industry Will Change With LMAs, Non-Cash Deals, Digital Radio

► continued from page 8

reason: Broadcasters with losing stations that can't be sold or financed can stem the hemorrhaging while the surviving broadcasters can leverage their way to more avails and greater efficiency.

Not all LMAs will succeed. Many new two-station, same-service operators with diverse formats have problems positioning them, pitching them and selling them. Similar format combos have the additional benefit of preempting format competition.

The duopoly and LMA-led rearrangement of the players in the markets will shake them up in a way not seen since the advent of FM.

This will continue to create opportunities for a few engineers to craft innovative interconnection and control systems to complement new multiple-station, same-market ownership structures. But, in the longer term, I see the consolidation of stations and the invasion of digital automation accelerating, both driven by economic necessity, resulting in the shrinkage of jobs for technical personnel in general and first-rate chief engineers in particular.

NAB Official Says Radio Regulations, Legislation Depend on Direction Clinton Administration Takes

Barry Umansky,
NAB Deputy General Counsel

Broadcast regulation and legislation likely will be affected by 1993 philosophical shifts—some modest, others more significant—that are expected from the Clinton Administration and the new FCC.

For example, the Clinton Administration should be receptive to an industry that provides, free of charge, valued, local service to all citizens, regardless of their ability to pay. Even the more ardent technological hedonists won't lose sight of the public's interest in information and entertainment being available to everyone.

Looking first at upcoming legislative developments, we can expect prompt congressional efforts at restoring the Fairness Doctrine and passing campaign reform. Any successful legislative initiatives in these areas likely will be followed by court appeals examining the constitutionality of the new statutory law.

With a budget to balance and a deficit to make up, there will be the continued threat of spectrum fees, user fees and spectrum auctions. While auctions and spectrum fees might be appropriate for

newly-allocated spectrum (such as that to be used for the new cellular-like "personal communications services (PCS)" later this decade), broadcasters have public interest obligations which separate our industry from other spectrum users.

Ownership consolidation and the economy will be at the forefront of radio broadcasters' attention in 1993. The current lack of lending capital should ease as the economy rebounds—with each helping broadcasters in direct and indirect ways. A major fiscal stride NAB and allied groups hope to make next year is the opening up of Small Business Administration (SBA) loans for broadcasters. Also, the new FCC likely will look soon at various ways of expanding minority ownership in radio, including (as recommended by NAB) an expansion of the distressed sales policy and the minority tax certificate policy.

The essence of the FCC's new radio ownership rules will not be overturned on reconsideration or in any court appeal. Rather, broadcasters will employ this new regulatory regime in more and creative ways. We'll see more station swaps, novel time brokerage-type LMAs and greater reliance on LMA joint sales and combo rate arrangements.

On the technical front, the FCC's 1993



Barry Umansky
Deputy General Counsel, NAB

final action on an AM stereo standard, coupled with the proliferation of AMAX receivers and the interference-reduction benefits of AM band expansion, will help revive AM. The future of DAB—terrestrial- and satellite-delivered DAB—may become more clear.

While the FCC ultimately may give spectrum to, and perhaps authorize, a satellite DAB service, implementation of such a ser-

continued on page 24 ►

7.5kHz or 20kHz Digital Audio... CCS has a CODEC for every need.

In 1989 **CCS Audio Products** set new standards for 7.5kHz digital audio CODECs with the Micro56. Now CCS is proud to introduce CDQ-2000, the world's first commercially available CD quality stereo **MUSICAM™** CODEC. CDQ-2000 delivers high quality audio yet requires only 112Kbps of digital facility. This means stereo music can be transmitted using as little as half the digital bandwidth of other competing systems. Furthermore, only CDQ-2000 offers you multi-rate flexibility between 112Kbps to 384Kbps, permitting connectivity between satellite services and terrestrial digital telephone networks such as ISDN, switched 56, or fractional T1.

From 7.5kHz news feed to 20kHz symphonic concerts, if you need **Crystal Clear Digital Audio™** come to CCS for the best.



CCS, Europe GmbH
Obere Hauptstraße 52
d-8050 Freising
49 8161 12255 Fax: 49 8161 12260

Now serving you from
the heartland of Europe,
CCS announces the opening
of our European office in
Munich, Germany.



CCS, Inc.
33 West Main Street
Holmdel, NJ 07733, USA
(908) 946-3800 FAX: (908) 946-7167

Industry Makes Predictions For 1993

Veteran FCC Commissioner Predicts Breakthroughs For In-Band, On-Channel Digital Audio Broadcast

**James Quello,
FCC Commissioner**

The new year should bring continued technological breakthroughs that provide for in-band, and hopefully on-channel, digital audio broadcasting for both AM and FM radio. On the regulatory front, the Commission has an outstanding proceeding implementing the 1992 World Administrative Radio Conference that provides for digital audio broadcasting via satellite. This proceeding is likely to

be resolved in 1993.

Perhaps the Commission's greatest accomplishment under former FCC Chairman Al Sikes has been the effort to develop a spectrum reserve for new telecommunication technologies. Specifically, the Commission is pro-

gressing in establishing the regulatory and technical scheme for personal communications services (PCS).

Progress will continue in the PCS proceeding, as well as associated proceedings, providing for incumbents in the 1.8-2.2 GHz bands to migrate to higher bands. I have been pleased with industry efforts to address the important technical aspects of PCS and I am confident that industry leadership in the technical arena will continue in the new year.

Regarding another band, there has been significant interest in the 28 GHz band as evidenced by the volume of waiver requests to provide video, voice and data services. The Commission at our December meeting adopted a Notice of Proposed Rule Making seeking to redesignate the 28 GHz band from fixed point-to-point to a point-to-multipoint local multipoint distribution service. This service will be capable of providing a variety of services.

I believe that in 1993 the radio industry will

begin to take advantage of the relaxed ownership limits. Preliminary reports suggest that, as we expected when we made the change, stations may improve their profitability by engaging in duopolies or other arrangements. This is very important at a time when most stations are losing money.

With regard to the economy, I expect and hope that the new year will see improved economic performance by all advertiser-supported media. Given this, and some of the regulatory changes we have made, I think the prospects for the industry are good.

I have no comment on radio-related legislation. This is an area of Congressional discretion.



James Quello, FCC Commissioner

Legal Matters Will Depend On New President

► continued from page 23

vice likely will be halted by economics, or at least postponed until the advent of current broadcasters' terrestrial DAB service.

The technical ability of conventional AM and FM stations to offer digital sound within their allotted spectrum also will be closely examined in 1993, as it was in 1992. Digital audio over cable services also will grow, and conventional broadcasters should be particularly wary of the prospect of digital audio being offered as a "rider" on DBS and perhaps PCS, the latter over cable and phone companies' infrastructure.

Working with RAB and other allies in 1993, NAB hopes to achieve legislative and regulatory changes that will bring back to radio thousands of retailers, manufacturers and services plagued with government-imposed advertising disclosure requirements.

Why Your AM Station Should Install The

LBA TUNIPOLE™ ANTENNA SYSTEM



BETTER THAN SERIES FED IN EVERY WAY!

PERFORMANCE

- Super bandwidth and efficiency - even at low frequencies.
- Improved impedance match - reduces tuning unit loss and complexity.
- Identical radiation pattern to series fed.
- Power capacity to 1,000,000 watts.

ECONOMY

- Up to 3 AM frequencies on one tower - without multicouplers.
- Reduces tower height and ground system requirements.
- Mount FM, TV, or communications antennas - without isocouplers or stubs.
- No base insulators or lightning transformers.
- Fast installation - one day typical.

LIGHTNING PROTECTION

- Direct tower ground - diverts lightning strokes to protect transmitters, tuning units, and other antennas.
- Lightning dissipators available for even greater protection.

RELIABILITY

- Hundreds of LBA systems in use since 1963 - the world leader in folded unipole technology.
- Heavy duty components give stable, long life operation from the tropics to the arctic.
- Unequaled support with 30 years of worldwide RF experience.
- One year warranty on parts and workmanship.

OPTIONS AVAILABLE

- Enhance operation with Powertop™ top loading systems and Basemax™ base efficiency systems. Full line of tuning units and RF components available.

For More Information About the World's Best AM Antenna System, Contact us at:

919-757-0279

919-752-9155 FAX

or our representatives worldwide



LBA TECHNOLOGY, INC.

Broadcast & Communications Antenna Products
P.O. Box 8026 Greenville, NC 27835 USA

Additional LBA Group services include Engineering Consulting Services in all aspects of Radio, TV, Microwave, Cable TV, Cellular Telephone, System Design and Equipment Procurement

An LBA Group Company

© 1993

We're Your Link to Digital STL.

Call us for complete information on **Dolby, Moseley and TFT.**

RF Specialties® Group

| | | |
|--|---|---|
| <p>Northwest (206) 546-6546</p> <p>West Coast (805) 682-9429</p> | <p>Southwest (806) 372-4518 (214) 771-4235</p> <p>Northeast (412) 733-1994 (215) 322-2410</p> | <p>Southeast (904) 678-8943</p> <p>Midwest (816) 635-5959</p> |
|--|---|---|

EACH OFFICE INDEPENDENTLY OWNED AND OPERATED.

U.S. MAIL

Radio's Only Comprehensive Reference Guide

The 1993 Radio World Directory

Coming in February...

Watch for It!

Did You Know that DigiCart™ is the best-selling *hard disk* recorder in the world today? Consider the advantages: Up to 8 hours in a single player, *plus* 20 minutes on each removable disk¹. The best audio quality in the business. Seamless back-to-back spots *without* the expense of multiple decks. It's easy to use, and it's *fast*. And DigiCart includes the *advanced DSP features* that set it apart from ordinary cart machines?² Best of all, DigiCart *costs less* than any floppy disk recorder. Which also helps explain why it's the best-selling digital *cart machine*.



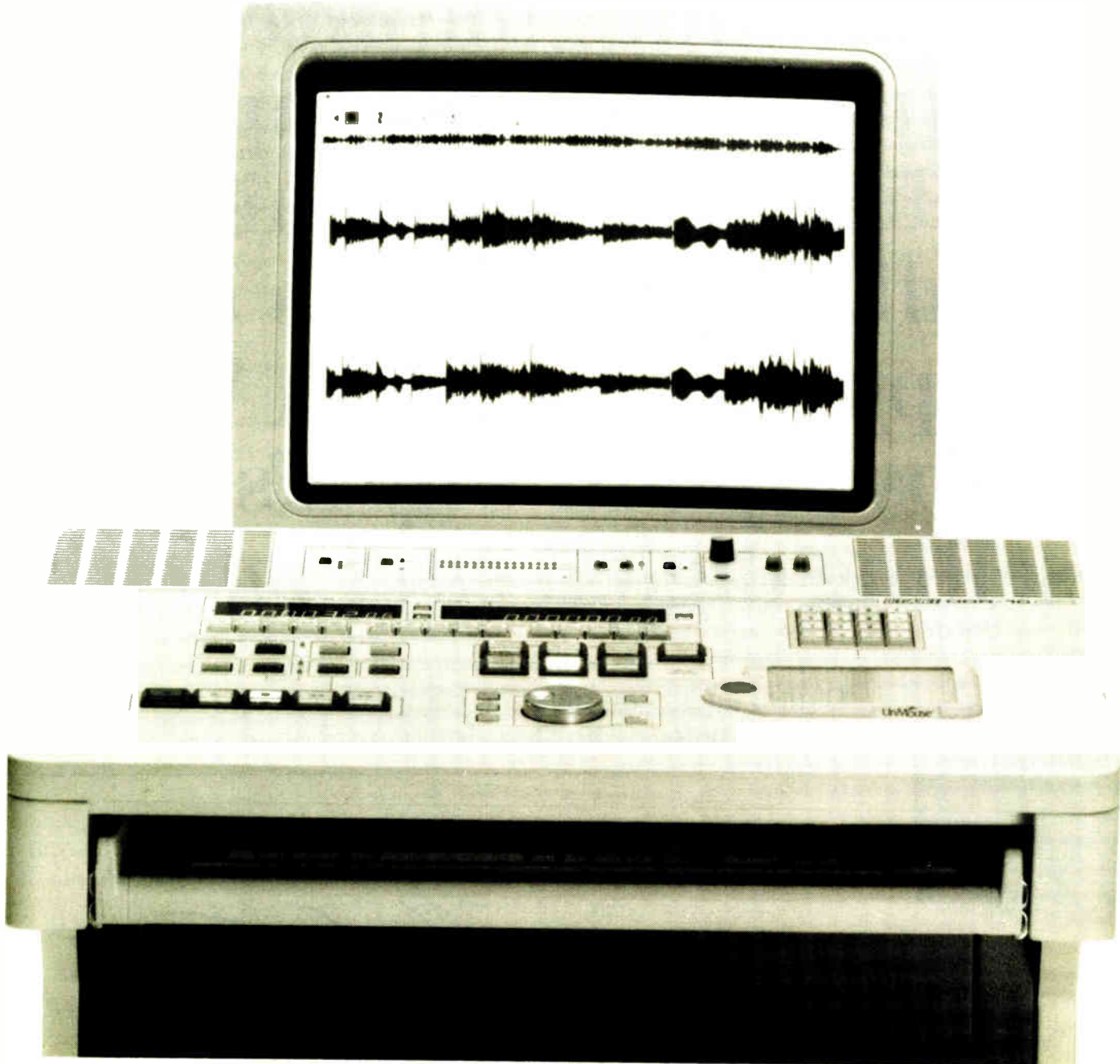
Digital audio can give the competitive edge to your on-air sound. Call today for a DigiCart demonstration at your facility.

18740 Oxnard Street, Tarzana, California 91356
Phone (818) 342-3127 • Fax (818) 342-4372

360 Systems
Broadcast Products Group

1. Stereo at 20 kHz bandwidth.
2. Precision editing, fades, programmed audio levels, data compression.

©1992 360 Systems. DigiCart is a trademark of 360 Systems. MADE IN U.S.A.



**RADIO'S TOP TEN! OTARI GIVES
YOU BETTER CHOICES.**

Otari's new audio recorders for radio give you features to fit any application or budget. This means you're not forced to make compromises when choosing a recorder, so your station sounds better to listeners, and is more efficient. And, of course, Otari's legendary reliability means less down-time.

On the forefront, there's a line of digital disk recorders including the new 2-track DDR-10, and the ProDisk 464 with up to 64 tracks for multitrack production.

Then, Otari's famous "work-horse" 5050 BII machine, the choice of radio professionals the world over, has become the BIII – just as tough, and twice as easy to use. And it has all the things you asked for, like a Q speaker, independent left/right reel size select, dynamic breaking, and much more!

A new line of 2, 4 and 8-track machines, the 5050 MKIV Series, delivers state-of-the-art performance, plus features that will make your life easier, like a built-in autolocator with 3 one-touch, cue-point memories and return-to-zero.

Don't forget the MX-50II; a professional 2-track with a price that will astound you, and the MX-55 with all the features you'll ever need today, or tomorrow. (The "50II" and the "55" both offer a Voice Editing Module for normal pitch at twice play speed.)

Then there's our multi-tracks, from 32 tracks on down, at almost every price level – 8 machines, 12 different versions! And, of course, the CTM-10, a high performance cart machine we built for perfectionists, and an automated radio station reproducer.

Before you purchase *any* audio machine, look into Otari's line-up for the broadcaster. We think you'll find exactly what you need, at a price that fits your budget. Call Otari at (415) 341-5900 for more information.



OTARI

Arbitron Touts Passive People Meter

by Frank Beacham

NEW YORK The Arbitron Co. has announced what it calls "the first fully passive people meter system" designed to automatically measure both radio and television audiences.

To make the system work, however, all broadcasters will have to agree to transmit a special code within their audio signal.

The Arbitron system would detect a unique call letter ID code that broadcasters embed in their program audio. The company claims the code can't be heard by the listener, yet it can be detected by a small beeper-size receiver/storage device worn by

the survey participant. Measurement of personal Walkman-type radios could be accomplished by patching the headphone through the measurement device.

Arbitron survey families could send the collected listening information directly to the company's computers by plugging the people meter into a modem. Alternatively, the meter could be mailed to Arbitron where the information would be extracted.

Arbitron contends the new system offers some key advantages over current ratings systems. They include both in-home and out of home measurement, elimination of record keeping by the sur-

vey participant and the ability to collect larger sample sizes.

A broadcaster-embedded code

To be successful, the proposed Arbitron system would require all broadcasters to agree to transmit the station ID code. No cost has been set for the coding equipment.

"We're offering broadcasters more complete coverage of the in- and out-of-home audience, larger sample sizes and more reliable estimates," Arbitron Executive Ken Wollenberg said. "The industry can have all these advantages in exchange for their willingness to embed an inaudible code in the audio portion of their programs."

Arbitron has signed agreements with two companies as key contractors to engineer the encoders and receivers: Martin Marietta Aero & Naval Systems, Bethesda, Md.; and Intellisys Automation, Rancho Cucamonga, Calif. Both companies seek to apply technology and expertise used in defense systems to commercial applications.

The Arbitron project plan calls for two U.S. media markets to be measured by the new system by the end of 1994.

The Arbitron proposal, however, has drawn a sharp negative response from the A.C. Nielsen Company, a company that specializes in television ratings research.

"It is bizarre to try to call that device passive," Nielsen spokesman Jack Loftus said. "It's going to be a bear to get people to walk around with a calculator-like device attached to them all day and night long."

Nielsen experimented with similar technology in the early 1980s and rejected it, Loftus said. That experiment required survey participants to wear a special ring on the finger that could detect programs being watched on television. "We found that in less than a week not only were most people not wearing the ring but many had lost the thing," he said.

Attention spans may wane

The Nielsen company, which does not conduct radio ratings research, currently uses an active people meter in its TV research that requires the survey participant to press a signal button at the beginning of a viewing session.

Once the viewer is identified, the device automatically determines the program being watched. "That's not a very complicated job, but it's still difficult to get everybody to cooperate," Loftus said. "What Arbitron is proposing is not passive at all. Since you have to carry or wear the device at all times, it's very active."

The Arbitron proposal also gets low marks from Nicholas Schiavone, NBC's vice president for media and marketing research and chairman of an NAB committee on ratings research. "It's high-tech wishful thinking," Schiavone said.

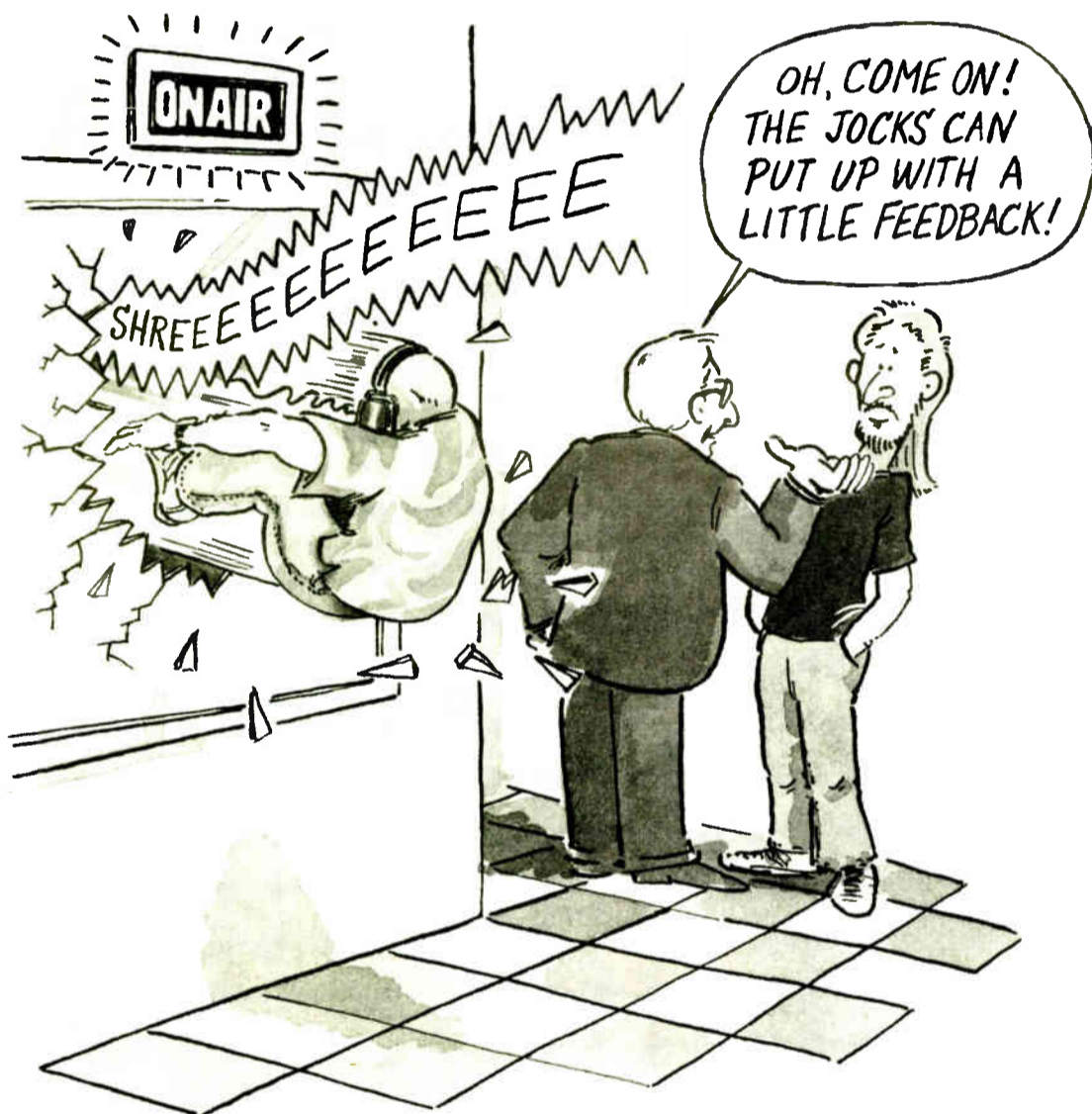
"You may not even need a meter for radio," the NBC executive said. "We already know the average person listens to between two and three stations during the typical week. To attempt to install a high-tech device to get at these two or three stations is a waste of time and money."

The current Arbitron diary system, given the alternatives, is adequate, Schiavone said. "Do you think people are going to shackle themselves with this device when they go to the beach or when they take a shower? People should not organize their lives around the measurement activity, nor should they be expected to."

Schiavone also raised the question of whether the system might degrade audio quality of the radio broadcast. "There are those with a golden ear who may claim the encoded signal may actually degrade the sound of the broadcast," he said. As for survey participants routing their Walkman headphones through the device, Schiavone responded: "Good luck!"

The ratings companies should focus their attention on understanding human behavior rather than on "gee whiz gadgetry," Schiavone said. "They would be better served by using simple tools well rather than complex tools poorly. They need to focus on what's possible and useful."

"If broadcasters see a system that will help them manage their businesses well, they will embrace it," Schiavone added. "But I don't think the (new) Arbitron system is that system."



Call-ins don't have to be a shattering experience. After all, your requirements are simple. You want great sounding phones with the ability to monitor callers through open speakers. Sounds easy enough...until you crank up the speakers and get feedback.

Telos comes to the rescue. We are the only manufacturer whose hybrids include digital feedback suppression circuitry. And ours are the only hybrids to offer digital dynamics control for perfect levels, call after call.

Choose from the best selling **Telos ONE**, the dual hybrid **Telos ONE plus ONE**, or our top-of-the-line **Telos 100 Delta**, the only broadcast product with dynamic, digital equalization. Each is a complete digital signal processing package which produces the most natural sounding, full-duplex audio without feedback.

Isn't it time you experienced the pleasure of great phones?



2101 Superior Avenue
Cleveland, Ohio 44114
216.241.7225 · FAX: 216.241.4103

BROADCAST ELECTRONICS



New Disc Trak™ Digital Cart Machine.

Using inexpensive 3-1/2" floppy disks as the removable media, Broadcast Electronics' Disc Trak Digital Cart Machine incorporates 16-bit linear digital technology to deliver superior audio quality matching that of CD, DAT and other digital sources.

- Up to 112 seconds of stereo audio at full band width can be stored on a single disk.
- Cueing is instantaneous, and up to five start/finish cues can be entered and executed in sequence with 0.01 second accuracy.
- LCD display provides spot name and timing information.
- 3-1/2" floppy disk features hard case and sliding gate for excellent protection of recorded material.
- Available in both record/playback and playback only configurations.
- Rugged design and construction for years of dependable service.
- Disks can be labeled on the sides and/or the end for quick, easy identification in the machine or in storage.
- Space required for storage represents only one tenth that of magnetic tape cartridges.
- CD audio quality on 50¢ media.

Immediate Delivery.

*Broadcast Electronics...your single source for
world class radio broadcast technology.*



4100 N. 24TH ST., P.O. BOX 3606, QUINCY, IL 62305-3606 U.S.A., PHONE (217) 224-9600, TELEX 250142, FAX (217) 224-9607

Circle (118) On Reader Service Card

COLE'S LAW

The FCC Creates Another Fine Mess

Broadcasters Are Paying the Price for Misconduct; More than Ever, It's Important to Toe the Line

by Harry Cole

WASHINGTON Perhaps in an effort to do its part to reduce the federal deficit, the Commission has recently been issuing fines like it was going out of style. The fact that the FCC is becoming a lean, mean, fining machine is in and of itself worthy of your attention.

Even more interesting, though, is (a) the nature of the "misconduct" which has triggered the fines and (b) the amounts of the fines being doled out.

After the fact

Take, for example, the station whose announcer called a woman during his program. After determining that he was talking to the right person, the announcer notified her that she was on the air and asked, "Is that OK?", to which she responded "yes."

Result? A \$5,000 fine. Ouch. The Commission's rules clearly prohibit the broadcast of any telephone conversation by a station out to a private party until after the private party has consented. Because the woman's consent was not given until the conversation was already on the air, it is clear that a violation occurred.

A \$5,000 fine for a piddly little thing like a two- or three-sentence broadcast may seem a bit out of line. And it probably is. But it is also a signal that the Commission may be inclined to enforce its rules governing the broadcast of telephone conversations more diligently than it has in the past.

As a programming note, this could be bad news for morning personalities who use "call-out" routines. Sure, it's often great radio to call someone and catch them unawares. The trouble is that more often than not, such call-outs fly in the face of the FCC's rules. So before you allow your air staff to use call-out routines, you should be aware that it could cost \$5,000 for each call—and possibly more, if the subject of the call were to sue the station.

Is it live?

Next up are the folks at the AM station in a small town in western New York. They aired a teaser announcement five minutes before their regular newscasts. The teaser (which previewed upcoming stories) began, "Here are the stories we are working on for the top of the hour."

It turns out that all news reports broadcast by the station after noon on any given day are taped, so to the extent that the teaser may suggest that all newscasts are live, it is arguably misleading. Somebody complained to the FCC about the supposedly misleading nature of the teaser and the Commission hit the station with a fine.

It seems that there is a rule that prohibits "making an affirmative attempt to make taped newscasts appear as if they were being presented live." It also seems that the Commission interpreted the teaser as a violation of that rule, even though the teaser itself says nothing about whether the actual newscast is live or taped.

The fine? Another \$5,000 (although it should be noted that at least part of that fine—the FCC didn't say how much—was attributable to the fact that the station admitted operating at times without licensed operators, a separate offense).

Am I missing something here? A fine

Unfortunately, the fines being handed out are not small change, and it is in every licensee's economic interest to avoid getting hit with a fine.

for a rinky-dink ambiguous little teaser announcement promoting regular non-entertainment programming (the type of programming the Commission theoretically is trying to encourage, but not mandate, licensees to provide)? That doesn't seem to make sense.

If your station runs news regularly, you would probably be wise to double-check any promos, teasers, etc. you use (and also any sound effects, like tickertape machines running in the background) to be sure that you don't run afoul of some similarly bizarre interpretation of this weird rule.

Tell it like it is

Next, consider the station that ran a contest whose rules promised a "\$2,000 big screen television set" as a prize. The winner complained that the TV actually awarded was worth "less than \$1,100." The station investigated and determined that the TV that was awarded was indeed of lower value than the set that had been promised.

The station then awarded the winner/complainant additional merchandise

to bring the total prize package value up to \$2,000. The complainant advised the FCC that the action was satisfactory to him.

So everybody's happy, right? Not. The FCC fines the station \$6,250 for failing to conduct the contest substantially as advertised. The problem, apparently, was the fact that at least some of the contest's promotional materials referred to a specific dollar value for the TV set.

Even though the set that was awarded was apparently no small potatoes, it wasn't worth \$2,000, and that made the difference. While this reaffirms our observations in a recent column in these pages about the pitfalls of contests, you still have to wonder why a licensee seemingly operating above-board and in good faith should get dinged more than six grand for something like this.

And then there is the Wisconsin station that aired spots for a local casino operated by a Native American tribe. The station knew that, in a letter to the Wisconsin Broadcasters Association, the Commission had approved references to "Vegas-style excitement" in ads for certain types of gaming establishments.

In its casino spots, the station referred to "Vegas-style games." Oops. As far as the FCC was concerned, there is a difference between "excitement" and "games." A difference that cost \$6,250, which is what the Commission fined the licensee for promoting a lottery.

Moving right along, let's talk about local public inspection files. Every sta-

tion is supposed to have one. Most stations probably make a serious effort to comply with the public file rules and make their files available to the public as required.

Not-so-public files

However, it seems to be the common experience of the majority of licensees that these public inspection files are almost never actually inspected by members of the public. That makes little difference to the Commission, though: It issued two fines—one for \$7,500, the other for \$3,000—for public file violations.

In each case it appears that the licensee conceded that its public file was missing some documents or was not immediately available during regular business hours. And in the \$7,500 case, the licensee had been admonished about the alleged unavailability of its file 12-18 months earlier.

The notion of a multi-thousand dollar fine for failure to comply completely with the public file rule may seem a tad excessive. Nevertheless, this should motivate all broadcasters to inspect their own public files right away to be sure that everything is as it should be.

The moral of these little tales from the bureaucracy is that the Commission seems to be in a fining mood nowadays, and it is fining for "misconduct" which may or may not warrant that label. Unfortunately, the fines being handed out are not small change, and it is in every licensee's economic interest to avoid getting hit with a fine.

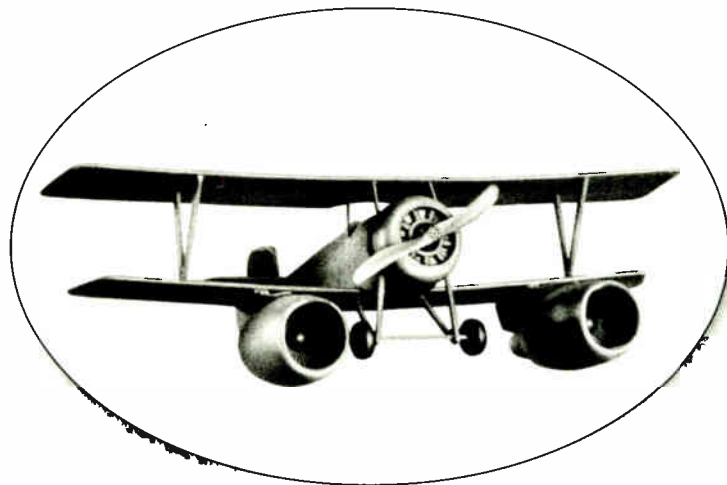
The only trouble is that it's hard, if not impossible, to figure out what rule (obscure or otherwise) the Commission may decide to enforce next. Good luck.

If you have any questions about these particular cases, or about compliance with any FCC rules, you should be sure to 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.

This is no way to design a digital STL.



The Ultimate Promotion: WLAD Promises the Moon

Dear Alex:

Happy New Year. You're reading this shortly after a wonderfully successful "First Night" in Danbury; this is an annual arts and music celebration held every New Year's Eve. I was a musical performer at one site (don't worry, I left the fiddle home), while 98Q FM celebrated New Year's twice the same evening.

How? With a phone link to a station in Nova Scotia. We helped them count down to their New Year (11 p.m. EST), then our own at midnight. It won't be long before other stations begin doing this.

Last month got pretty hairy here, with that Northeaster that blew through, not

were responsible for a naturally-occurring celestial event—forgetting the fact it would have happened whether or not WHEN was there. The execution of the idea was nonetheless priceless.

I simply couldn't wait to duplicate that promotion at my next station.

Well, it took a very long time. Either the "stars weren't right" for an eclipse to occur or the higher-ups thought the idea was lame.

Frankly, there were times the station wasn't right for the promotion as well. Most "Music of Your Life" stations and many deliberately puffy, humorless soft ACs would be well-advised to let this one slide.

But WLAD was perfect to pull it off.

FROM THE TRENCHES

by Alan Peterson



burst and sweep with reverb.)"

On-air, we all put on our best poker faces while reading the live promo cards promising "plenty of free parking and seating for the event," bragging how only our station had the bucks and the clout to pull off a show like this. Any station could hang a banner at the mall, but only WLAD could make a full moon disappear from the sky.

My role in the eclipse? I was going to be running the lights (chortle, chortle). I explained to listeners how I'd be running a carbon-arc spotlight with a Gibson-LaBaye No. 15-C polarizing filter pointed at the moon.

OK...with that line of fluff, everybody listening was in on the joke. All except for one Junior High A/V Club kid who phoned to rag on me for not knowing Gibson-LaBaye filters only went up to No. 10. Guess he showed that dumb DJ, huh? (At least until I told him Gibson and LaBaye are really guitar manufacturing companies and I made the whole thing up. Haven't heard from him since.)

Naturally, the day of the event we were beating it to death, to wit: "Don't miss tonight's WLAD Lunar Eclipse—the show so expensive, we may not be able to do it again for several years." Or even, "WLAD—the only station that can moon 100 million people and get away with it." The final touches were added when our staff meteorologist and our weekend call-in astrologer were given credit as executive co-producers.

Finally, when it began, we provided live

updates during PM drive. What a hoot.

Next day, our city paper ran photos of the eclipse on the front page, with no mention of our involvement. No matter. We still took full credit for it, right down to our on-air joy of "our eclipse having hit the front page." Best of all,

continued on page 40 ▶

Many programmers and some consultants may disagree with me, but radio ain't radio without occasional elements of preposterousness and unprepared lunacy (pardon the pun) now and again.

to mention that total lunar eclipse which crossed the Eastern U.S. Did you get to see it?

I hope you liked it...WLAD sponsored it.

Oh, yeah, my happy little full service, adult contemporary station took complete credit on the air for bringing the lunar eclipse to the world. In the grandest tradition of radio contests and promotions, this idea was shamelessly ripped off from another station.

Long before I worked for WHEN Syracuse, that station "sponsored" a 1979 solar eclipse. I thought it was brilliant. Imagine a very promotions-conscious station telling listeners they

These are the same guys who gave away free smoke detectors after a disastrous transmitter fire. The same guys who "canned" the entire airstaff and went All-Beatles radio for April Fool's Day. Who else could wave a hand and make an eclipse?

Many programmers and some consultants may disagree with me, but radio ain't radio without occasional elements of preposterousness, moments of unpredictable lunacy (pardon the pun) now and again. Well, so it was when WLAD hit the air with a fully-produced promo promising, "The best show of 1992...WLAD brings you a total eclipse of the moooooon! (laser

However, this is.

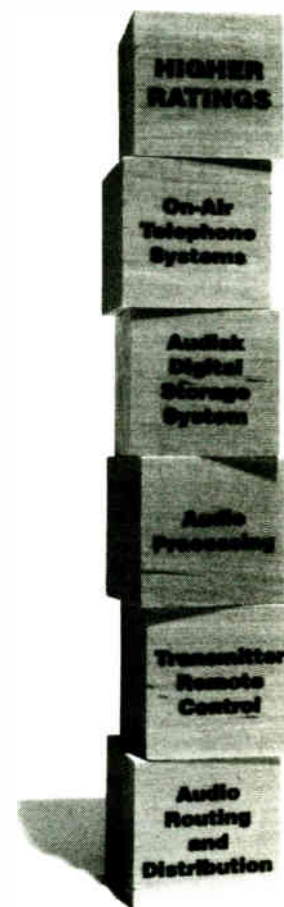
Introducing the new Dolby DSTL™. It's the world's only digital STL designed from the ground up to combine high quality audio coding with sophisticated digital modulation and ultra linear RF sections. This results in extremely high audio quality, significant advances in spectrum efficiency, and unparalleled freedom from interference and fade that only a systems approach can accomplish. Add-on schemes yield compromises that just won't fly in the end.

For further information, contact your Dolby DSTL distributor, or Dolby directly.



Dolby Laboratories Inc. • 100 Potrero Avenue, San Francisco, CA 94103-4813 • Telephone 415-558-0200 • Facsimile 415-863-1373 • Telex 34409
346 Clapham Road, London SW9 9AP • Telephone 071-720-1111 • Facsimile 071-720-4118 • Telex 919109
Dolby, DSTL, and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation ©1992 Dolby Laboratories Inc. S92/9516

Building Higher Ratings from the Ground Up.



Call us today for a free catalog, detailing our complete line of broadcast equipment.



(801)975-7200 FAX (801)977-0087

Understanding Inductive Reactance

This is the fourth in a 10-part series called Fundamentals of AC. Northern Virginia Community College will offer 1.2 CEUs (Continuing Education Units) to registered students who successfully complete an examination mailed at its conclusion.

To register, contact the Community Education Office, Annandale Campus, 8333 Little River Turnpike, Annandale, Va. 22003, or call 703-323-3168 or 323-3528. The fee for the course is \$30.

by Ed Montgomery

Part IV of X

ANNANDALE, Va. It is important to remember the properties of inductance, and that a magnetic field is produced when electrons flow through a conductor. Lenz's Law states that an electro-magnetic field is capable of producing another potential known as an induced voltage. This induced voltage will generate a current that will be opposite to the current flow from the current flow that created the initial magnetic field.

This induced voltage can be found in an adjacent conductor that travels through the magnetic field, or it can be found within the coil producing the magnetic field. It is a product of self-inductance. Remember the induced voltage and electron flow only occurs when current in the conductor varies.

Figure 1.

$$X_L = 2\pi fL; \text{ where}$$

$$\pi = 3.14...(\text{a constant})$$

$$f = \text{The frequency of the current measured in cycles-per-second (Hertz)}$$

At 60 Hz a 6 henry coil will have an inductive reactance of:

$$X_L = (2)(3.14)(60)(6) = 2260.8 \text{ ohms}$$

At 5,000 Hz a 6 henry coil will have an inductive reactance of:

$$X_L = (2)(3.14)(5000)(6) = 188,400 \text{ ohms}$$

Lenz's Law states that the energy stored in a magnetic field will oppose current changes in the coil it surrounds. This attempt to resist change is identified as inductive reactance. It is measured in ohms, but its property is determined by the amount of inductance a coil contains and the frequency of the alternating or pulsating current passing through it.

Inductive reactance

Inductive reactance is given the symbol X_L . As frequency, or the rate of change of the current increases, so does the value of X_L . The formula for inductive reactance is found in Fig. 1.

A cycle is considered to be a sine wave. Note how the value of X_L changes when the frequency of the current is increased.

Although inductive reactance is measured in ohms, its characteristics of resistance are

quite different from DC circuits. Voltage and current characteristics are also different in circuits containing inductive reactance. Fig. 2 illustrates a sine wave.

If this is an example of current flow, observe where the greatest rate of change of current occurs. Maximum change of magnitude on the sine wave takes place at points "A," "C," and "E." Points "B" and "D" are at maximum strength of the wave but very little rate of change takes place at these positions.

Maximum induced voltage occurs where maximum current change takes place. The dashed line in Fig. 2 illustrates the relationship of current and voltage in an inductor. Note that the voltage occurs at a different time or phase than the current does. If the solid line sine wave illustrates voltage, the maximum induced voltage will be at locations "A," "C," and "E." Minimum induced voltage will be at points "B" and "D."

Within a coil, voltage and current do

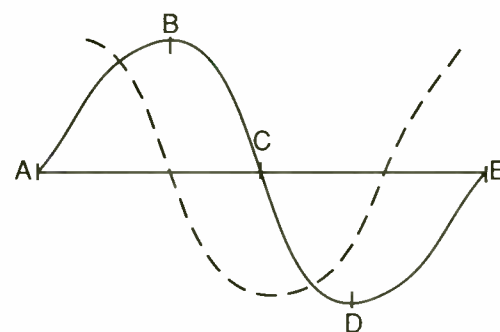
not occur within the same time frame. The induced voltage is dependent upon current change for its development. Within a coil, voltage and current are 90 degrees out-of-phase.

Because of this phase shift, one cannot use Ohm's Law to calculate total voltage, current, resistance and power. Most circuits containing inductors also will have resistors. These circuits will be analyzed in a future lesson.

Circuits that contain pure inductive reactance can be solved by using the same laws that govern series, parallel, and series-parallel circuits (illustrated in Fig. 3). Remember coils can be wired to aid each other or oppose each other.

Inductive reactance must be considered when using coils to carry information. For instance, an audio transformer should have an inductive reactance that

Figure 2.



does not change drastically through the frequency spectrum it must pass. The design of the transformer, the number of windings, thickness of wire—all these will factor into the reactance characteristics of the device.

Test your knowledge:

Question: A 6 millihenry coil has a 5 kHz signal applied to it. How much inductive reactance is produced?

Answer: _____ Ohms.

[] [] [] []

Ed Montgomery is a communications teacher at Thomas Jefferson High School for Science and Technology. He has taught broadcast engineering at Northern Virginia Community College and worked as a broadcast engineer for several radio stations. He can be reached at 703-750-5090.

Figure 3.

Inductors in series

$$X_{LT} = X_{L1} + X_{L2} + X_{L3} \dots X_{LN}$$

Inductors in parallel

$$\frac{1}{X_{LT}} = \frac{1}{X_{L1}} + \frac{1}{X_{L2}} + \frac{1}{X_{L3}} + \dots \frac{1}{X_{LN}}$$

1992 Radio Upswing

NEW YORK January-November 1992 advertising revenue for the radio industry paced two percent ahead of the figure for the same period in 1991. Combined national spot and local radio were up three percent for November 1992 over November 1991.

The five percent January-to-November gain in local revenue more than balanced national revenue's decrease of seven percent—combining to surpass radio's performance for the same revenue period in 1991.

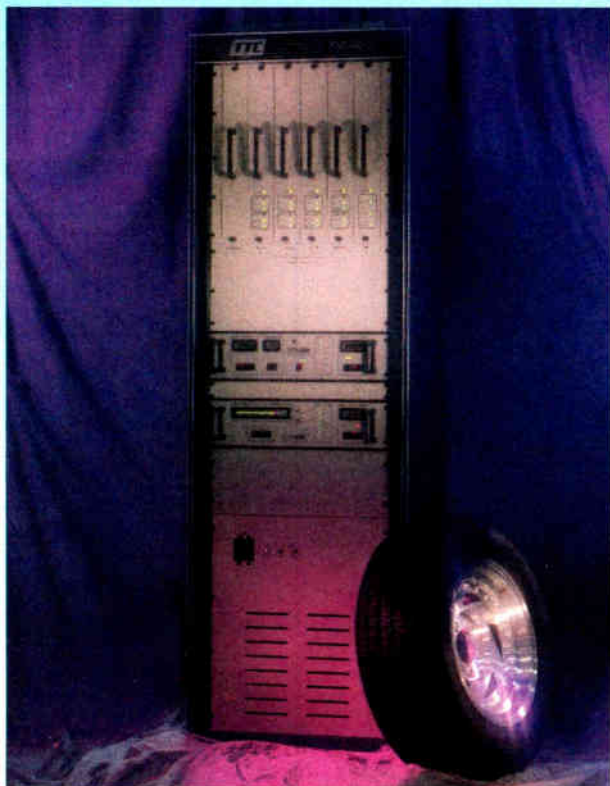
Local revenue continued its growth trend; every region of the country, with the exception of the West, posted a gain for the month to boost local revenue levels by four percent. The

East surpassed its October 1992 increase of three percent, improving six percent in November 1992 over November 1991.

After two months of positive growth, national revenue decreased four percent for November 1992 versus November 1991. The Midwest, however, posted a two percent gain in national revenue for the month.

These figures are based on the Radio Advertising Bureau (RAB) Radio Revenue Index of more than 100 markets. The accounting firms of Miller Kaplan Arase & Co. and Hungerford Aldrin Nichols & Carter provide the local and national spot revenue data on the markets RAB uses to calculate the index.

Tubeless.



If you thought Solid-State FM was something new... think again.

Why settle for old tube-type performance when field proven solid-state FM is here today? Since 1989, TTC has shipped over 80 solid-state FM transmitters to customers all over the world. Cost Savings? About \$3,000 per year over competitive designs. Lightning Protection? It's built in. Performance? Some specs are eight times better than our competitors.

Power Range? 100 watts to 16,000 watts. For more information on TTC's full line of Radio Products, please call or write Russ Erickson at TTC.



650 S. Taylor Ave. Louisville, CO 80027 (303)665-8000 FAX (303) 673-9900

Rackmountable Technics CD Players

SLPG100PKG



Cues to music / Peak program search

Only \$149.95

SLPG300PKG



Cues to music / Peak program search

Headphone jack / Keypad select

Wireless remote

Only \$169.95

Need We Say More?

*Order yours today! By calling 800-426-8434 or
FAX 800-231-7055*

Circle (33) On Reader Service Card

BSW
BROADCAST SUPPLY WEST
America's Full-Time Broadcast Supplier

**Due to tremendous response on these packages we advise you to order early to ensure availability.*

World Radio History

YOU DON'T KNOW WHAT YOU'RE MISSING



If you don't have an Eventide® VR240 Digital Broadcast Logger, you're missing the easiest, most efficient way to keep track of everything that goes out on your air, and more. There's no bulky, high maintenance, hard-to-use hardware, because Eventide has compressed a complete 8-to-24 channel digital broadcast logging system into one easy-to-use three-rack-space device. There's no need for a tape warehouse, either—the VR240 records up to ten days worth of audio on a single ultra-compact DAT cassette. With the dual-drive option, total unattended logging time stretches up to three weeks. And yes, you can search and play a tape on one deck while simultaneously recording audio on the other.

Without an easy, practical, multi-channel logging system, you're missing what's going on with your crosstown competitors, what your talent (and call-ins) *really* said on the air, when that commercial *actually* ran, who called your contest lines, what the police and fire

dispatchers said. The VR240 even records modem, fax, and transmitter remote control telemetry transmissions. The advantages of logging have always been clear. Now the Eventide Digital Broadcast Logger gets rid of the disadvantages.

There's no broadcast logging system as advanced as the VR240. And with hundreds of Eventide-built digital loggers already in service worldwide, there's no other digital logger with our track record of reliable service. So don't miss out—call Eventide or your broadcast distributor for full information on the logger that makes full-time logging practical: The Eventide VR240 Digital Broadcast Logger.

Eventide

One Alsan Way • Little Ferry, New Jersey 07643 USA
Tel: 201-641-1200 • Fax: 201-641-1640

LOWPOWER LOWDOWN

Low Power Translators, Then and Now

by Howard Enstrom

MOUNT DORA, Fla. On a wall behind my computer monitor hang these framed words: Small minds discuss people. Medium minds discuss events. Large minds discuss ideas.

To borrow from Andy Rooney, I like that: a reminder of what's important, because the passing of time changes some things.

Early technical woes

TV translators appeared first, during the 1950s. Television emerged from World War II radar technology, but stations were scattered, operated with lower power, visual was black and white only, and radiation was horizontally polarized. TV sets had poor sensitivity by today's standards, and so did the vacuum tube translators. UHF channels were especially bad, which is why some sites had pretty elaborate receive antennas.

A typical system received a VHF TV station and re-transmitted on a UHF channel. A mountaintop site may have used a row of telephone poles, each supporting one or more vertically-stacked, horizontally polarized Yagi antennas to form a very large phased array. Chicken wire was stretched across the back of the poles to shield against unwanted signals.

Several preamplifiers in tandem may have been located at the junction of phasing lines in order to present the highest possible signal-to-noise ratio voltage to a single conversion translator. Some systems were, and still are, solar-powered.

TV stations transmitted with horizontal polarization. A TV translator's input/output antennas were likely to be Scala HDCA-5 or HDCA-10 Yagis, which matching sections are for 75 ohm lines. In MATV, CATV and station program switching/distribution, standard circuit impedances are also 75 ohms. But with power RF circuits, 50 ohms is standard. Line loss for 50 ohms is slightly greater, of course, because of higher current flow for a given power.

During early post-WWII years, Americans watched black and white images of anything. Some radio personalities, such as Amos 'n' Andy, tried TV, but couldn't equal their popular radio image. Besides, Americans were becoming more choosy with increasing entertainment choices, including hi-fi audio and peripherals...and FM, such as it was.

FM's early days

Such as it was? Well, the story of Armstrong's FM invention, which proved to be so effective for communications during the war, is a sad commentary on big business greed and government handling. I believe every broadcasting professional should know the background facts about FM's struggle to survive, faced with those who tried to kill the infant. They failed with FM; instead, they did in its father.

Anyway, during the 1950s, the FCC threw a bone to the public interest by moving FM from 45 MHz to the present dumb piece of spectrum between TV Channel 6 and 7. So, FM broadcasting suffered more, but at least became a proven value with a brighter future than most could envision.

The problem of line-of-sight VHF and UHF television signal also belonged to FM. So innovative people modified TV translators and used similar site facilities to deliver FM service to shielded, remote communities. Of course, the wide IF band-pass of TV translators meant stinko selectivity and sensitivity for FM. There were a lot of illegal FM translators on the air at

If some older translators are overpowered under the newer rules, just as many might be underpowered.

the time I got involved in manufacturing and marketing of the only FCC type-accepted equipment, the Jones J Series.

There are some very old FM translators still perking out there. But I wonder about others, poorly designed and doing a mediocre job. It's something to think about if you have an older FM translator.

The Commission allows translators to continue operation in non-compliance with 74.1204 (concerning contour protection of stations, translators and IF relationships), 74.1205 (concerning protection of Channel 6 TV stations) and 74.1235 (concerning mean effective radiated power versus antenna radial height above average terrain) if there is compliance with 74.1203. That part of the rules also deals with interference, but more specifically with complaints that cannot be resolved, among other things.

Not necessarily grandfathered

Especially important, older translators are not permanently grandfathered. In fact, all translators must be in compliance within three years of the effective date of the newer rules: Dec. 4, 1993. However, the Commission will consider requests to extend grandfathering periods, if it can be shown that compliance would unneces-

sarily deprive the public of service. In this regard, the Commission expects the licensees to have made an effort to use other options, including financial support.

The FM band is getting very crowded, even in smaller metro areas. Large metropolitan areas are an absolute jungle. We consultants use computer databases for station profiles and terrain elevations,

radiated shape, due to terrain elevation changes. FCC translator rules lean heavily on Part 73 rules for full service stations. They are stringent, but fair, about permitted interference.

If some older translators are overpowered under the newer rules, just as many might be underpowered—even though they may satisfactorily serve a principal community, if not surrounding vehicular listeners.

ERP and antenna do not alone form a figure of merit. The mode of radiation is important, too. Some scoff at the value of circularly-polarized radiation, but their argument is with all the full service FM and TV stations that universally radiate in that mode. The benefit is enhanced signal penetration by accommodating the many ways a listener's receiver intercepts wave energy.

Further, older translators deserve rethinking because their output channel may now have legal incoming interference.

Phone, fax or write to me if you wish to discuss a translator matter. Or, maybe a reprint of one of these columns has information you need.

□ □ □

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.



Join the LPB Signature Console Crowd

Over 1000 licensed U.S. radio stations
Hundreds of international stations
Hundreds of college stations

Discover *why* the LPB Signature may be radio's most popular console:

- an unparalleled record of reliability and longevity
- clearly labelled screw-terminal connections for painless installation
- modular electronics for easy maintenance
- superior RFI immunity

Signature's standard features set new standards of flexibility:

- 3 inputs per channel
- 2 identical output buses
- remote starts
- tape outputs for each bus
- internal monitor, headphone and cue speaker amps
- mono/stereo input switches (on stereo consoles)

Signature options add even more versatility:

- mix-minus plug-in module (mounting kit for mono consoles)
- mono mixdown plug-in module for stereo consoles


Signature is available in a size to fit your station and your budget:

- stereo 6, 8, 10 or 12 channel
- mono 6, 8 or 10 channel

It's easy to join the LPB Signature Console Crowd—just call your broadcast distributor. For full information and specifications, contact LPB.

LPB[®]

28 Bacton Hill Road • Frazer, PA 19355 USA • Tel: 215-644-1123 • Fax: 215-644-8651



FM STUDIES

- **SPACING/INTERFERENCE SEARCHES** to locate a channel
- **DETAILED INTERFERENCE STUDIES** optimizing site location and directional antenna designs (calculates allowed ERP on all 360 bearings)
- **TERRAIN ELEVATION RETRIEVAL** determines HAAT for 8 or more radials
- **DISTANCE TO CONTOURS** plots projected coverage
- **POPULATION COUNTING** to determine potential listening audience
- **COVERAGE MAPS AND OVERLAYS** depicts signal coverage, zip code boundaries, received signal level, terrain shadowing and more

dataworld
A Service of DW, Inc.

(301) 652-8822 (800) 368-5754

Circle (25) On Reader Service Card

Circle (127) On Reader Service Card

When owners look at the bottom line, DCS comes out on top.



"I checked with my peers, chief engineers and your competitors. Computer Concepts always came to the top. Now I know why. You haven't let me down."

Jerry Hinrikus, Owner/GM, KABI/KSAJ, Abilene, KS

"Thanks for helping my stations make money. Our three DCS systems all work great right out of the box."

**J.R. Curtis, Owner/President, KFRO/KLSQ,
Longview, TX KNYN, Santa Fe, NM**



"Your support people are wonderful. There's only one digital audio system on the market worth owning—Computer Concepts."

Jim & Deneen Lambley, Owners, KSDZ, Gordon, NE

"We've been Computer Concepts clients for over 10 years. Their hardware and software support is wonderful. I highly recommend the DCS system."

Gary Hawke, Owner/GM, KSYC/Y98, Yreka, CA



THE DIGITAL COMMERCIAL SYSTEM (DCS) – REAL VALUE IN HARD DISK DIGITAL AUDIO.

Profit From Our Experience

**Computer Concepts
CORPORATION**

Computer Concepts Corporation

8375 Melrose Drive, Lenexa, KS 66214

800-255-6350 • Tel: 913-541-0900 • Fax: 913-541-0169

Circle (103) On Reader Service Card
World Radio History

WORKBENCH

The Cold, the Heat and Tips on STLs

by John Bisset

FALLS CHURCH, Va. Couldn't believe the comments we got on the do-it-yourself temperature sensor using an LM-34. It sounded like a lot of engineers wanted to know just how cold that transmitter site gets this winter! Equally surprising was the number of engineers who had trouble finding this chip through their local suppliers.

My first fear was that National Semiconductor had discontinued the chip, but the company confirmed all is well, and the LM-34 is readily available. I spoke with National's Applications Engineer Bill Heyn, who gave a little more information on these chips.

There are actually two chips—the LM-34

on the day I called, the company had over 1,000 in stock!

If you want to order the LM-34, you can call Digi-Key at 800-344-4539. If you'd just like to be placed on a mailing list for the company's current catalog, circle **Reader Service 83**.

In addition to low cost and volume discounts, Digi-Key also offers same-day shipment. If you have applications questions on National's chips, give the toll-free applications number a call at 800-272-9959.

★★★

George Nicholas, CE at KHAK in Cedar Rapids, Iowa, was telling me what Santa brought. Seems George is always on the lookout for new specialty tools, and he found just that in the "Volt Pen." This is a

and his workbench was covered with strings of Christmas tree lights. With the volt pen, it only took about 20 minutes to check them, and at \$3.00 for a new set of lights, don't quit your day job just yet.

The volt pen can also be used for your own personal safety. We've all rewired rack rat's nests and wished we had a device like this. Guess when you think about it, for the seasoned engineer, our index finger could be called our "built-in volt pen"—only George's idea is safer.

This patented AC sensor is manufactured by Santronics, and is carried by most electrical contractor/supply stores. It costs under \$20, is powered by two AAA batteries, which will give you one to two years of use. If you'd like to have information on Santronics AC Sensor, circle **Reader Service 152**.

★★★

If RW ever ran a "Most Popular Customer Service Technician" contest, Vince Mercadante from Moseley would be one of the finalists. Vince is known to anyone with a Moseley STL as "Mr. STL." He certainly knows his product.

He passes on a neat little modification to the PCL-606 series receivers that was adopted by WJZE-FM CE Richard Mertz. Richard has tied the RF signal test meter voltage into his remote control system. The advantage is that he can check the receive status of his STL either by computer from his home, or looking over the logs printed out by his autologger. The disadvantage was that if the power blipped, the front panel test meter would switch back to test meter position one.

The RF signal strength is found on position three, and when this happens, you think you've got STL signal problems

when you really don't. If you open the receiver and remove the metering and status board, you'll find a U-2. This is a counter chip that counts the switch positions. To select switch position three, you don't want any jumpers to this chip.

The stock PCL-606 comes with pin 1 jumpered. The normal procedure would be to cut the board trace. Vince's suggestion, which is faster and doesn't deface the PC board, is to remove the U-2 and bend the lead for pin 1 up so it won't be inserted

continued on page 38 ▶

The 'Volt Pen,' a Magic-Marker sized instrument, can sense the presence of more than 50 volts AC—even when no current is flowing.

gives a voltage proportional to temperature change in degrees Fahrenheit, the LM-35 is calibrated for Centigrade. The chips are available in a couple of packaging options. The LM34CH is in a T0-46 case, the LM34CZ is a T0-92. Both of these sensors operate from minus 40°F to plus 230°F. The LM34DZ is the Centigrade version, housed in a T0-92 case.

For those engineers not near metropolitan areas that might stock these chips, your best recourse is placing an order with Digi-Key. This mail-order house is a good supplier of all kinds of electronics parts—at decent prices. As for these particular chips,

Magic-Marker-sized instrument that senses the presence of more than 50 volts AC—even when no current is flowing.

By placing the tip near the hot lead, an internal lamp glows. The tip of the Volt Pen has a prong that fits standard AC outlets, but it will sense AC if placed in close proximity to a hot AC conductor. George used this device successfully to trace an AC interlock circuit—the tip glows red until you come to the switch or wire that is open.

I intentionally saved George's tip until after the holidays. George made the mistake of letting his staff know he had this,

AM ANTENNA SYSTEMS



50 KW AM TUNING UNIT

Antenna Tuning Units Transmitter Combiners Folded Unipole Antennas Diplexers, Triplexers RF Components

Call LBA Technology for RF systems and excellent technical service. Products for AM, FM, Shortwave and TV are designed and built to international standards. LBA antenna systems will improve your efficiency, performance and reliability.

LBA is the world leader in single and multiple station folded unipole antenna systems for high efficiency, wide-band AM transmissions at all power levels. LBA systems are found from Alaska to Argentina, Kuwait to Saipan.

Our capabilities include the design and fabrication of RF equipment, complete system integration with products of other leading suppliers, project management, on-site installation, and commissioning. Consult LBA for fast response to your RF needs.

919-757-0279

919-752-9155 FAX

or Contact Our Representatives Worldwide



LBA TECHNOLOGY, INC.

P.O. Box 8026 Greenville, NC 27835 USA

30 YEARS OF
WORLDWIDE ENGINEERING
SERVICES

**COMPLETE LINE OF RF
PRODUCTS**

An LBA Group Company © 1993

If you're in a hurry, we understand.



Maybe you just want to get on the air. Your choice of one exciter/amplifier over another or whose STL you install may not be your first priority.

But now's as good a time as any, so listen to this. If you don't buy a BEXT, you just won't get BEXT's modular construction. You won't get that BEXT instant serviceability nor our unique 24-hour engineering

hotline. You won't have the convenience and speed of front-panel programability and you may not be treated the way you would like.

BEXT products consistently outperform their own high specifications because they're built by engineers who know broadcasting for

broadcasters who know the BEXT difference? No. And, our delivery times are often weeks less than you've learned to expect... most often immediately from stock... so you can afford to slow down a little and still come to the

right decision. Join the growing BEXT family.

739 Fifth Avenue • San Diego, California • 92101 • USA
619-239-8462 FAX: 619-239-8474



Circle (43) On Reader Service Card

Circle (161) On Reader Service Card

KEYBOARD CONNECTION

COMDEX Show a Computer Wonderland

by Barry Mishkind

LAS VEGAS If you think the NAB spring show is big, the fall computer show, COMDEX, makes the NAB show seem like a walk in the park.

Over 140,000 persons and 2,000 exhibitors descended on Las Vegas; it took eight locations to get enough exhibit space. Hotel space was basically non-existent within a 40-mile radius. Traffic was a nightmare. But the exhibits filled every computer nerd with joy. Let me share some of them with you.

From memo writing to presentations, the computer has nearly made the typewriter

obsolete. This year, many of the popular word processors were upgraded. Microsoft Corporation's Word For Windows™ went to version 2; Lotus' Ami Pro™ is now on

A cross between the word processing world and databases is the infobase. It is a really neat engine to search files and retrieve information on the fly.

version 3; and Quicksoft released PC-Write Advanced Level™ version 4.

At COMDEX, Word Perfect™ showed

off an improved version 5.2 of their GUI (Graphical User Interface or Windows) product, and promised version 6 for DOS by spring. Quicksoft also released

the PC-Write Font Selector 2.0 to make manipulation of fonts easier, especially for laser and desk jet printers.

"Drag and drop"

One of the new features touted everywhere was "drag and drop." Basically used in GUI word processors, it's become important in many kinds of applications. "Drag and drop" means that you highlight something, and using a mouse, just pull it to wherever you desire. This really speeds up editing.

In presentation and database type products, this capability makes setting up the layouts real easy.

A cross between the word processing world and databases is a word new to many: infobase. Infobases are really neat engines to search files and retrieve information on the fly. Excellent for everything from trivia contests to talk shows to news "morgues," programs like askSam™ and Folio VIEWS™ let you take any information and retrieve the desired section almost instantly.

News for news departments

Watching these run gave me lots of ideas, some of which we'll explore in upcoming columns. For news departments using computers, every story you use, plus background information, can be compiled into a library. Finding what and when is as quick as typing a few words.

continued on page 40 ▶



**Press 1 For Today's Weather.
Press 2 For The Ski Report.
Press 3 For Concert Information.
Press 4 For . . .**

Now you can provide multiple listener information services with one phone line!

The new Telephone Information System (TIS) from Henry Engineering stores up to ten separate messages for instant playback via touch-tone.

With just one "info hot-line" phone number, your listeners can get the specific info they want just by pushing the right buttons on their phone.

Digital audio memory means messages never wear out. When the unit is called, a "Menu" message plays,

telling your caller which messages are available. The caller may then select any message(s) for instant playback. Messages are easily updated by re-recording. And, over eight minutes of information can be stored in the TIS digital memory.

Henry's TIS . . . Telephone Information System . . . from Harris Allied. It's quick. It's easy. It's profitable. And, it's in stock now.

**8:00 a.m. to 8:00 p.m. EST
1-800-622-0022
Fax 317-966-0623
Canada 1-800-268-6817
Toronto 416-731-3697**

**HARRIS
ALLIED**

WORKBENCH

▶ continued from page 37
when you re-insert the chip.

This forces the test meter to come up in the RF signal strength test position when the receiver is powered up. As Vince pointed out, any switch position can be selected, depending on the jumpers used.

It's possible to get a similar sample off the 505-C receivers. This takes a little more time, since the test meter is sampling the AGC voltage out of the FM demodulator, and the sample must be buffered. A simple 741 DC op-amp will work—anything to provide a high impedance so the meter is not loaded down.

You'll see that there is even a spare feed-through on the 505-C receivers that let you get the op-amp output to the rear panel barrier strip. To really properly finish the mod on a 505-C, you need a voltmeter to measure the DC sample, and a signal generator to vary the RF input. For more information, contact Vince at 805-968-9621.

Got a tip or an idea to share with your engineering brothers and sisters? Jot it down and fax it to me at 703-998-2966. Not only will you receive a modest honorarium for your efforts, the publishing credit can be used toward SBE re-certification.

□ □ □

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

Editor's note: Field modifications to equipment may invalidate the manufacturer's warranty. Before attempting any repairs or modifications, consult the manufacturer for advice and guidance.

Always use the utmost care and follow good engineering practices when working with or around electrical equipment. RW will not assume responsibility for any loss or injury.

MICRO SOUND

Digital Audio Workstations

Delivering Your Expectations

You expect the ultimate quality, precise editing and faster production that digital audio promises... Meet MicroSound.

Now produce any audio project with true sonic transparency and noiseless performance in a fraction of the time! Make undetectable edits instantly, no matter how long your files; or undo-redo them any time, since your masters are untouched. Sync audio cues instantly to sample-precision, moving thousands unbounded on unique Floating-Tracks™. Disk-Layering™ allows up to 38 cues at any location, to be mixed and output to stereo or 4-tracks!

Assembled/tested AT-486 Workstations start under \$7,800; or add to your 386/486 computer for under \$3,700.

Contact MTU today for your free 24 page brochure to find out how fast MicroSound can meet your expectations.

Quality digital audio since 1977

(919) 870-0344
Fax: (919) 870-7163

MTU

Micro Technology Unlimited
156 Wind Chime Court
Raleigh, NC, USA 27615



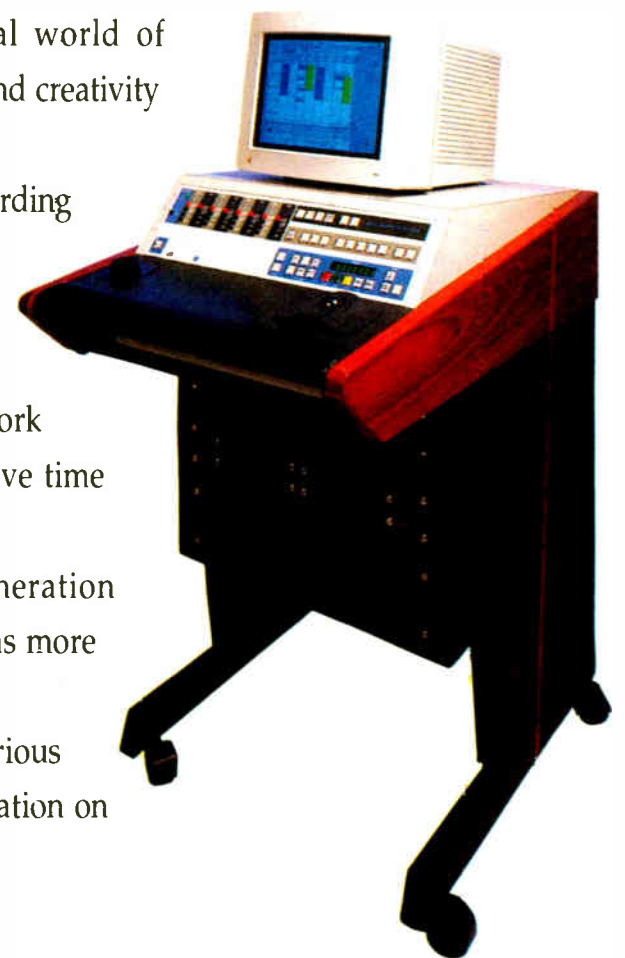
Introducing ADX, the first digital production system designed for the real world of broadcasting. A world where time is of the essence, change is the rule, last-minute is routine, and creativity is the competitive edge!

ADX is a fully integrated system which combines the creative flexibility of digital recording and editing with the speed and intuitiveness of a fully automated production mixer. Instead of simply storing audio elements and their edit decisions, ADX also recalls and recreates the mixing and processing talent of the producer.

Just imagine having the ability to precisely replay complex multitrack production work the way you mixed and equalized it yesterday, last week or last month! Think of the creative time saved when a change or update is requested in an otherwise perfect mix.

Plus, the ADX is unencumbered by the architectural limitations of first-generation workstations and is designed to grow and expand with your needs. Even the basic system has more standard features than anything before.

And like all PR&E products, ADX is a powerful tool optimized for the fast and furious demands of broadcasting and backed by world-famous PR&E support. Call today for information on ADX, the next generation of digital.



Pacific Recorders & Engineering Corporation, 2070 Las Palmas Drive Carlsbad, CA 92009
Tel: 619-438-3911 Fax: 619-438-9277 GSA Contract: GS-03F-2057A

DESIGNS THAT MAKE THE DIFFERENCE

Circle (123) On Reader Service Card

World Radio History

COMDEX Show a Computer Wonderland

► continued from page 38

Operations manuals for staff, historical information on music and artists, even lists of contest winners can be set up for instant recall. HyperText capability allows linking information easily.

There were many traditional and innovative true database products. Borland's popular Paradox™ was shown in both DOS and Windows formats, while Microsoft was unveiling its new Access™ windows database management system, as well as coming upgrades to the recently acquired Foxbase™ program.

Speaking of data, we all need to know what we're going to do next. Personal Information Managers (PIMs) have grown rather sophisticated, and useful. Polaris Software's PackRat™ 4.1 is a calendar, phone book, dialer, Rolodex, envelope and label printer, and more. It even manages links to word processors and the Eclipse™ fax program, logging what was sent.

Need less versatility but want more fun? Amaze!nc has produced some neat daily planners based around The Far Side™ or Cathy™ comic strips. For trivia nuts, there's a Trivial Pursuit™ edition. Each will help plan schedules for the next 4.5 million days or as the information says "until you die laughing or of cerebral overload."

Office Accelerator™ from Baseline focuses on your addresses and phone numbers. Installed right into the major

GUI word processors as macros, it automates mail merges, address printing, and faxing.

Multimedia news

Another really big area at COMDEX was the multimedia area. This is where sound and information meet the computer. Often stored on CD-ROMs (they look like music CDs, but store up to 680 megabytes of information), multimedia brings encyclopedias to life, shows movie clips, even Grammy winners.

CD-ROM readers have dropped in price this year, and many were shown at \$200 or less.

Compton's Interactive Encyclopedia™ has taken the entire encyclopedia, with sound, pictures, world maps, dictionary, thesaurus, and more, and made it avail-

Everyone can benefit from the file manipulation, program launching, and diagnostic features of many of these applications.

able in a format called "Virtual Workspace." This prevents information from getting "cluttered" and "lost" as you search for related facts. Watching JFK, Babe Ruth or the Moon landing really makes things stand out. You may want this one for home as well as the office!

For checking out STL and RPU shots, don't miss Delorme's MapExpert™. Built on their super Street Atlas USA™, which has virtually every street in the country, MapExpert adds a latitude and longitude display, and distance calculations. Zooming in and out lets you prepare everything from coverage maps to monitor point routings.

Your sales department or sports staff also will find Street Atlas USA and the disk-based Automap™ great aids in finding the best routing to their clients or remote broadcasts. Automap calculates the mileage and driving time, and provides detailed directions to over 120,000 locations around the nation.

In the programming category, I'm real excited by Visual Basic™. Now in a

DOS version as well as Windows, you can import your QuickBasic™ programs and run them unmodified. But the real buzz is that without rewriting the whole program, you can run part of it as usual, and dress up other sections with the new visual commands.

Quarterdeck's DESQview/X™ has taken the popular windowing manager and moved it squarely into the graphical environment. Quarterdeck has long been a leader in multitasking; DESQview lets virtually any computer do more by coordinating all the applications you have, not just in DOS; it provides solid support to networks running DOS, UNIX, DEC VMS, and more.

Xtree for Windows™ and a pair of products from PC-Kwik—Power Pak™ and WinMaster™—were among the highlights of the utilities. It doesn't take a power user to benefit from the file manipulation, program launching, and diagnostic features of these applications.

Got someone in the office always calling to ask about some computer terminology? Que Software just released the Computer User's Dictionary™, a neat lit-

tle pop-up for DOS or Windows that explains terms and provides tips on what to do.

That's just a taste of this year's COMDEX. Stay tuned for more next time.

□□□

Barry Mishkind, aka RW's "Eclectic Engineer," can be reached at 602-296-3797, or on FidoNet at 1:300/11.3 or "barry@coyote.datalog.com" on Internet.

WLAD Promises Listeners the Moon and Fun

► continued from page 31

it happened during the book.

Here are some things to consider for the next eclipse: Get a real sponsor. Pick a client with a sense of humor to sponsor the whole thing exclusively (at bottom of the card rates). Run the van over to the local university's observatory to serve free coffee and "Moon Pies" to the viewing public.

AOR stations may want to add a mooning contest, followed by a "Moon Rocks" concert with a hot local band. Maybe get custom voicers from Wolfman Jack. The possibilities are limitless.

One of the most fun aspects of radio promotions is taking credit for absolutely nothing and having a good time doing it. And when the audience is in on the gag, the impact is doubled. I'll be curious to see what other stations do with this idea when the next celestial show is put on and they have a chance to take the credit for it. Meantime, I'll check in next month with more.

Waxing & waning,

—Al

□□□

Al sees the bad moon rising. Al sees trouble on the way. Al writes from WLAD/98Q Danbury, CT 06810, and advises, "don't go around tonight."

A Broadcast Industry

BEST BUY

Mono Play
\$920

Stereo Play
\$1000

F.O.B. Factory

Reliable / Rugged / Professional Design

- All Metal Housing with Cast Aluminum Front Panel
- Half Inch Thick Aluminum Deck with Stainless Steel Overlay
- Air-Damped Solenoid with Telfon™-Coated Plunger
- Direct-Drive Capstan Motor
- Three-Point Adjustable Head Mounts
- Output Transformers
- CMOS Logic
- Straightforward / Serviceable Design
- Compact Size (1/3 Rack Width)
- 30-Day Guarantee of Satisfaction / 1-Year Warranty



DL Series

AUDI-CORD CORPORATION

1845 West Hovey Avenue, Normal, Illinois 61761 USA
Phone 309-452-9461 - Fax 309-452-0893

Available Through Your Regular Distributor

ARE YOU LOOKING FOR A COST EFFECTIVE ALTERNATIVE TO MANUFACTURER SERVICE?

IN CASE OF EMERGENCY

We can help get you back on the air with our STL Loaner Program. We have STL's available that will be set to your frequency prior to shipping.

We also provide over-the-phone technical assistance.

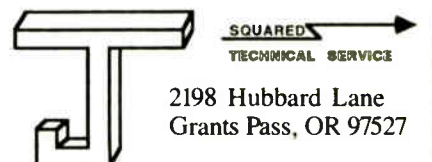
SERVICE, REPAIR & CALIBRATION

- › STL's › RPU's › TSL's › Exciters
- › AM/FM Broadcast Monitors
- › Remote Control Systems

SPECIALIZING IN EQUIPMENT BY

- › Belar › Marti › Moseley
- › McMartin › TFT › And others...

An authorized TFT service center



2198 Hubbard Lane
Grants Pass, OR 97527

(503) 471-2262



Starting
under \$3,100

Cost-Effective Quality

The New Dynamax MX Series

Modular Audio Console

- True modular design
- Ultra-reliable motherboard construction
- VCA mixer and monitor control
- Active balanced line inputs, transformer isolated mic inputs
- Active balanced main and monitor outputs
- Full monitoring/cueing facilities with VCA level control and active source selection
- Built-in cue amp with speaker and amplified stereo 8-ohm headphone output
- Remote start logic
- Count-up event timer
- Two input expansion switches standard
- Two inputs per module, mic/line or line/line - line inputs may be mono or stereo, consumer or professional format
- Four assignable outputs - two stereo plus two mono
- Available in 6, 8, 10 or 12 channel models
- Rotary or linear faders
- Separate audio and logic power supplies
- Sturdy, all-steel construction
- Durable Lexan overlay control surfaces
- All inputs/output connection via compact, captive screw barrier strips - no soldering, crimping or spade connectors necessary
- Excellent RF immunity

**Whether you lease, pay cash, or use your credit card,
call the industry's most experienced distributor...**

Eastern & Central
VOICE 800/525-1037
FAX 919/934-1537

 **BROADCAST
SERVICES CO.**

Mountain & Pacific
VOICE 800/523-1037
FAX 805/266-1695



The Davis Communications Group, Inc.
The Preferred Source



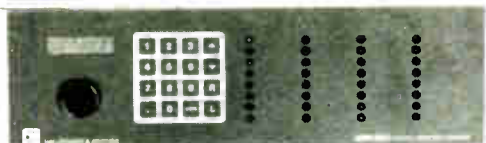
Circle (157) On Reader Service Card
World Radio History

Products & Services Showcase

For more information on the products shown below, circle the appropriate Reader Service No.(s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.

PROGRAM ABILITY

Programmable Digital Remote Control. What others promise, Hallikainen & Friends delivers to your exact specs with the DRC 190. With its extended BASIC language, the DRC 190 can control, alarm, display and log measured and calculated system parameters. Typical installations also generate a daily report showing the minimum, maximum and average of each parameter, simplifying oversight of the system. For true flexibility of user control over evolving equipment demands, get with the program, get the DRC 190.



PROGRAMMABLE EXPANDABLE AFFORDABLE DRC 190

HALLIKAINEN & FRIENDS

141 Suburban E4, San Luis Obispo, CA 93401-7590 USA
805-541-0200

READER SERVICE NO. 26

NO MORE EXCUSES!

If you've been wanting a hard disk recording system but thought you couldn't afford one, we've taken away your last excuse. Introducing — hard disk recording and editing on your AT-compatible.

CardD™ \$795

The CardD is an AT-compatible bus board that gives you:

- Real time direct-to-disk stereo recording and playback
- True professional-quality 16-bit audio
- Stereo analog inputs and outputs
- 32kHz, 44.1 kHz, and 48 kHz sampling rates

EdDitor™ \$250

The EdDitor is an interactive stereo waveform editing program that features:

- Non-destructive editing
- Cut, copy & paste
- Mix, fade, crossfade
- Full zoom-in & zoom-out
- Catalog feature for fast access of sounds
- On-line help



AUDIO BROADCAST GROUP

2342 S. Division Avenue
Grand Rapids, Michigan 49507

1-800-999-9281

200 Fareway Drive - Suite 2
Smithfield, North Carolina 27577

1-800-369-7623

READER SERVICE NO. 98



AUTOMATICALLY

- Switches to backup or tertiary stereo audio source when main audio source loses a channel or is missing
- Switches both outputs to the channel with audio when one channel is missing from a stereo source
- Corrects audio polarity if it is reversed
- User programmed time delays and sequencing
- FULL alarm outputs and total remote control
- ON-LINE audio monitoring and stereo audio switching
- Locate at Transmitter site for full REDUNDANCY
- Locate at Studio site to monitor studio audio and make instant corrections for console, cart/tape, or satellite programming errors.

AND MUCH MORE... CALL FOR DETAILS

Model MLW-1

TITUS TECHNOLOGICAL LABORATORIES

77 Kreiger Lane Glastonbury, CT 06033
(203) 633-5472

READER SERVICE NO. 57

NEW!!! from AVCOM

PSA-65A Portable Spectrum Analyzer & SCPC-2000E Single Channel Per Carrier Receiver



PSA-65A Portable Spectrum Analyzer - \$2855

AVCOM's PSA-65A Portable Microwave Spectrum Analyzer covers a frequency range from less than 2 MHz to 1000 MHz. The broad frequency coverage and high sensitivity of the PSA-65A make it ideal wherever a low cost, compact spectrum analyzer is needed. The light weight, battery or line operated PSA-65A Portable Spectrum Analyzer from AVCOM is the perfect instrument for field testing of RF systems, classroom instruction, satellite system alignment, electronic countermeasures, cable TV maintenance, cellular and production use.



SCPC-2000E SCPC Satellite Receiver - \$1875

AVCOM's Single Channel Per Carrier Receiver, model SCPC-2000E, has been developed for the reception of FM SCPC signals from satellites operating in the 3.7 to 4.2 GHz band. The SCPC-2000E is a complete receiver that can tune up to 4 specific crystal controlled audio or data channels from a given transponder and adapt to a variety of de-emphasis requirements. The SCPC-2000E is available in either wide or narrow band models and may be used with the SS-1000 (\$1027) Slave for simultaneous reception of additional channels.

AVCOM OF VIRGINIA 500 Southlake Blvd, Richmond, VA 23236 U.S.A.
Bringing High Technology Down to Earth Phone 804-794-2500 / Fax 804-794-8284

READER SERVICE NO. 102

Zercom Telephone Hybrid ZH-2



An interface for connecting a telephone line to a studio console. "Now with upgraded performance." It provides full duplex (simultaneous two way audio) for best results. The hybrid sends audio to a telephone line and receives audio from the line. To make up for a telephone line's inherent 15 DB send to receive level difference, it has a nulling circuit which is used to reduce the local send audio as heard back in its receive output.

Adjustable input and output gain controls are provided to accommodate almost any situation. Audio inputs and outputs are active balanced. The telephone line tip and ring connection is set up for a direct line hold configuration or capacitor isolated to prevent DC flow through the hybrid's telephone line transformer. The choice is user selectable on the rear terminals.

There are two null controls for reducing the audio input to output transfer. The hybrid also has an audio processor to reduce receive gain by 10 DB while audio is being sent to the caller. This reduced trans-hybrid leakage to a point where it is not normally audible to listeners.

ZERCOM

Box 84, Merrifield, MN 56465 • 218-765-3151

READER SERVICE NO. 141°



Econco REBUILT POWER TUBES



Approximately One Half
the Cost of New

3,000 Hour Unconditional Guarantee

Call for Our Price List

Econco 1318 Commerce Ave. Woodland, CA 95695
Phone: 916-662-7553 Fax: 916-666-7760 Telex: 176756
Toll Free: 800-532-6626 From Canada: 800-848-8841

READER SERVICE NO. 38

Attention Advertisers

Reach 18,000+ radio station owners, managers, engineers and consultants.

Products & Services Showcase

appears monthly in Radio World.

To advertise your product or service contact your sales representative.

Radio World

P.O. Box 1214, Falls Church, Va 22041

Phone: +1-800-336-3045

FAX: +1-703-998-2966

If you haven't tried this pre-amp, you don't know how good your microphones can sound.



If you read ads for microphone pre-amps you'll find they all, regardless of price, promise the same things: low distortion, low noise, and great noise rejection.

PROMISES... PROMISES

Sontec promises you something better. Install our MPA-1 pre-amp. If it's not cleaner and more transparent than what you're now using, just return it for credit. Now that is a promise!

Sontec Electronics

Audio Drive, Goldbond VA 24094 USA
703-626-7256 FAX: 703-626-7257

READER SERVICE NO. 11

USER REPORT

KIIS Test Set Is All in System One

by Mike Callaghan
Chief Engineer
KIIS-AM-FM

LOS ANGELES The Audio Precision System One is a universal audio testing system designed to interface with a personal computer. The screens and controls of the computer provide an easy way to regulate the System One's many features.

Tests of everything from distortion to frequency response and tape head phase measurements are easy to configure and operate using either the keyboard and/or a mouse interface.

Storing capabilities

Once the parameters and limits for a specific test have been entered and test run, the setup and limits may be stored in a disk file so the same configuration is easily recalled for later use.

The test results may also be stored, which is useful for later comparisons of declining equipment performance. The differences between the two sets of values are helpful in catching early signs of tape head wear and other mechanical inconsistencies.

A group of tests can be linked to form a procedure. This is a sequence of different tests, prompts, and screen captures allowing the complete analysis of a piece of

| GENERATOR | | LOCAL | ANALYZER | | LOCAL | SWEEP (F9) | | DEFINITIONS | |
|-----------|---------|--------|------------|---------|-------|------------|------------|-------------|--|
| WAVEFORM | SINE | NORMAL | MEASURE | A THD+N | | DATA-1 | ANLR | PHASE | |
| IM-FREQ | 60.0000 | Hz | RANGE | | AUTO | GRAPH TOP | +180.0 | deg | |
| FREQUENCY | 1.00000 | kHz | READING | 0.57029 | % | BOTTOM | -180.0 | deg | |
| | FAST | | LEVEL | 785.3 | mV | # DIVS | 0 | LIN | |
| AMPLITUDE | 1.000 | Vrms | FREQUENCY | 1.00149 | kHz | | | | |
| OUTPUT | OFF | BAL | PHASE | | OFF | DATA-2 | ANLR | NONE | |
| | 50Ω | FLOAT | BP/BR FREQ | | AUTO | GRAPH TOP | | OFF | |
| BURST ON | 1.000 | CYCL | DETECTOR | 8/sec | AVG | BOTTOM | | OFF | |
| INTERVAL | 3.000 | CYCL | BANDWIDTH | <10Hz | 80kHz | # DIVS | 0 | LOG | |
| LOW LVL | -80.17 | dB | FILTER | OFF | | | | | |
| AMPSTEP | 0.010 | + | CHANNEL-A | INPUT | 100KΩ | SOURCE-1 | EXTERN | FREQ | |
| FREQSTEP | 1.260 | * | RANGE | | AUTO | START | 50.0000 | Hz | |
| | | | CHANNEL-B | INPUT | 100KΩ | STOP | 20.0000 | kHz | |
| REFS Freq | 1.00000 | kHz | RANGE | | AUTO | # DIVS | 0 | LOG | |
| dBr | 387.3 | mVrms | REFS Freq | 1.00000 | kHz | SPACING | 5 | % | |
| dBm/W | 600.0 | Ω | dBr | 387.3 | mV | TABLE | OFF | | |
| | | | dBm/W | 600.0 | Ω | DISPLAY | MONO-GRAPH | | |

AMPLITUDE BANDPASS BANDREJECT THD+N SMPTE CCIF DIM W+F -----
Analyzer Measurement mode

To return to menu, press the Esc key

Sample of Control Screen as seen on PC Monitor

If it fails, a maintenance engineer checks into the problem. If it passes, the printout is stored in a binder and nothing further is needed. This binder contains all the test results, and it's a complete synopsis of the performance of all our audio equipment.

In addition to the basic audio measure-

ments we perform, the Audio Precision System One has the option of connecting directly to digital ports on DAT machines and CD players. Flutter/Wow and a number of other test options also are available.

The signal generator in the basic System One can be configured to step either in terms of frequency or amplitude. The analyzer detects phase, amplitude or distortion. This makes it simple to write and run tests of output level versus distortion or frequency versus distortion. Both the analyzer input and the generator output impedances are selectable and can also match floating, balanced and unbalanced circuits.

more valuable when setting playback and record head azimuths.

The mouse or the cursor keys get you where you need to be, and the available choices for each option appear on the bot-

tom of the screen to make changes easy.

The specifications of the System One are excellent—certainly much better than the equipment being repaired or adjusted.

The Audio Precision System One has been invaluable in keeping our 44 cart decks and 23 reel-to-reel machines in spec and operating as well as possible.

□□□

For information on the System One, contact Tom Mintner in Oregon at 503-627-0832; fax: 503-641-8906; or circle Reader Service 190.

The signal generator in the basic System One can be configured to step either in terms of frequency or amplitude.

audio gear by even an inexperienced user.

For example, KIIS routinely checks the performance of the cart decks in our air studio using this system. A special "test bus" between the studio and the engineering shop connects the output of machines under test in the studio to the Audio Precision system in the workshop.

The disc jockey runs a special test cart. It triggers the System One to start a special procedure that tests each of the cart decks automatically. Two tests are run: the frequency response and the all-important playback phase response.

Test analysis

These test results are saved to the hard drive and later combined with screen prompts to eventually produce a single sheet of paper. The printout includes charts of the frequency response, the playback head azimuth, and the machine location, serial number, the date of the test and the initials of the testing engineer.

Analysis of the printout is simple: One single line determines if the cart or tape deck passed or failed the limits set when the test was written.

ments we perform, the Audio Precision System One has the option of connecting directly to digital ports on DAT machines and CD players. Flutter/Wow and a number of other test options also are available.

The signal generator in the basic System One can be configured to step either in terms of frequency or amplitude. The analyzer detects phase, amplitude or distortion.

This makes it simple to write and run tests of output level versus distortion or frequency versus distortion. Both the analyzer input and the generator output impedances are selectable and can also match floating, balanced and unbalanced circuits.

Automatic switching

A stereo feature in the detector can run distortion and output tests on stereo systems by automatically switching between the channels during the testing process.

A bar graph option easily shows an analog result for almost any value on the main screen. By watching the graph while making the adjustment, it's easy to set playback or record EQs. This is even

SPECIALS

LIMITED TIME

CLOSEOUT SPECIAL

TELEX PH-93

Sportscaster Headset

An amazing one time offer!

- Dual isolating muffs
- Condenser Boom/Mic

Orig. List \$289.00

NOW ONLY

99.00 Buy 1

94.95 Buy 2

89.95 Buy 4

79.95 Buy 6

Limited Time Offer!

HURRY!



AKG 240M HEADPHONE SPECIAL

Limited Time Only!

Orig. List \$139.00

NOW ONLY 77.97



AKG CONDENSER MICROPHONE SALE

Limited Time Only!

AKG C414/ULS Orig. List \$1199.00

Prices Too Low To Print—CALL!

FULL COMPASS

1-800-356-5844

Consultation: 608-271-1100

5618 Odana Road, Madison WI 53719

QEI QEI QEI QEI QEI QEI QEI QEI QEI QEI

Bring your station into the 90's with CAT-LINK—the digital STL/TSL.

"It's a dream system—we get specs like the microwave wasn't even there. CAT-LINK has completely eliminated the STL delay."

Jeff Andrew, WGCI-FM, Chicago

"CAT-LINK solved all our problems in 4 minutes—2 minutes to install each end. Performance has been impeccable."

Paul Christensen, WIVY-FM, Jacksonville, FL

"CAT-LINK makes money for us, and it improves the sound of the station."

Mike Callaghan, KIIS-FM, Los Angeles CA

"CAT-LINK has held up through extreme heat, a hostile RF environment and nasty summer lightning storms."

Dick Byrd, WZGC-FM, Atlanta GA

Two-way multi-channel communications

CAT-LINK digitizes the entire composite signal with no data compression, so you can run the stereo generator and processing at the studio, where they really belong. At the same time, CAT-LINK sends and receives up to four customized auxiliary channels with no crosstalk—SCAs, control channels, voice communications, RS232 data, AM audio, transmitter readings and satellite or remote program feeds. What's more, CAT-LINK gives you extra capabilities like transmitter building surveillance via closed circuit TV and an analog telemetry channel.

Transparent digital transmission

CAT-LINK encodes the fully processed composite signal, then decodes it at the transmitter. You always get full stereo separation, without the phase or amplitude variations that plague two-channel STLs. Dynamic range is up to 84 dB, and your processed composite signal can use virtually all of it. You hear clear, clean, undistorted audio—all the time.

No audible delays

CAT-LINK's real-time digital encode/decode process doesn't introduce audible delays as data compression can. Jocks can monitor on-air without problems.

Flexible signal path options

• 23 GHz

Stations across the country are avoiding 950 MHz problems by using 23 GHz with CAT-LINK. They've stopped worrying about frequency congestion and interference, repeater-induced signal degradation, and fresnel zone clearance fading. 23 GHz dish sizes also reduce wind loading and tower space requirements.

• DS1 (T1) Data Line

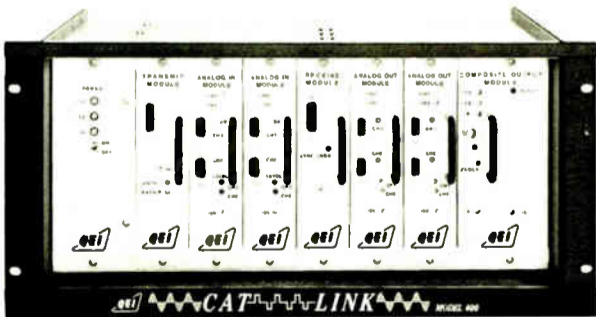
CAT-LINK is cutting phone bills for stations that don't have a clear microwave path. With CAT-LINK, a single bidirectional DS1 line replaces multiple Class A telco lines, providing multi-channel STL and TSL over the same link. Already available virtually anywhere, DS1 service is getting cheaper every day.

• Fiber Optic

CAT-LINK and its optional fiber optic modem provide direct connection to discrete fiber.

• Twisted Pair

CAT-LINK will drive up to 5000 feet of twisted pair wire without repeaters. Four wires provide full two-way multi-channel capabilities.



Turn the weak link in your signal chain into one of the strongest.

Call QEI toll-free at 800-334-9154 for more information on CAT-LINK—the digital STL/TSL for the 90's...and beyond.

QEI CORPORATION
ONE AIRPORT DRIVE • P.O. BOX 805 • WILLIAMSTOWN, N.J. 08094

24 HOUR SERVICE HOTLINE (609) 728-2020
TEL (800) 334-9154 • FAX (609) 629-1751

QUANTITY • **E**NGINEERING • **I**NNOVATION

Circle (12) On Reader Service Card

USER REPORT

KCRW's Job Is Made Easier with QEI 691

by John C. Huntley
Chief Engineer
KCRW-FM

SANTA MONICA, Calif. While the QEI 691 Modulation Monitor/Test Set is not a new piece of equipment, it is as useful to us today as when we purchased our first one over 10 years ago.

Many of us remember the long hours spent completing the FCC required annual "Audio Proof of Performance." The 691 made the task easier to accomplish when FCC regulations still mandated it. And to this day, stations must meet the audio transmission requirements behind the dreaded "proof."

More than a monitor

The 691 is not simply a modulation monitor, but also an integral test set for measurement of stereo and SCA subcarrier parameters. All the stereo and SCA measurements we normally make are readily available in a single box.

KCRW has three 691s. One is at the transmitter, where it's the "reference" point for stereo measurements at KCRW. There is another at the studio, used for daily or weekly "quick checks" for compliance with the FCC rules and the tighter tolerances specified in SCA contracts.

A third 691, in a road case, is used to verify the stereo operation of KCRW through our translators.

KCRW has multiple subcarrier tenants.

The unit is designed to work over quite a range of RF input signals.

We check subcarrier injection and deviation of the tenants at least weekly, and the 691 is well suited for this job.

We check our mono/stereo balance regularly during monaural programming, of which we have quite a bit. This quick check lets us know of any drift in the STLs (split left and right system) or in our audio processing. Because the Los Angeles market is largely automotive during much of the day, this is a prudent check. The design of the 691 makes it nearly painless.

Peak limits

We use another device to verify the station's compliance with the peak modulation limits: the QEI VPDTO (Variable Peak Duration Test Option). The device was installed into one of the 691 monitors at KCRW.

The tracking of peak modulation is now very close to the more expensive demodulation system. If you have no requirements

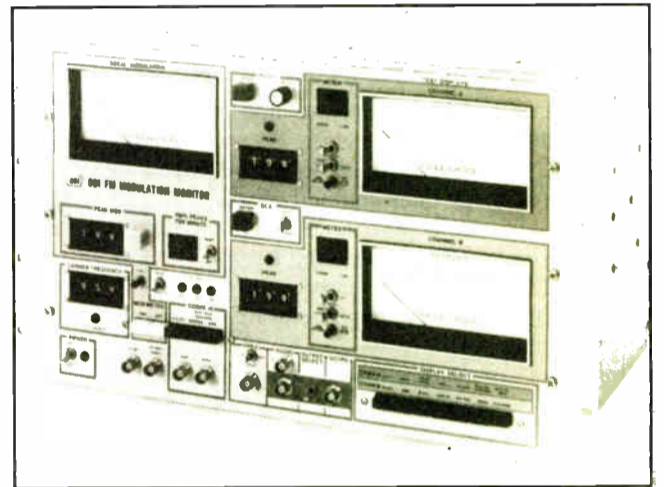
for computer-based tracking of modulation, the 691 with VPDTO works very well.

The QEI 691 is designed for self-calibration using an internal Bessel null function. This monitor can be used (with an oscilloscope connected to front panel outputs) to provide a spectrum analyzer display.

We use this display in conjunction with an audio oscillator to perform a Bessel null on our exciters to verify the 100 percent modulation point.

Design range

The unit is designed to work over quite a range of RF input signals. There are connections for both an antenna input and a higher level RF input. The higher level connection is a loop-through connection, and it may be connected to the output of an exciter and an external load to measure the modulation of an exciter.



QEI's 691 Modulation Monitor/Test Set can be used for measurement of stereo and SCA subcarrier parameters.

I have noted that the antenna input is somewhat numb (probably for valid design considerations). This means the monitor installed at the studio location may require a preamplifier for an adequate signal level. If a preamplifier works best. Narrowband amplifiers will cause inaccurate peak modulation readings.

The 691 works well in conjunction with our Audio Precision System One, using the Audio Precision FM Proof software package for more detailed checks of KCRW.

I would not advise using this or any modulation monitor for AM (synchronous) noise measurements. The chance of inaccuracy is too great. The ACM-2 from Radio Design Labs is designed specifically for this measurement. Its design avoids the pitfalls of using an FM modulation monitor for AM noise measurements.

Secondly, it is inadvisable to measure peak modulation at a studio site remote from the transmitter. Any multipath distortion present will cause all modulation monitors to display inaccurate peak modulation. The 691 can be used with an oscilloscope to display the multipath conditions that will let you know of possible inaccuracy.

□ □ □

For information on the QEI 691, contact Jeff Detweiler at 800-334-9154; fax: 609-629-1751; or circle Reader Service 150.

Modulation Readings You Can Trust.

With its new internal DeModulator, ModMinder is calibrated at our factory and certified accurate for two years.

ModMinder's advanced digital circuitry makes it the most accurate, temperature-stable modulation monitor ever made. Now it has a front end that maintains the same level of precision, reliability and stability.

When you order a ModMinder™ with the internal DeMod Board, or have Modulation Sciences upgrade your ModMinder, we actually seal the modulation calibration control. We also send you a certificate of calibration valid for the next 24 months.

How can we do that? DeMod™ is the first and only demodulator whose calibration is traceable to an NBS (NIST) reference. Modulation calibration is totally stable from freezing to 122° F. It's also immune to mechanical shocks, so we certify calibration not only at our factory, but at your station. In addition, DeMod works with an exceptionally wide range of RF levels – from 10 mW to 1 W, without any user adjustment.

ModMinder and DeMod eliminate the uncertainties that have plagued modulation measurement. There's no calibration drift due to temperature fluctuations. No need to calibrate for modulation and RF level before each measurement. No meaningless moving pointers. Instead, you get high-resolution, instantly readable, totally reliable numerical readouts. You can get those readouts anywhere there's a modem-equipped PC, too – with ModMinder Remote software. It's free with every ModMinder, and it includes a unique Modulation Histogram that gives you important insights into your station's modulation.

ModMinder has revolutionized the way hundreds of stations measure modulation. Now the optional internal DeMod card turns it into a standalone dynamic modulation measurement and analysis system – the most accurate ever made. Of course, for precision, convenience and reliability, ModMinder has been standing alone from the very beginning.



modulation sciences, inc.

12A World's Fair Drive • Somerset, NJ 08873
Tel (908) 302-3090 • Toll Free (800) 826-2603
Fax (908) 302-0206

USER REPORT

WGBH Maximizes with the ModMinder

The System Allows Monitoring and Analysis from Remote Sites While Keeping the Sound Consistent

by Peter Swanson
Chief Engineer
WGBH-FM

BOSTON The FM "ModMinder" by Modulation Sciences has been employed by many stations to allow the maximum of modulation with the minimum of worry.

The ModMinder's electrical characteristics are tailored to conform to the latest

official FCC rules for modulation monitors. And its digitally-based design doesn't "cry wolf" when detecting modulation peaks that are shorter than those of concern to the FCC.

Remote monitoring

There are two other compelling reasons for owning the ModMinder: the capability of remote modulation monitoring and the powerful tool of quantitative modulation analysis (read: Take the pulse of your audio processing...or your competition's!).

At six out of eight FMs I've been involved with, the modulation monitor at the studio has not agreed reliably with its counterpart at the transmitter. Invariably, the studio mod monitor would read higher total modulation than was showing out in Transmitterland.

The culprit, unavoidable at each studio location, was multipath. Careful comparison of readings between the studio and

Thanks to Eric Small and his friends at Modulation Sciences, I can now reliably verify my modulation without driving out to "The Hill." With Modulation Sciences' software available for the ModMinder and modem-equipped PC, I read modulation and peak flasher counts being measured at the transmitter from anywhere there is a dial-up line.

No more multipath-induced errors! Not only do I call in from the WGBH-FM studios on a regular basis—but I periodically call in from home evenings and weekends.

Storage capability

The peace of mind is worth a lot, but the frosting on the cake is the storage and analysis capability of the software. The

time, store them on disk and then analyze such goodies as average RMS level and processing ratios, then compare A/B displays of different periods of modulation. With the composite signal option, you can compare your processing "signature" with that of your competition.

Don't settle

Consider the possibilities. You've been happy with your current processing chain, but the new FlameThrower processor with Ramafrantic Spectral Digital Defrabbulation has just come on the market. Your PD swears that KKKK (Krock 101) has this new processor on line, and is melting a hole in the dial.

What to do? You obtain an evaluation unit of the FlameThrower, and, sometime between dark:30 and dark:45, you play with it versus your regular processing. Using the same program material (we are doing this at 3 a.m., aren't we?) you capture both normal and FlameThrower



LMA/DUOPOLY CONTOUR MAPS

The DATAWORLD LMA/DUOPOLY Market Survey Contour maps present a precise electronic verification of overlapping and intersecting contours.

AM 5 mV/m and FM 3.16 mV/m City Grade contours are shown in full color, including transmitter site indicator. The map is supported with a printout showing all of the stations which appear on the map. Daily updating of DATAWORLD'S AM and FM databases protects against errors and omissions.

OTHER MAP OPTIONS

- SHADOWING (TERRAIN SHIELDING)
- CONTOUR COVERAGE
- POPULATION DENSITY
- ZIP CODE BOUNDARIES
- RECEIVED SIGNAL LEVEL
- SPECIAL REQUIREMENTS

1990 CENSUS

WHO ARE YOUR LISTENERS?

1990 BUREAU OF CENSUS POPULATION COUNTING

- Comprehensive Ethnic and Demographic Data
- Ethnic/Demographic Data Available for Each Zip Code Within Coverage Area
- Age Analysis Reflected in Ethnic Breakout
- Resolution Increased to Block Level
- Percent of County Coverage Shown

ETHNIC PIE-CHART DISPLAY

- Projects Ethnic Population in Multi-Color Pie Chart Form

dataworld®

800-368-5754 FAX: 301-656-5341

Circle (117) On Reader Service Card



The FM ModMinder by Modulation Sciences features error-free remote modulation monitoring and quantitative modulation analysis.

plain vanilla software supplied with every unit gives you a mockup of the face of the ModMinder to observe from your computer location.

... I read modulation and peak flasher counts being measured at the transmitter from anywhere there is a dial-up line.

transmitter monitors would leave engineering with the imperfect choice of guessing what the modulation was when the transmitter site was not staffed, which is usually six-and-a-half days a week.

It reveals instantaneous modulation percentages, and a count of overmodulation occurrences. You can change the peak flasher settings from your remote site!

The "Bells and Whistles" version allows the user to record modulation levels over

modulation data. Then, using the MSI software, you can compare and contrast modulation histograms, as shown in the accompanying printout.

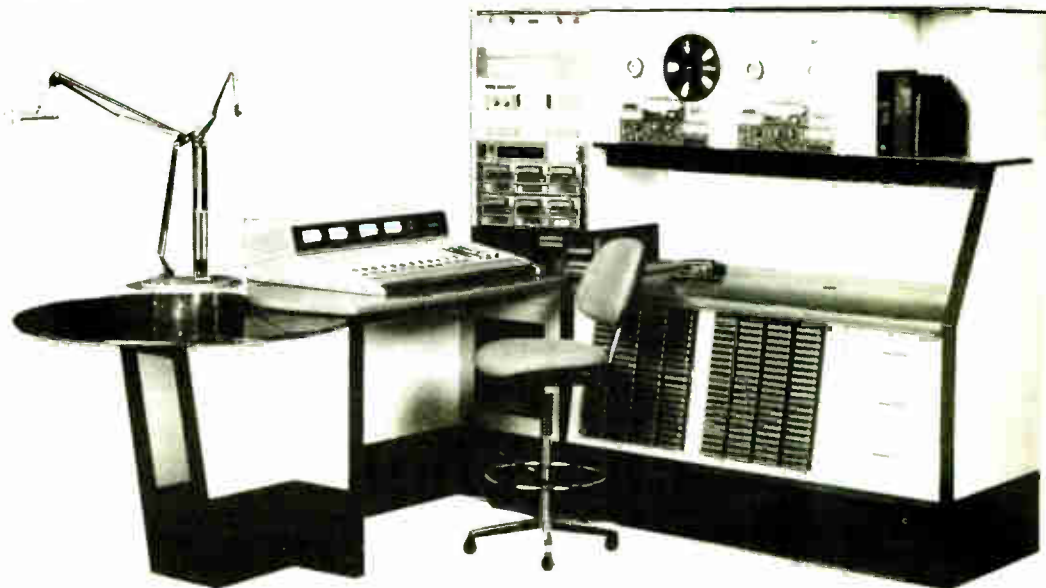
I would've killed to have this back when I was working for Boston's "Kick-Ass Rock-and-Roll" station. Right now, the ModMinder and its software are helping us here at WGBH-FM to be one of Boston's cleanest and most natural sounding stations.

It has proven itself an invaluable tool for coaxing an audiophile signal from a processing chain, maintaining competitive loudness while sounding subjectively "open" and unprocessed.

□ □ □

For information, contact Brett Porter at 800-826-2603; fax: 908-302-0206; or circle Reader Service 146.

▲ SEE THE FUTURE ▲



▲ AVANT-GARDE SERIES ▲

MODULAR FLEXIBILITY WITH A CUSTOM FIT

WE OFFER A CHOICE OF FIVE ELEGANT LINES OF STUDIO FURNITURE

MURPHY
STUDIO FURNITURE

▲ 4153 N. BONITA STREET ▲ SPRING VALLEY, CA 91977 TEL (619) 698-4658 ▲ FAX (619) 698-1268 ▲

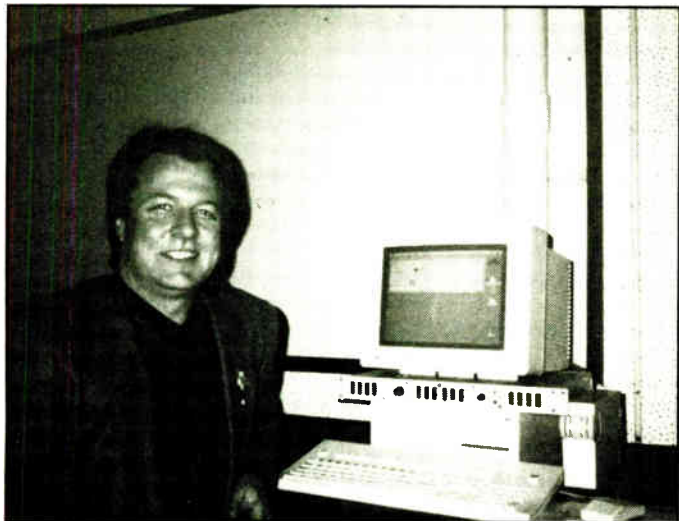
Circle (64) On Reader Service Card

USER REPORT

WPR's Demands Matched With Wohler's AMP-1A

by Dave Harris
Consultant
WPR

SAN FRANCISCO Western Public Radio, located at the Fort Mason Center, is a radio production training facility developing digital audio workstations for radio and other production facilities. When we were looking for a compact, powered speaker to use in our training workstations, Wohler Technologies



Dave Harris sits next to his AMP-1A unit by Wohler Technologies.

brought by an AMP-1A unit.

Our workstation speaker requirements demanded that the system be self-powered, compact, stereo capable, magnetically shielded and offer balanced and unbalanced inputs.

Facility oriented

The AMP-1A unit met the requirements we had for a basic workstation. In fact, its features would work in many types of facilities, such as master and satellite control rooms where multiple signals need to be checked from time to time, and rack space is at a premium.

The magnetic shielding was effective and allowed us to use the AMP-1A in direct contact with a Macintosh computer screen. In one of our training workstations, WPR uses the AMP-1A, which could be easily installed in a rack. Different configurations are used in our other workstations.

The AMP-1A is only one rack unit high and 12 inches deep. Installation is facilitated by the RCA unbalanced inputs and balanced XLR loop-throughs. The front panel has three sets of speaker ports: left channel, right channel and the centrally-located combined low-frequency driver (500 Hz and below from both channels).

Level indicators

The front panel of our unit also holds the 10-step stereo LED level indicators, gauged stereo volume control, balance pot, power indicator and an option called the In-Phase Indicator (IPI-1). The optional level indicators, volume control and balance pot are fairly straightforward. They offer good peak input level indication and smooth control of the signal.

The In-Phase Indicator is particularly

interesting. It consists of four LEDs, which indicate left channel input presence/clipping, right channel input presence/clipping, in-phase (same polarity) material and out-of-phase (opposite polarity) material.

This LED array can give a quick indication of out-of-phase conditions between the left and right channels. After a little practice, it's fairly simple to determine whether the mono sum of a stereo signal will suffer from cancellation, or if it has a

wide stereo image with a coherent center. A polarity problem is instantly obvious when monitoring a two-channel mono signal.

The ability to quickly establish the polarity of a two-channel signal is crucial to stereo radio and television engineers. The \$120 spent on this option is well worth it if there are no other means to analyze the signal.

While we're talking price, the AMP-

1A is a bit on the high side. The unit with no options lists for \$720, and the input metering adds \$160. Still, I know of no other monitoring system which supplies the features of this unit within the confines of a single rack space.

For information on the AMP-1A, contact Will Wohler in California at 415-285-5462; fax: 415-821-6414; or circle Reader Service 125.

INDUSTRY ROUNDUP

Low Costs Benefit New Equipment Users

by Mary Ann Dorsie

WASHINGTON Test and monitoring equipment has become more accessible and more affordable over the past few years, paving the way for greater product usage, according to some company representatives.

Spectrum analyzers, for example, were out of reach for many radio stations a few years ago because of their price tags of \$20,000 or more, said Jim Wood, president of Inovonics. Now, a good one sells for around \$4,000 or \$5,000, he said.

"As the price of test and monitoring equipment goes down, more broadcasters are buying that type of equipment," Wood said.

John Casey, broadcast division sales engineer for RE Technology, said he envisions a trend in the industry toward the AES/EBU digital audio interface format.

"When you begin to route the AES/EBU format through cable...there's a need for monitoring," Casey said.

Although the interface has been in existence since 1985, he predicts it will become more popular and widely used in the radio industry in the coming years.

"It will be as common as CDs are today by the end of this decade," Casey said.

Bill Hoelzel, senior vice president of QEI, said money tends to dictate what's important with test and monitoring equipment. But the product's lifespan also depends on the product itself.

QEI's Model 691 FM Modulation Monitor probably followed a path similar to many models in the industry, Hoelzel said.

It first entered the market as a new product around 1976 or 1977, he said. Sales started to pick up a couple years after that, before dropping to its current, stable level of 80 to 100 annual sales.

More accessible test equipment is the trend because new products don't really crop up in the test and modulation business, Hoelzel added.

"Since FM is an established commodity, so to speak, the measurements of various parts of the signal are also established," he said.

The ease of operation is what's different. Within the last two years, the way in which peak modulation is being measured has changed, Hoelzel said.

"It meant certain stations could be louder and still be legal," he said.

Will Wohler, president of Wohler Technologies, said he has seen a trend in the satellite transmission of audio, and envisions that being the direction of the future.

"The trend is to hear radio on demand," he said. "The customer—the person at home or in the office—is able to select from an incredible variety of programming sources."

If the trend continues, Wohler said, he expects it to generate business, because it will require monitoring for many more sources than before.

The rise of computers also has contributed to the greater usage of equipment, Inovonics' Wood said.

"Because of the availability of computers—IBM compatibles—you can get into test equipment you could not afford before the computer was integrated into the process," Wood said.

Turn Twisted Copper Pairs Into Gold.



Just when you thought your bag of technical tricks was empty, RE America introduces the 15kHz Tie Line Audio Codec. Developed for 15kHz quality audio links, the RE8720/8730 (stereo or dual mono) and RE 8721/8731 (mono) provide a cost-effective alternative to expensive digital or equalized telco circuits by utilizing existing twisted copper pairs. The RE Tie Line products add new life to DC metallic pairs between your studio and transmitter.

Tie Line Audio Advantages

- ▲ Install and forget.
- ▲ Less than 4ms total delay.
- ▲ Superior to mechanical equalization.
- ▲ Digitally pure sound.

Tie Line Codec Applications

- ▲ Studio to transmitter links.
- ▲ Studio to microwave links.
- ▲ Studio to studio links.
- ▲ Satellite backhaul.
- ▲ Sports, RPU and many more.

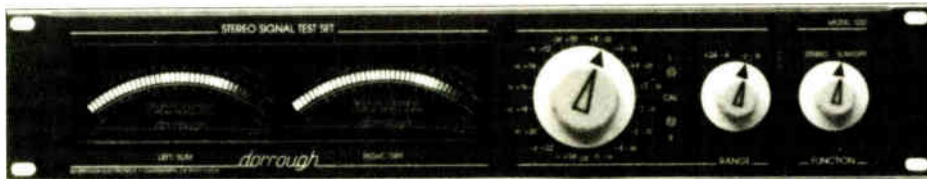
re

RE AMERICA, INC.
31029 Center Ridge Rd. ▲ Westlake, Ohio 44145
Phone: (216) 871-7617 ▲ Fax: (216) 871-4303

Circle (171) On Reader Service Card

Dorrough's Model 1200 Offers Accurate Testing Through Multiple Features

WOODLAND HILLS, Calif. Dorrough Electronics' Stereo Signal Test Set Model 1200 offers high-accuracy stereo line measurements.



A quick reference check system, the unit measures system gain, L/R polarity and phase compatibility, system headroom,

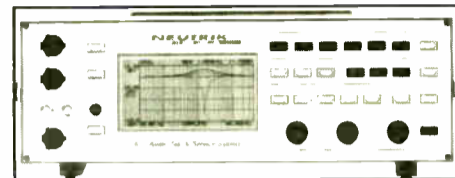
noise floor, crosstalk and allows quick adjustment of record and playback azimuth.

The unit's specifications include: measurement range from -76 to +20 dB in 1 dB steps (reference .775V); input features including 40K balanced, 20K unbalanced, with a differential servo; frequency response from -0.2 dB 10 Hz to 50 kHz; and power requirements from 115V or 220-230V at 50-60 Hz. The test set's price is \$1,650.

For information on the Stereo Signal Test Set, contact Kay Dorrough in California at 818-999-1132; fax: 818-998-1507; or circle Reader Service 23.

Neutrik's Model A1 Provides Easy-to Learn Remote Features

LAKEWOOD, N.J. Neutrik's Model A1 test set is portable enough to be used in remote facilities, flexible enough to adapt to various interconnect strategies and constructed well enough to fend off high RF fields.



The unit's display includes a large, backlit LCD panel. It provides a lightweight graphics interface with three display modes.

Plots are legible and both axes are labeled clearly in the Graph Mode. Activating the Meter Mode provides a numeric reading with a bargraph and information about settings, input level and input frequency. Scope Mode simultaneously displays the original signal and the distortion residual while measuring THD.

The unit is easy to learn, and runs well in both its automated and manual modes.

Although the A1 is a single channel measurement device, it can still do channel-to-channel phase. When the display is set to manual mode, it can retain many waveforms for channel-to-channel comparisons.

The A1's PC software allows remote control and enhances the unit's testing capabilities.

Automated multitest sequences can be created by pressing the front panel buttons, while the PC remembers retains the previous information.

For information on the A1, contact Ken Smalley at 908-901-9488, ext. 10; fax: 908-901-9608; or circle Reader Service 91.

Fluke's 90 Series ScopeMeter Increases Flexibility and Use

EVERETT, Wash. John Fluke Manufacturing Co. has added to its 90 Series ScopeMeter® with a new Version 4 software upgrade. The ScopeMeter has extensive measurement capabilities for field service environments.

First introduced in September 1991, the ScopeMeter combines a 50 MHz, 25 megasamples per second (25MS/s), dual channel digital storage oscilloscope (DSO) with a digital multimeter.

The ScopeMeter upgrade's features include: percent duty cycle measurements for pulse width modulated signals in control circuits such as fuel injector on/off ratio; 30 ohm range and 0.01 ohm resolution to look for an elusive short circuit with additional resolution; time stamp to show when the Minimum and Maximum values occurred while recording; waveform inversion on both channels for easier math and Min/Max glitch capture waveform flexibility; increased frequency counter resolution; and voltage measurement at cursor 1, which allows the user to measure a waveform's voltage at any single point.

For information, contact John Fluke in Washington at 206-347-6100; fax: 206-356-5116; or circle Reader Service 13.



All-Mode Reception Included in Inovonics' Sentinel 550, a Station Monitor Receiver

SANTA CRUZ, Calif. Inovonics has developed The Sentinel Program Audio Monitor-Model 550. The Sentinel is a Station Monitor Receiver with all-mode reception: NRSC AM/AM-Stereo, FM/FMX™-Stereo and SCA.

Twelve key parameters and characteristics of interest to programmers, including Loudness, Dynamic Range, Spectral Profile, Stereo Balance and Image, are graphically displayed with meaningful and useful numbers. There are 24 presets to facilitate station comparisons.

For information, contact Jim Wood in California at 408-458-0552; fax: 408-458-0554; or circle Reader Service 116.

We maintain a Double Standard

Audio Precision offers two different standard-setting product lines.

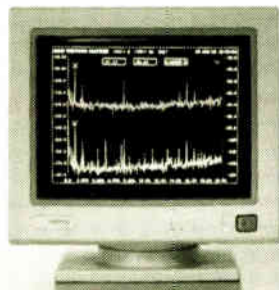
The automated System One – the industry standard for bench and factory.

- Graphic results on PC screen with hard copy to printers
- Automated proof procedures & limits testing
- State-of-the-art performance and speed

The self-contained Portable One Plus & Portable One – for service bench and field.

- Compact and affordable stereo test sets for applications not requiring automation
- Both offer comprehensive capability & high performance in a rugged package
- Portable One Plus adds sweeps, graphs and printer port

The System One and Portable One... two families of test sets designed for different jobs, each with the quality and performance that you have come to expect from Audio Precision.



Audio precision

PO, Box 2209, Beaverton, OR 97075
503/627-0832 1-800/231-7350
FAX: 503/641-8906, TELEX: 283957 AUDIO UR



Circle (137) On Reader Service Card



You can measure...

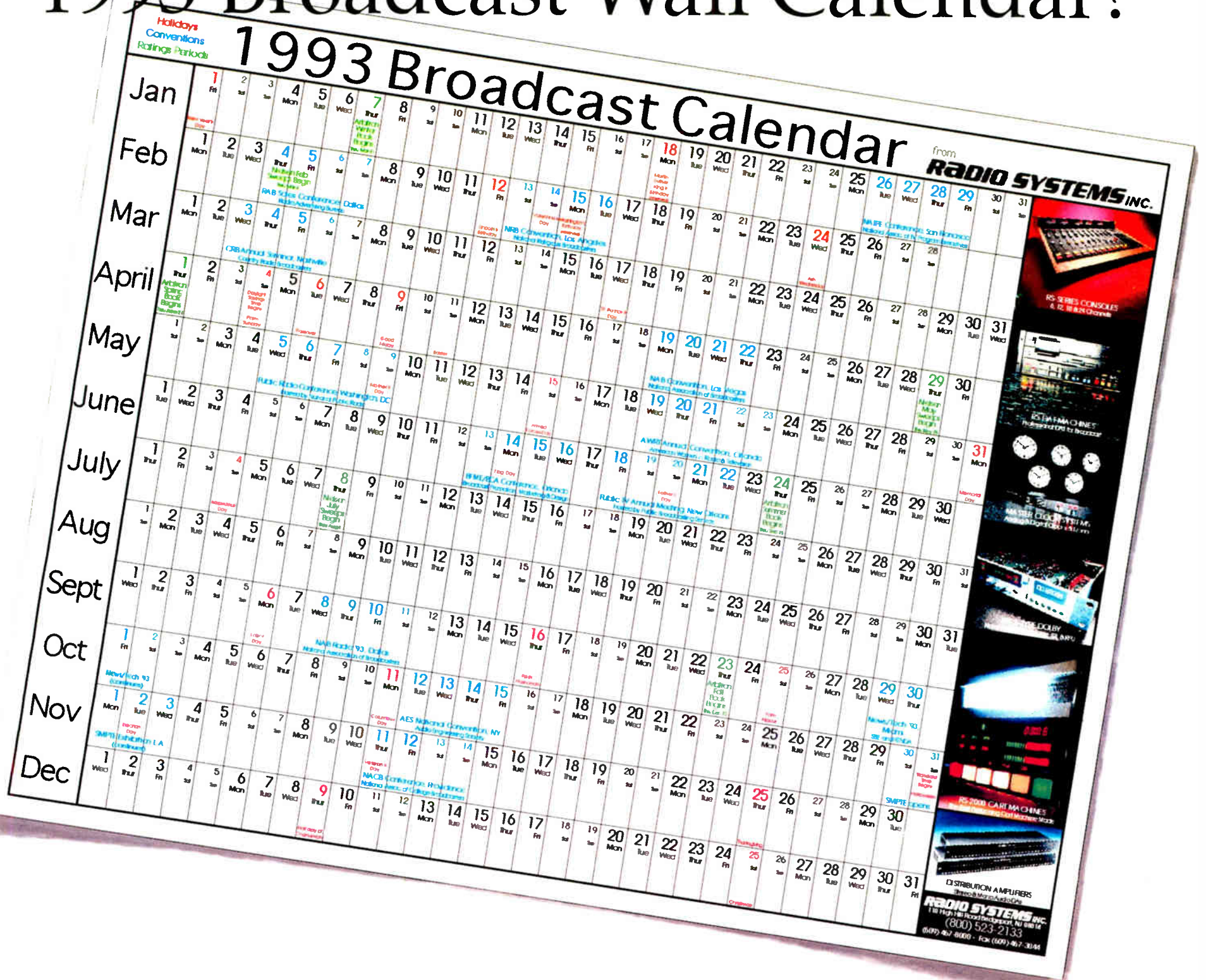
with the best monitor and the most accurate test set.

The FMM-2/FMS-2 series monitors provide an even greater degree of precision measurement than ever before... You can measure S/N below 90 dB, You can measure crosstalk below 85 dB, You can measure separations of better than 70 dB, You can measure frequency response to better than 0.25 dB, You can measure distortions to lower than 0.01%, and much more... Our uncluttered panels and autoranging voltmeters make these measurements a dream.

BELAR ELECTRONICS LABORATORY, INC. CALL ARNO MEYER (215) 687-5550
LANCASTER AVENUE AT DORSET, DEVON, PENNSYLVANIA 19333
Call or write for more information on Belar AM, FM, Stereo, SCA and TV monitors.

Circle (62) On Reader Service Card

Did you get your free 1993 Broadcast Wall Calendar?



To celebrate the new year and to announce our new network of Broadcast Dealers, Radio Systems has produced the first wall-size broadcast calendar. In its year-at-a-glance format you'll find major broadcast conventions, radio and TV rating periods, and, of course, major holidays. It's free for the asking - just call!

Thousands were mailed to broadcast stations across the country. But if you missed your copy, here's another chance.

CALL RADIO SYSTEMS AT (800)523-2133 OR YOUR DEALER

Bradley Broadcast Sales - Gaithersburg, MD
 Broadcasters General Store - Ocala, FL
 Broadcast Supply West - Tacoma, WA
 Crouse Kimzey Co. - Ft Worth, TX
 Full Compass Systems - Madison, WI

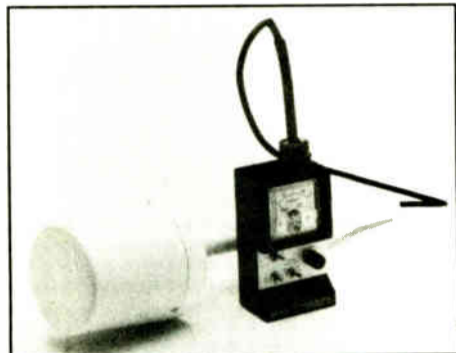
Giesler Broadcast - Houston, TX
 Northeast Broadcast Labs - S. Glens Falls, NY
 Technet Systems Group - Auburn, NH
 Jim Walters Co. - Honolulu, HI

RADIO SYSTEMS INC.

Circle (189) On Reader Service Card
 World Radio History

Narda's 8520 Complies with RF Radiation Exposure Limits While Keeping the Cost Down

HAUPPAUGE, N.Y. Narda's Model 8520 provides the FM/VHF broadcaster with an accurate and inexpensive solution in complying with FCC and OSHA limits for exposure to RF radiation. Electric and magnetic fields are measured separately with one probe that is permanently attached to the meter.



This broadcaster compliance meter operates over the 50 to 220 MHz frequency band, where separate E and H field components must be measured to ensure compliance. In the past, the surveyor has changed probes to measure different fields, increasing the amount of equipment, time and cost required.

Changing field detection with the Model 8520 is as simple as changing a switch position on the meter. Accuracy of field measurements is the same, or even higher than systems costing twice as much.

Measured field levels are displayed on the analog meter movement with full scale levels of 0.2 and 2 mW/cm². The equivalent power density readout allows the use of one scale for both fields.

The cost of a Model 8520 (under \$2,000) allows all licensees to measure field intensities and document results before an inspection occurs.

For information on the Model 8520, contact Vinod Chitkara in New York at 516-231-1700; fax: 516-231-1711; or circle Reader Service 101.



Belar's RF Amplifier Tackles Reception Problems

DEVON, Pa. Belar's RFA-4 frequency agile RF amplifier can handle many difficult reception conditions, with its capture ratio of 1.5 dB and built-in attenuators to help minimize front-end overload problems. Extremely low distortion and good separation and signal-to-noise ratio all contribute to the unit's accuracy.

This one-rack-unit-high amp features a 12-character alphanumeric high-intensity LED display for preset number, frequency and even call letters or other identifiers you program.

fiers you program.

With 10 programmable memory locations, all your competitors can be a single button-press away. You can even program the non-volatile memory to remember the station you were last monitoring or return to your own station after a power outage.

The RFA-4 can be used with any Belar FM monitor. When used with the FMMA-1 ("The Wizard"), the unit can be controlled remotely through an RS-232 port, including changing channels. For

Naptex Protective Suit: Comfortable and Convenient While Offering RF Protection

HAUPPAUGE, N.Y. The Naptex RFR Protective Suit from Maxwell Safety Products offers radiation-exposure safety in various E-field broadcast environments.

Naptex, a fabric which looks and feels like broadcloth cotton material, integrates a stainless steel microfiber core. The material provides a minimum of 15 dB attenuation (about 30 times) of electric fields to 1000 MHz. This translates to safety for tower crews and technicians risking frequent exposure despite the present FCC guidelines.

The Naptex coverall contains two breast pockets, Velcro/zipper closures and a removable, integrated hood. It is convenient and comfortable to wear. It may be machine-washed and dried repeatedly with no measurable effect to its shielding performance.

The RFR suit is presently used by various broadcast services and was shown to exhibit excellent microwave protection by the U.S. Navy Biomedical Engineering Division.

It is available in four standard sizes, small to extra-large, in a high-visibility, safety-orange color. It sells for \$699.

For information on Naptex, contact Don Doty at 214-293-1200; fax: 214-293-1255; or circle Reader Service 114.



those broadcasters requiring only a single frequency, the same performance is available in the new Belar RFA-1A fixed-frequency version.

For information on the RFA-4, contact David Hirsch in Pennsylvania at 215-687-5550; fax: 215-687-2686; or circle Reader Service 67.

NASA-1000A Performs as a Network, Spectrum Analyzer

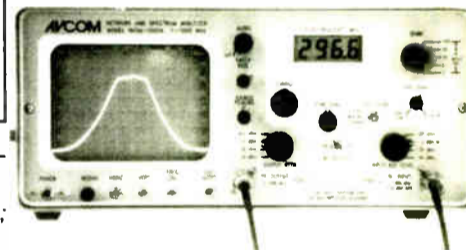
RICHMOND, Va. The NASA-1000A by AVCOM of Virginia is functional as both a network and spectrum analyzer.

As a network analyzer, it allows the operator to make swept measurements of filters, duplexers and amplifiers from 1 to 1,000 MHz, with a range of more than 90 dB. In addition, stimulus-response measurements of other RF networks can be made.

As a spectrum analyzer, the unit is versatile and cost effective, with a frequency range of 1 to 1,000 MHz and a sensitivity of -95 dBm. Applications include receiver and transmitter alignment and troubleshooting, LAN analysis, cable head end level balancing and satellite receiver alignment and signal demodulation (with optional demodulator).

The NASA-1000A's front panel is separated into the display, the RF source and the swept receiver. The frequencies of the RF source and of the swept receiver track, and the response of an RF network inserted between the RF source and receiver, are displayed on a CRT.

For information on the NASA-1000A, contact Charlie Odom of AVCOM of Virginia at 804-794-2500; fax: 804-794-8284; or circle Reader Service 72.



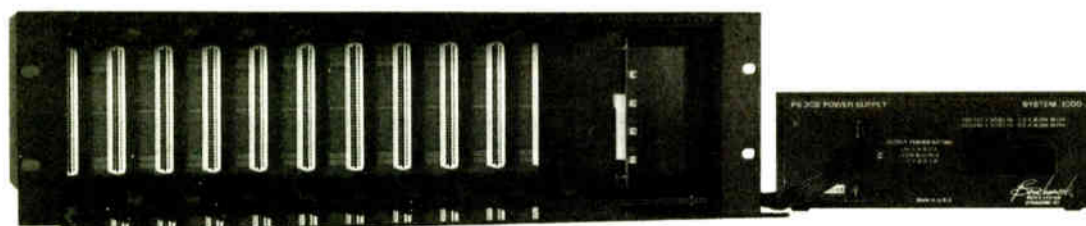
Products & Services Showcase

For more information on the products shown below, circle the appropriate Reader Service No.(s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.

Benchmark's New MF-302 System

Our outstanding MF-300 Card Frame now with an Internal Power Supply. With this system, you can mix and match any 10 of our 14 different modules.

Now Under \$1000



BENCHMARK MEDIA SYSTEMS, INC.
315/437-6300 800/262-4675 FAX 315/437-8119

Benchmark
...the measure of excellence!™

READER SERVICE NO. 73

WHY LEAVE THEM IN THE DARK...

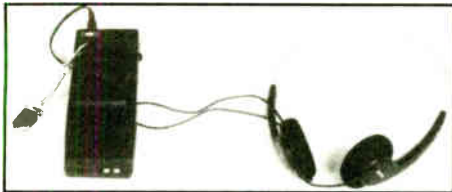
...when you can reach over 18,000 radio professionals with your product showcase ad? Gain valuable exposure for your products or services at minimal cost.

For more information
Call Simone at

1-800-336-3045

or

FAX 1-703-998-2966



RE America's d940 Monitors Audio I/Os with Headphone Interface

WESTLAKE, Ohio Small enough to clip to a user's belt, RE America's d940 headphone interface can monitor AES/EBU and SPDIF digital audio by performing a 16-bit digital-to-analog conversion.

The d940 will lock to any of the three standard sample frequencies of 32/44.1/48 kHz, and it includes an LED display of signal validity.

Output from the unit is short circuit-proof and can be set to mute when the signal is lost.

The life of the battery is extended with low-power circuit design and selectable automatic on/off switching. The d941 battery charger recharges its nickel cadmium batteries, accepting up to three units for recharging.

For information, contact John Casey in Ohio at 216-871-7617; fax: 216-871-4303; or circle Reader Service 132.

Server Introduces Sentry Remote Power Manager

SANTA CLARA, Calif. Server Technology, Inc. has introduced the Sentry Remote Power Manager, which features Power On/Off Reboot Control.

The feature eliminates dispatching people or maintenance organizations to reboot the remote device to get back to an operational mode. The manager also geographically distances devices that support Wide Area and Local Area Networks.

A modem telephone call accesses the unit, which asks the caller to enter a password. Once the password is validated, the Power Control Screen is displayed.

This gives users an interface to individually control the AC power flow to four Power Modules.

For information, contact Brandon Ewing in California at 408-988-0142; fax: 408-988-0992; or circle Reader Service 110.

TFT's Model 884 Gives Users a Low-Cost Monitor Option with Accuracy

SANTA CLARA, Calif. The TFT Model 884, a popular, low cost FM stereo modulation monitor, features a frequency-synthesized preselector, FM baseband demodulator, and stereo demodulator to combine complete stereo measurement with our peak modulation duration differentiator and built-in FM calibrator circuit.

The Model 844A has all the features of the 884, plus a second set of thumbwheel switches for A/B station comparison, an additional meter for measurement display, front panel BNC for off-air measurement of pilot and carrier frequency, and a multipath indicator for proper antenna orientation.

Both models display all operational parameters necessary for compliance and maximum modulation accuracy.

The Model 753 AM Modulation Monitor has an extremely wideband input (500 kHz to 4 MHz) for high level RF signal, digital peak indicators, and built-in voltmeter.

For information, contact Darryl Parker in California at 408-727-7272; fax: 408-727-5942; or circle Reader Service 172.

Potomac 1750: Built for Tower Light Monitoring

SILVER SPRING, Md.

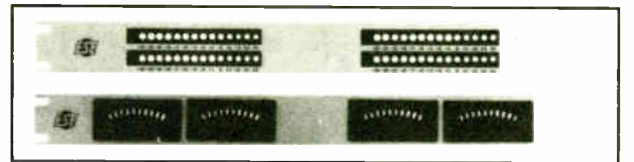
Potomac Instruments' 1750-CS "Comparator/Status" unit can be used in a number of ways (high/low temperature alarm, high/low voltage monitor, signal level alarm, etc.) to solve problems typical at broadcast facilities, but tower light monitoring was its design goal.

The 1750-CS can monitor up to four lighting circuits and accurately identify a single bulb failure on each input. It provides a definitive status indication to the operator or remote control. No

longer does the nighttime DJ have to interpret voltages or look outdoors to determine proper tower light operation.

To accomplish this task the 1750-CD incorporates: four comparator inputs (AC or DC input), individually programmable for comparing "greater than" or "less than" the reference voltage; photocell inhibit input (including inverting logic); external or internal reference voltage selection (provides for direct line voltage tracking).

For information on the 1750-CS, contact Dave Harry in Maryland at 301-589-2662; fax: 301-589-2665; or circle Reader Service 56.



ES-215 Offers Audio Level Indication

EL SEGUNDO, Calif. ESE has introduced the ES-215, an LED audio level indicator with rackmount options. In addition, the ES-216 is now available with the rackmount option.

These LED meters were made to simulate the action of a conventional VU meter, but with better dynamic characteristics. Both units have Peak or Average Response modes.

For information, call Bill Rajaniemi in California at 310-322-2136; fax: 310-322-8127; or circle Reader Service 155.



DIGITAL STL BREAKTHROUGH



TFT DMM92 Digital STL Modems: The Spectrally Efficient Solution

Would you like to improve the fade margin of your existing analog STL by 20 dB or more? Increase Signal-to-Noise Ratio by at least 10 dB? Extend STL distance by miles? You can—without buying expensive new transmission equipment, without modifying your existing STL. Just add TFT's advanced DMM92 Spectrally Efficient Digital STL Modem/Multiplexer. Along with vastly superior performance, you'll get:

- ◆ **More Channels** — Analog models accommodate up to four analog channels or two AES/EBU digital audio pairs, plus a 9600 baud RS232 channel—all in a 75 kHz baseband. MUX subcarriers at 110 kHz and 152 kHz can coexist with the DMM92 baseband signal plus additional channels.
- ◆ **More Flexibility** — Digital models accommodate codecs from apt-X, Musicam, Dolby, Intraplex... any 256 kbps codec with RS422 or V.35 interface. Plus two 7.5 kHz audio channels and two more SCA subcarriers or MUX channels.
- ◆ **More RF Power** —The DMM92 allows you to use the full power of your STL transmitter, not just 1 Watt.
- ◆ **More Usable RF Spectrum** — the DMM92 requires only ±50 kHz carrier deviation for 451 kbps, allowing composite STLs to be operated on 250 kHz channel spacings.

The DMM92 is also compatible with video microwave links. A single composite subcarrier can contain four audio channels with 80 dB SNR and an RS232 data channel.

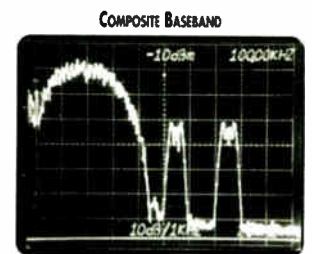
also from TFT:

9100 Composite STL

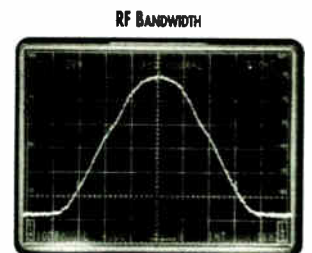
- ◆ Frequency-synthesized, field-programmable Tx and Rx.
- ◆ Patented IF Modulation for superior performance.
- ◆ Very sharp cavity RF filter, phase linear IF SAW filter.
- ◆ Interoperable with DMM92.

Sound Quality for over 20 Years

3090 Oakmead Village Drive • Santa Clara • California 95051
Toll Free: 1-800-347-3383 • Tel: (408) 727-7272 • Fax (408) 727-5942



2 x 15 kHz, 2 x 7.5 kHz, 1 x 9600 baud RS232, 110 kHz and 152 kHz Subcarriers.



2 x 15 kHz, 2 x 7.5 kHz, 1 x 9600 baud RS232 in 250 kHz RF channel spacing.



TFT 9100/9107 STL Tx and Rx.



Circle (82) On Reader Service Card

Who's running the ship?

Unattended operation is one way to keep your station profitable, but you still have to mind the store.

The acclaimed Burk Technology ARC-16 Remote Control System is the first step. You can control transmitter and studio from any phone.

But wait. There's more!



Introducing AutoPilot™ from Burk Technology.

AutoPilot is break-through computer software that makes automatic operation of your studio/transmitter facility a dream come true.

- Automatic power changes
- Automatic pattern changes
- Automatic site changes
- Automatic power trim
- Automatic fault recovery
- Automatic logging

Now your imagination is the only limit.

The new FCC fine schedule is imposing. Why risk a big penalty when AutoPilot can help you stay within the rules?

Call us at 508-433-8877
or toll free at
1-800 255-8090
for more information
and a FREE DEMO.

BURK

TECHNOLOGY

Circle (184) On Reader Service Card

MARKETPLACE

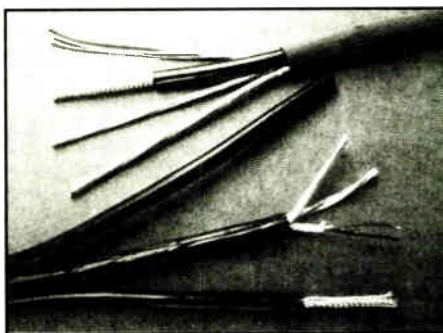
Radio World's Marketplace, a compendium of new and recently introduced radio broadcast products, appears monthly in Buyers Guide.

Composite Audio/Video Cables

Nemal Electronics International has introduced a new line of composite audio/video cables to be used in the broadcast industry.

The cables, consisting of either a standard RG59 or NEMAL 1570 double shielded precision coax, have one or more individually shielded pairs of 22 AWG stranded tinned copper with drain wire.

Round and flat standard cables in this series are available from stock. The round version, part number BC153P, contains one precision video cable and three audio pairs



with an extra flexible abrasion resistant jacket. The flat, peel-apart version, part number BC253PF, consists of two precision video cables and three audio pairs.

For information, contact Benjamin Nemser in Florida at 800-522-2253; fax: 305-895-8178; or circle **Reader Service 121**.



Radio's Only Comprehensive Reference Guide

The 1993 Radio World Directory

Your Source For...

Complete Equipment & Supplier Information

Radio World's 1992 Editorial Index

Phone Listings for the NAB & FCC

Handy Reference Material

Also Featuring...

The Best of Workbench

The Scoop on RBDS

Radio Programming Trends

All FREE with your subscription to **Radio World**, the industry's best read newspaper.

Coming in February...

Watch for It!

Safety Pen Detects Dangerous AC Voltages

The Texas Association of Broadcasters (TAB) has introduced a Safety Tape and Pen to promote engineering safety.

The pen can detect and determine the voltage running the transmitter by illuminating at different distances depending on the power level.

The UL-approved, plastic insulated pen verifies that power is turned off at the transmitter site and acts as a guide to find a breaker that has not been turned off.

Gil Garcia, Clear Channel Communication's KPEZ chief engineer, the TAB, and members of the Austin chapter of the Society of Broadcast Engineers, have also produced a safety videotape aimed at alerting chief engineers and general managers about the hazards at the transmitter site.

The tape focuses on the hazards of electrocution, RF radiation, weather conditions and security.

The tape, which is recommended for viewing before going to the transmitter site, is available at a nominal fee with the pen.

For information, contact Karen Brown-Monsen at 512-322-9944; fax: 512-322-0522; or circle **Reader Service 180**.



Updated Vega UHF Wireless Mics

An updated version of the "600 Series" UHF wireless microphone system, model 662A, was introduced by Vega. Several changes have been made to the upgraded wireless receiver in response to input from the field.

A programmable grounding of the receiver's audio transformer center tap has been implemented, making it more accommodating to a wide variety of mixing consoles.

Hum from external sources has been decreased with the help of a MU-metal shield around the audio transformer. Optimization of the grounding in the receiver's audio circuit board and power supply also reduces hum.

For more information, contact Paul Baughman in California at 800-877-1771; fax: 818-444-1342; or circle **Reader Service 111**.



Bird Electronic Calorimeter

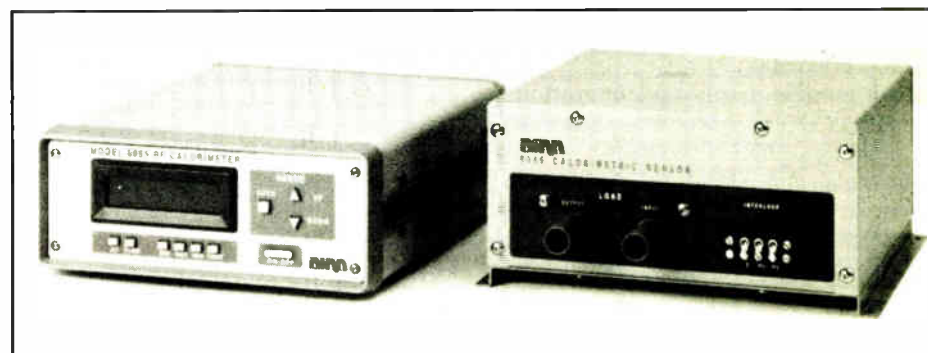
A new laboratory grade, high power, broadband calorimeter has been announced by Bird Electronic Corp.

Designed to be used with Bird's new series of Moduload load resistors, the Model 6085 has load-dependent operating frequencies. Typical measurement uncertainties are better than -3 percent of reading.

The calorimeter eliminates the need for nulling or repeated calibration before making each individual measurement. Each unit is precalibrated at the factory to a low frequency standard and carries the resulting calibration profile in non-volatile memory.

The microprocessor also eliminates the need to interpolate flow rates and temperature differences. Readings prior to display are corrected, which ensures the accuracy of the reading.

For information, call William Yochum in Ohio at 216-248-1200; fax: 216-248-5426; or circle **Reader Service 135**.





dbx 172 SuperGate Speeds Setup

dbx Professional Products has introduced the dbx 172 SuperGate, which features several engineering innovations designed to speed setup and permit effective gating in situations where conventional gates can't be used.

The SuperGate uses 24 dB/octave Voltage Controlled Filters (VCFs), instead of standard 12 dB/octave key filters.

Transient Capture Mode™ uses a precision linear-phase all-pass filter to insert 0.3 milliseconds of delay in the main signal path.

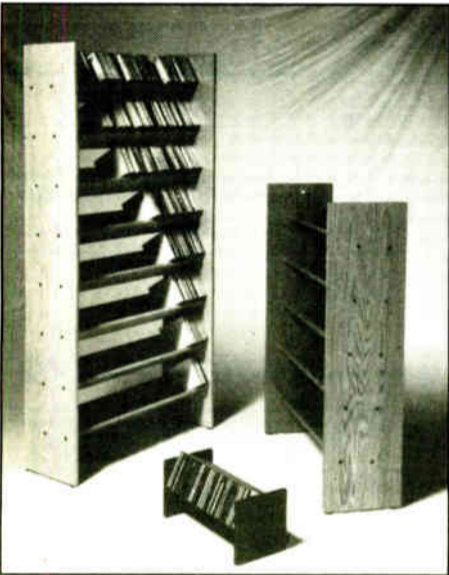
For information, contact Jawxillion (JX) Loeb in California at 510-351-3500; fax: 510-694-3991; or circle Reader Service 163.

Storadisc Provides CD Storage

Davidson-Whitehall has created the Storadisc™ CD storage system. Four different models of the storage system are available, in capacities of from 36 to 576 CDs.

The racks can be ordered in a variety of solid hardwoods and finishes. Depending on the wood, finish and capacity requested, the models range in price from \$360 to \$625.

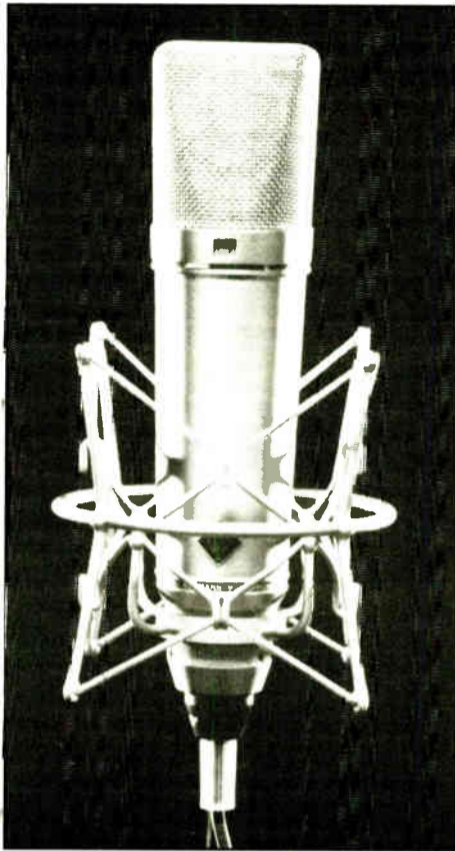
For more information, contact Eric Willadsen at 800-848-9811, or circle Reader Service 178.



Neumann U67 Tube Microphone

Neumann USA has produced a small number of the classic U67 tube microphone.

The microphone's EF 86 tube, capsule and transformer are identical to the original U67.



The package includes the microphone, power supply, suspension, cable and rosewood box. Availability is immediate, but the supply is limited.

Starting May 1993, a new version of the TLM 170 microphone will be available. The TLM 170 R will have the option of remote selection of the polar patterns through a separate power supply/controller, the N 48 R-2.

The remote controllability will be accomplished through standard, three-conductor XLR type cabling.

For information, contact Jeff Alexander in Connecticut at 203-434-5220; fax: 203-434-3148; or circle Reader Service 105.

New Team

Shalco, Inc., the oldest Michigan rep firm, recently joined the team of RAMSA representatives.

The Shalco team includes Carl Ludwig, chairman of the board; Bill McCall, president; Rick Wright, secretary/treasurer; and Margie Ludwig, office manager.

Shalco is a member of the Electronic Representatives Association and the National Sound Contractors Association. Panasonic Broadcast & Television Systems Company markets a full line of professional sound equipment, including consoles, power amplifiers and DAT recorders, under the RAMSA and Panasonic names.

adding long-term strategic financial planning to his responsibilities.

Joey Wolpert has been appointed as product specialist for AKG.

Wolpert, who recently engineered on Natalie Cole's *Unforgettable* album, has also done product specification and customer contact work at Speck Electronics.

Broadcast Programming has recently named Jim LaMarca as VP/sales manager.

LaMarca joined the company in 1991 as program director. His radio background includes working at B100, 91X, XTRA and Noble

Broadcasting in San Diego and KGW/Portland.

LaMarca will continue to program "Heart of Rock," the BP hybrid format of AC and AOR.

Bud Stiker has been named executive vice president of Bonneville Broadcasting System.

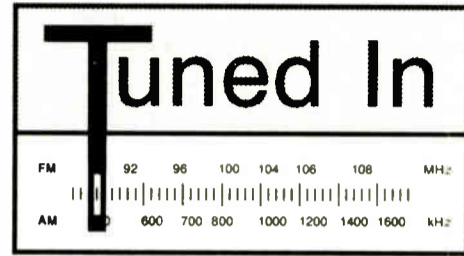
Stiker joined the company in June. Prior to Bonneville, Stiker managed stations in Boston, Dallas, Denver and Baltimore. He was most recently VP/GM for WBT AM/FM in Charlotte.

Appointments

Two promotions have been announced at Microwave Filter Company.

Robert Portmess has been promoted to executive vice president and Richard Jones has been promoted to vice president, chief financial officer and treasurer.

Portmess, who joined the company in 1985, will be responsible for engineering, sales and manufacturing. Jones, who joined the company in 1983, is



ADVERTISER INDEX

This listing is provided for the convenience of our readers. Radio World assumes no liability for inaccuracy.

| Page No. | Advertiser | Reader Service No. | Page No. | Advertiser | Reader Service No. |
|----------|--------------------------------|--------------------|----------|--------------------------------|--------------------|
| 25 | 360 Systems | 168 | 42 | Hallikainen & Friends | 26 |
| 6 | ATI | 140 | 38 | Harris-Allied | 52, 130 |
| 19 | Aphex | 36 | 7 | Harris-Allied Broadcast Equipm | 14, 85 |
| 11 | Associated Press Bdct. Service | 185 | 20 | Harris-Allied Broadcast Equipm | 18, 165 |
| 40 | Audi-Cord | 20 | 20 | Hnat-Hindes | 183 |
| 42 | Audio Broadcast Group | 98 | 18 | IFR Systems, Inc. | 53 |
| 48 | Audio Precision | 137 | 40 | J Squared Technical Service | 99 |
| 16 | Audopak | 96 | 3 | Kintronc Labs | 176 |
| 42 | Avcom of Virginia | 102 | 24 | LBA | 148 |
| 33 | BSW | 33 | 37 | LBA | 161 |
| 48 | Belar | 62 | 35 | LPB | 127 |
| 50 | Benchmark Media Systems | 73 | 38 | Micro Technology Unlimited | 193 |
| 37 | Bert | 43 | 16 | Microwave Filter | 170 |
| 18 | Broadcast Devices | 70 | 45 | Modulation Sciences | 197 |
| 29 | Broadcast Electronics | 118 | 22 | Moseley | 29 |
| 4 | Broadcast Services | 61 | 46 | Murphy Studio Furniture | 64 |
| 8 | Broadcast Services | 196 | 10 | NASDAQ | 107 |
| 41 | Broadcast Services | 157 | 8 | Nautel | 143 |
| 4 | Burk Technology | 15 | 12 | Orban/AGK/dbx | 65 |
| 52 | Burk Technology | 184 | 26, 27 | Otari Corp. | 54 |
| 58 | C & N Electronics | 2 | 39 | Pacific Recorders | 123 |
| 1 | CCA Electronics | 74 | 9 | Pioneer | 50 |
| 6 | Clark Wire and Cable | 21 | 14 | Potomac Instruments | 173 |
| 46 | Computer Concepts Corp. | 103 | 44 | OEI | 12 |
| 3 | Continental Electronics Corp. | 55 | 47 | RE America | 171 |
| 23 | Corporate Computer Systems | 112 | 24 | RF Specialties | 63 |
| 13 | Datavorld | 47 | 14 | Radio Concepts | 80 |
| 35 | Datavorld | 25 | 54 | Radio Resources | 6 |
| 46 | Datavorld | 117 | 49 | Radio Systems | 189 |
| 18 | Dielectric Communications | 16 | 15 | SMARTS Broadcast Systems | 10 |
| 30, 31 | Doby | 59 | 18 | Shively Labs | 124 |
| 18 | EAV Technology | 191 | 18 | Sono-Mag | 84 |
| 42 | Econco | 38 | 42 | Sontec | 11 |
| 58 | Econco | 4 | 13 | Super Gospel Country Radio Net | 188 |
| 57 | Economy RF Construction | 126 | 51 | TFT | 82 |
| 13 | Energy Onix | 119 | 32 | TTC | 100 |
| 54 | Engineering Etc. | 8 | 28 | Telos | 138 |
| 34 | Eventide | 136 | 18 | The Management | 34 |
| 21 | Fidelipac | 198 | 42 | Titus Technologies | 57 |
| 18 | Flash Technology | 167 | 2 | Wheatstone | 77 |
| 43 | Full Compass | 44 | 59 | Wheatstone | 144 |
| 31 | Gentner Electronics | 79 | 60 | Wheatstone | 186 |
| 18 | Gorman Redlich | 35 | 17 | ZAPNEWS | 93 |
| 54 | Hall Electronics | 104 | 42 | Zercom | 141 |

| | | | |
|----------------------|----------------------------|-------------------------|-----------------------|
| Associate Publisher |Carmel King | Publisher |Stevan B. Dana |
| Marketing Consultant |Al Leon | Ad Coordinator |Regan Deatherage |
| Production Director |Kim Lowe | Ad Coordination Manager |Simone Mullins |
| Production Manager |Julianne Stone | Circulation Director |Tiana Hickman |
| Production |Lisa Lyons, Lisa Mamo | Circulation Manager |Rebecca Seaborg |
| | | Accounts Receivable |Steve Berto |

Advertising Sales Representatives

| | | |
|-------------------------------|----------------------|----------------------|
| U.S. East: Skip Tash |703-998-7600 | Fax: 703-998-2966 |
| U.S. West: Dale Tucker |916-721-3410 | Fax: 916-729-0810 |
| International: Stevan B. Dana |+1-703-998-7600 | Fax: +1-998-2966 |
| Europe: Dario Calabrese |+39-2-753-0274 | Fax: +39-2-753-2697 |
| Japan: Eiji Yoshikawa |+81-3-3327-2688 | Fax: +81-3-3327-3010 |

Free subscriptions are available upon request to professional broadcasting and audiovisual equipment users. For address changes, send current and new address to RW a month in advance at P.O. Box 1214, Falls Church, VA 22041. Unsolicited manuscripts are welcomed for review; send to the attention of the appropriate editor.

SUBSCRIPTION/READER SERVICE FORM



FREE Subscription/Renewal Card

I would like to receive or continue receiving Radio World FREE each month. Yes No

Signature _____ Date _____

Please print and include all information:

Name _____ Title _____

Company/Station _____

Address _____

City _____ State _____ ZIP _____

Business Telephone () _____

Please circle only one entry for each category:

I. Type of firm

- D. Combination AM/FM station
- A. Commercial AM station
- B. Commercial FM station
- C. Educational FM station
- E. Network/group owner
- F. Recording Studio
- G. TV station/teleprod facility
- H. Consultant/ind engineer
- I. Mfg, distributor or dealer
- J. Other

II. Job Function

- A. Ownership
- B. General management
- C. Engineering
- D. Programming/production
- E. Sales manager
- F. News operations
- G. Other (specify) _____

III. Purchasing Authority

- 1. Recommend
- 2. Specify
- 3. Approve

Reader Service

Jan. 20, 1993 Issue Use Until Apr. 20, 1993
Please first fill out contact information at left. Then check each advertisement for corresponding number and circle below. NOTE: Circle no more than 15 numbers, otherwise cards will not be processed.

- 001 023 045 067 089 111 133 155 177
- 002 024 046 068 090 112 134 156 178
- 003 025 047 069 091 113 135 157 179
- 004 026 048 070 092 114 136 158 180
- 005 027 049 071 093 115 137 159 181
- 006 028 050 072 094 116 138 160 182
- 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
- 010 032 054 076 098 121 142 164 186
- 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
- 016 038 060 082 104 125 148 170 192
- 017 039 061 083 105 127 149 171 193
- 018 040 062 084 106 128 150 172 194
- 019 041 063 085 107 129 151 173 195
- 020 042 064 086 108 130 152 174 196
- 021 043 065 087 109 131 153 175 197
- 022 044 066 088 110 132 154 176 198

Copy & Mail to: Radio World, PO Box 1214, Falls Church, VA 22041

RadioWorld

Broadcast Equipment Exchange

"Broadcast Equipment Exchange" accepts no responsibility for the condition of the equipment listed or for the specifics of transactions made between buyers and sellers.

RADIO RESOURCES

1201 S. Sharp Street
Baltimore, MD 21230

- New and quality pre-owned broadcast equipment for sale
- Test and remote equipment available to rent for a day or a month
- Call and ask us how to turn your excess equipment into \$\$\$CASH\$\$

Call Steve, Chuck, Scott or Bill

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

9 AM-6PM E.S.T.

Circle (6) On Reader Service Card

ACOUSTICS

Want to Sell

RTS-405 (2) stereo phono preamps, used 6 mos, \$220 ea. B Lord, Lord Bdcg, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

AMPLIFIERS

Want to Sell

Marantz 8, \$1200; McIntosh MC240, \$1200; MC225, \$750; MC40, \$600; A116, \$600; MC2300, \$1500; Nak PA7AMK2, \$1750; NRG PA1, \$4500/BO/trade. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Microtrak 6401 (2) phono preamps, \$50 ea/BO. M Guidotti, 408-946-9466.

Bdct Audio BA-235 stereo mon amp, 35 W/chnl, MOSFET rack mount w/manuals, \$175/BO. R Bauer, Price Bdcg, 35 Century Park Way, SLC UT 84115.

Harris 6108 audio mon amp, 10 W, new, \$40 ea/\$100 for 3. J Davis, KRKB, 500 Media Pl, Sacramento CA 95815.

Marantz 8-B, \$995; Mdl 9's, pair, BO. Dave, Insight Prods, 7441 Wayne Ave 10-D, Miami Bch FL 33141. 305-866-6048.

RCA, Altec, Dynaco tube amps, sell of trade. Tracy Eaves, 615-821-6099 (evenings before 10PM EST).

Broadcast Technology B-300, 300 Watt RF Amplifier. New, with full documentation. 719-336-3902.

Want to Buy

Denon POA8000; Sansui B2301, B2302, C2301, C2302; Fisher SA(K)1000; Nak PA5/2; B&W MPA810; ARC M360, D150, D79, D75, D76; Crown Macro Ref; Marantz 1-10; McIntoshes; Peploes. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

McIntosh/Marantz tube gear, working/not, tubes/parts. R Gleen, WJGR, 1718 Shannandona, Wimauma FL 33598. 813-634-1940.

ANTENNAS & TOWERS

Want to Sell

Gentner VRC-1000/2000, high pwr, tuned for 93.7 MHz, BO. P Anderson, KZBQ, POB 97, Pocatello ID 83204. 208-234-1290.

RCA (8), 3 1/2" hard line bullets, fair cond, BO. M Everhart, KXYQ, 111 SW 5 #1550, Portland OR 97204. 503-226-6731.

Dear AM Broadcaster... Is your antenna system old? Need repair? New system too costly? Is copper theft a problem? New design offers cost savings & less maintenance. Send description of your situation, requirements & budget. It's worth the stamp. **ENGINEERING ETC.**, Frank Patka, 10300 S Cicero #174, Oaklawn IL 60453.

Circle (8) On Reader Service Card

ERI 1-bay circ, 95.3 MHz, 9 kW, exc cond, 4 yrs old, \$1400. M Persons, KAGE, 402 Buffalo Hills Ln, Brainerd MN 56401.

Harris/ERI 6-bay FM on 96.9 MHz, 450' 3" Helix, EIA flanges, BO. T Green, North Star, Hwy 35 E, Bay City TX 77404. 409-245-4642.

Andrew 50 ohm (2) reducer conns, 1-5/8" to 7/8" \$125 ea; 7/8" to N adap 2260B, \$75; 5 1/2" LDF5-50A w/L45R

7/8" flange on ea end, \$150; (2) 204989 1-1/2" grid kits, \$10 ea; 204989-2 7/8", \$15. M Guidotti, 408-946-9466.

Andrew 87G-83799 (2) 1 5/8" EIA flanges, new, gas blocking, \$100 ea; Andrew 34660 inner conn assembly, new, \$15. B Brewer, KOKL, 410 W G, Okmulgee OK 74447. 918-756-5400.

Cablewave APD 1030 dehydrator; CBS Labs Automax 3, mono, \$45 ea; CBS Labs DPE 450, \$45; Electro Impulse 5 kW load, bad load resistor & oil must be replaced, 1 7/8" EIA conn, \$50; Mod Sci CP 803 composite clipper. B Umberger, WMTX, 18167 US 19N #500, Clearwater FL 34624. 813-536-9600.

Utility/Rohn 400' tower for FM, gd cond. G Gilbert, CSRG, POB 50539, Denton TX 76206.

Dielectric 50000 3 1/8" motorized coax switch, \$3500. T Toenjes, KQLZ, Box 103, Manhattan KS 66502. 913-437-6549.

Stainless 300' 24" face, 25' sections w/beacon & side lamps, gd cond, 15 yrs old, \$7000. R Summer, WFXR, Box 584, W Dennis MA 02670.

4 1/6" hardware, elbows, reducers, hangers, flanges. C Murray, 503-484-9400.

ERI FMH10AC 10-bay tuned to 100.3 MHz; Andrew Helix, 3" & dehydrator, BO. G Peterson, KGGG, POB 8205, Rapid City SD 57709. 605-348-1100.

Dielectric Comm 5000-203 coaxial switch, 4-port, 1 5/8", 110 V relays, flanged, rem cable w/conn & manuals, installed, never used, \$2500/BO. D Christian, KPIU, Adm 207, Tacoma WA 98448. 206-535-7265.

USED TOWERS BOUGHT AND SOLD. Call 1-800-643-6988.

ERI 3-Bay rototiller, medium power, excel. 816-635-5959.

Want to Buy

Phelps Dodge/FM w/8+bays on 93.3/lower freq; Rhone 80 42" w/2-4 sections. E Moody, 501-273-9039.

12-bay tuned to 92.3 for upgrade; Rohn 55 10' sections. R Whitlock, KITE, 838 G Sidney Baker, Kerrville TX 78028. 210-792-4560.

R-45-G. 200'. J Kesler, WKYZ, Rt 1 Box 313, E Bernstedt KY 40729. 606-843-2209.

AUDIO PRODUCTION

Want to Sell

Studio Sound S305, vintage passive filter sets, matched pr, consec #, rack-mount, rare, \$175/ea/trade. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

RTS 405 phono preamp, (3) balanced out, 2 level present, exc cond, \$150 ea/\$400 all. J Somich, Somich Prods, 1208 Stoney Run Trl, Broadview Hts OH 44147. 216-546-0967.

SAVE \$300 ON T T 144 POINT PATCH BAYS
brokers of fine and coarse used equipment
audio village 619/320-0728

NRSC-PR pkg w/standards, preemphasis & audio filter, \$200. B Brewer, KOKL, 410 W 6th, Okinulgee OK 74447. 918-756-3646.

SAE 5000A impulse noise reduc, gd cond, \$150; dbx 118 expander/compressor, exc cond, \$125; JVC SUA-400-J surround sound proc, new w/rem, \$150. R Gleen, WJGR, 1718 Shannandona, Wimauma FL 33598. 813-634-1940.

dbx stereo noise reduc unit w/manual, rack mount, \$100/BO. M Guidotti, 408-946-9466.

Orban 672A stereo EQ, dual chnl, 8-band quasi para, nds minor work in left chnl. J Green, J Green Ltd, 1078 Barbara Ct, N Belmore NY 11710. 516-221-1344.

Henry Matchboxes (2), (2) Superrelays, (2) USDAs, Telecart II, \$105 ea+s/h, used 6 mos; (2) Lil Miss Moffaat 48 V phantom pwr splys, \$25 ea+s/h; (2) bdct sply 6' equip mounting rails, \$28 ea+s/h; Electrocom JBL ceiling spkr, housing & vol cntrl, \$40+s/h; Realistic TM 150 AM/FM tuner, \$25+s/h. B Lord, Lord Bdcg, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

Prophet 600 synthesizer, \$450; Spectro Acoustics rack mount 200 W amp, \$150; Crown VFX2 electronic crossover, \$125. W Gunn, 619-320-0728.

AKG 414 P48 like new, \$675; Dynaco 410, 400 W amp, \$400; dbx 1BX expander, \$135. W Gunn, 619-320-0728.

SKL Hi/LO variable filter (pair), \$200. W Gunn, 619-320-0728.

Roland SPH323 phaser, \$75; Rockmann sustainer & stereo chorus/delay, \$350/both. W Gunn, 619-320-0728.

TT (Bantam) ADC patchbays, 144 pts, 1 rack sp, \$129; Tannoy HPB385A 15" coaxial monitor pair in cabinet, \$1750; Altec 436A tube compressors, Daven attn, both \$700. W Gunn, 619-320-0728.

MCI JH110A 2-Trk in stand w/sound & vision remote/locator, \$1200; Orban 674A paraphoric stereo EQ, \$600; Foxtex 3070 comp/limiter, \$150; Foxtex 3180 reverb, \$50. W Gunn, 619-320-0728.

Want to Buy

Harris MSP 95. B Lacy, 95.7 KAR, 3611 Soney #6A, Amarillo TX 79121. 806-359-4000.

Crown EQ2; Sony SEQ555ES/333ES; Technics SH9090; dbx 10/20, 20/20, 14/10; Yamaha REV5, REV7; Burwen TNE7000. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks 91403. 818-377-5264.

Sansui QSD-4; QSE-4; QSE-5B encoders; Sansui QSD-1; QSD-2 decoders, any cond. R Longseth, Surround Plus, Box 64, Emery SD 57332. 605-449-4759.

Ampex MX10 or MS 35 mixers. W Gunn, 619-320-0728.

Fairchild 600 conac or 602 Conex high freq limiters. J Gangwer, 942 32nd St, Richmond CA 94804. 415-644-2363.

AUTOMATION EQUIP

Want to Sell

Harris 9000 w/3 SMC 350 Carousels, SMC 250 Carousel in 2 racks, \$2500. M Persons, KAGE, 402 Buffalo Hills Ln, Brainerd MN 56401.

IGM EC w/PC, audio switcher, interface cards for SMC 250 Carousels; 3 SMC 250 Carousels w/spare Carousel for parts & access, \$3000/BO. J Parman, WRNZ, 324 W Main St, Danville KY 40422. 606-236-7106.

IGM Go-Cart (4) 42-tray, \$2200 ea; (2) 78-tray, \$2700 ea. R Klotz, KCNQ, POB 3434, Lake Isabella CA 93240.

Harris 9000 w/kybd mon, disk drive & 4 Carousel stereo carts; 3 Gates mono cards, BO. A Russell, WNLC, 90 Foster Rd, Waterford CT 06385. 203-442-5328.

Sentry Format, used 1 yr w/everything, \$6500. G Gilbert, CSRG, POB 50539, Denton TX 76206.

SMC MSP-1 2000-event prog w/batt backup, logging printer, (4) SMC 450 Carousels, (3) mono cart P/B, sat switcher in 2 racks, \$5995. D Kelly, KWPN, Box 84, West Point NE 68788.

Harris Syst 90 w/2 Instacart machines, (4) R-R's, Brain kybd & printer, manuals & racks. J Reardon, KFJB, 123 W Main St, Marshalltown IA 50158. 515-753-3361.

SMC RS350 (2) 24-tray Carousels in rack, \$500; Xtel printer, \$150; Infoton term for Schafer 903 w/encode cards, \$50; ESP1 automation w/2 RSM 350 Carousels & 4TS 25 tone sensors, \$2500. D Rose, KAAA, 2534 Hualapai Mtn Rd, Kingman AZ 86401. 602-753-2537.

Otari ARS-1000 (9), very gd cond, \$1000/BO; (2) MW Persons 3A, \$5000/BO, 1 extension, adds 5th unit, \$150; 6' rack, 2 yrs old, \$200. T Green, North Star, Hwy 35 E, Bay City TX 77404. 409-245-4642.

IGM EC (3) w/o PCs, 24-tray Go-Carts, (4) 24-tray SMCs, rbit. C Murray, 503-484-9400.

SMC on Air Ctrlng Sat Music Ntwk, w/(2) side by side racks w/(4) SMC 350 Carousels, PDC-Super clock, DS20 dig switcher, 2-pos cart PB unit, cart P/R w/aux tones, DP-2 sequencer, DT-4 encoder w/2 video mons, \$4995. L Spivey, WLLS, 1121 S Main, Hartford KY 42347. 502-298-3268.

Schafer 900 Syst 900 w/5-Carousel decks, working & 3 large cabs, \$500/trade. B Kelley, TV-40, 4237 Airline Rd, Musk MI 49444. 616-733-4040.



Broadcast Equipment Repair

- Backed by 90 day warranty
- Highly trained, professional staff
- Fully equipped with up-to-date test equipment
- Emergency service available

Call: 217-222-8200, ext. 3160
from 8AM to 5PM CST weekdays
or ext. 3500 other times

Spotmaster microprobe programmer, \$1500. J Kesler, WKYZ, Rt 1 Box 313, E Bernstedt KY 40729. 606-843-2209.

Sentry Format FS12B w/3 R-R, (2) 48-deck stereo Instacarts, racks, \$15K/BO. Rich, 509-925-1488.

Instacart 48, mono, \$3000. J Kesler, WKYZ, Rt 1 Box 313, E Bernstedt KY 40729. 606-843-2209.

Want to Buy

Systemation ntwk superswitch. G Finney, WPWB, 7137 Heather Ln, Macon GA 31206. 912-788-2124.

BUSINESS OPPORTUNITIES

Want to Sell

THIS SPACE AVAILABLE

CALL

1-703-998-7600

CAMERAS (VIDEO)

Want to Sell

Sony RMP-3 rem paint boxes for Betacam, \$700. Dennis, Valley Prods, 6633 Van Nuys Blvd, Van Nuys CA 91305. 818-988-6602.

Sony Triniton DX-1600 w/CCU, AC adap, Canon zoom, cables, \$150+s/h. G Kirby, Gray Fox, 13613 US 36, Mansville OH 43040.

JVC GX-5700A color, working, \$500/trade. B Kelley, TV-40, 4237 Airline Rd, Musk MI 49444. 616-733-4040.

Value & Economy for Tough Economic Times

- ☆ Rebuilt & New equipment at 'bottom line' prices
- ☆ Replacement electronics & update kits for ITC, Harris, Autogram & other brands
- ☆ Full rebuild & repair service for ITC, BE and other popular cart & reel equipment.
- ☆ Tacsam and Otari factory authorized service center
- ☆ Tape heads, transformers, RF & other engineering supplies

THE SMART CHOICE!



1305-F Seminole Trail
Charlottesville, VA. 22901
(804) 974-6466

Mastercard & Visa Welcome

Circle (104) On Reader Service Card

RECEIVING/RECORDING STUDIO EQUIPMENT

• SALE or LEASE •

- BENCHMARK Audio Dist Proc & Pkg System
- SAS Audio Routing Switch
- YAMAHA YPDR 601 CD Recorder
- TASCAM 2 & 8 Trk Rcdr, CD & Cass Player
- DORROUGH Stereo Test Set
- SATELLITE DISHES...and MUCH MORE!

Call 617/267-8600 for complete configuration

LIKE NEW! • IMMEDIATE DELIVERY
EQUIPMENT REMARKETING COMPANY • Boston, MA

CART MACHINES

Want to Sell

Ampro CT 4500 plyr & Audicord 100 rec w/o head block, \$500 both. D Rose, KAAA, 2534 Hualapai Mtn Rd, Kingman AZ 86401. 602-753-2537.

BE 5000 mono R/P, \$400. S Keele, WCNI, CT College, New London CT 06320. 203-447-1296.

Great Prices on original equipment tape heads for ITC, BE, Fidelipac, Otari, Tascam & others!



HE HALL Electronics
(804) 974-6466 • FAX 6450

ITC R/P, mono R/P w/3 tones, desktop, superb cond w/cases, \$600+s/h. J Emmer, Paragon Bdcers, 509 3rd St, Peckville PA 18452.

Tapecaster 700P P/B, new belts w/150 Hz tone sensor, \$475+s/h; PD, single tone, \$295. T Crockett, Hot Tracks, POB 10501, Blacksburg VA 24062. 703-953-0222.

ITC 3-deck mono w/WRA, stereo 3-deck, P/B R/P mono, mint cond, BO. J Phillip, WZOM, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

CART MACHINES:

Many makes & models, Record/Play...
\$395.00 ea. + shipping.
Call Mark 619-598-3311

ITC SP9003 mono P/B, exc cond w/spare hd & drive wheel, \$300+s/h. G Hutchins, Hutchins Sound, 116 Roberta Dr, Hendersonville TN 37075. 615-264-1373.

ITC SP mono, play; hds & roller like new, beautiful cond w/manual, \$495; Sparta 300-CP mono play, noisy motor, \$150/BO; (5) ITC cart guides, (5) motor switches & (1) pinch roller for SP/WP mach, \$5 ea; (2) P&B KHU17D12 24 V relay, \$5 ea. M Guidotti, 408-946-9366.

BE 3000A stereo R/P/B, 3 cues in desktop case, \$1325. D Kelly, KWPN, Box 84, West Point NE 68788.

Gates mono, R/P, \$500. K Jones, KTLR, 105 W Moore, Terrell TX 75160. 214-563-1071.

ITC 3D play only, stereo triple deck, gd cond, \$1100. M Everhart, KXYQ, 111 SW 5 #11550, Portland OR 97204. 503-226-6731.

Tapecaster 700-RP, \$300; 700-RP w/delay switch, \$350; BE/Spotmaster 1070RPS w/svc manual, \$600; Mdl 1500 splice finder, \$150. P Ferrand, Ferrand Comms, 65 Atherton Ave, Nashua NH 03060. 603-889-1067.

ITC-99B stereo R/PB w/ELSA, \$3600+s/h; (5) Fidelipac Dynamax CTR112 stereo, \$1395 ea+s/h, perf cond, used 6 mos. B Lord, Lord Bdcg, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

ITC Delta 3D stereo. 2 yrs old, like new, \$2295; Henry Telecart II (4) avail, \$125. Phil Davis, Hall Electronics, 1305-F Seminole Trail, Charlottesville VA 22901. 804-974-6466.

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

CASSETTE & REEL-TO-REEL RECORDERS

Want to Sell

Revox A77 1/4-trk in wood case w/manual, clean VGC, \$350/BO; A77, parts, \$75/BO. M Guidotti, 408-946-9366.

Russco Studio Master 505 mono, record, \$500. K Jones, KTLR, 105 W Moore, Terrell TX 75160. 214-563-1071.

Otari MX-70 16-trk 1" w/rem & 14 chnl or dbx 150x noise reduc, \$11500. C Bluschke, RW Video, 4902 Hammersley Rd, Madison WI 53711.

Otari 7308 8-trk, 1", low hrs, exc cond, 15/30 ips w/rem, \$3900. L Wagner, 407-299-1299.

Amplex 350 (5) P/B w/Schafer elects, \$50 ea; (2) 350 mono, tube-type, \$50 ea; 350 xport in Russ Lang roll around cab w/P/B elects, very gd cond, \$300. B Umberger, WMTX, 18167 US 19N #500, Clearwater FL 34624. 813-536-9600.

HEAD RELAPPING/REPLACEMENT

All tape and film formats
30 years experience



350 N. Eric Drive
Palatine, IL 60067
708-358-4622

Studer A807-2 (4) VUK 2-trk analog mastering w/rare 4th hd for 1/4-trk P/B, \$6950/BO; Studer HS77 Mk IV full-trk mono, 10 hrs use, \$875/BO/trade; port

case for A77 w/mon spkrs & pwr amps, exc cond, \$375. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Otari ARS-1000 P/B, new; (3) Ampex J Phillips, WZOM, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

Long Life Tape Heads
One year warranty
Flat response or
±dB 35 Hz to 16 kHz

SEQUOIA ELECTRONICS

1131 Virginia Ave.
Campbell, CA 95008
(408) 866-8434

Ampex 440 2-trk workhorse, P/B w/rol-around cab, 1 owner, \$975; Otari MX-5050BII 2-trk mastering, 2 yrs old w/documentation, 1 owner, looks & sounds new, \$1950. B D'Anjon, Ewing Enterprises, 2927 W 141st, Gardena CA 90249. 310-532-9216.

MCI (2), not working, \$500 ea/BO; ITC 750 mono, not working, \$250/BO; Scully 280B, stereo R/P, not working, \$250. T Green, North Star, Hwy 35 E, Bay City TX 77404. 409-245-4642.

Ampex Scully 10 1/2" w/2-chnl stereo elects, BO + s/h. J Emmer, Paragon Bdcers, 509 3rd St, Peckville PA 18452.

Roberts 990 old tube-type 4-trk stereo w/amps & mon spkrs, nds work, handy man's special, BO+s/h. J Emmer, Paragon Bdcers, 509 3rd St, Peckville PA 18452.

ITC 770 (3) P/B, \$400 ea; (2) ITC 750, P/B, \$300 ea; (2) MCI-110, low profile, VGC, \$1995 ea. M Phelps, Terrapin Sound, 3526 Shore Ln, Charlotte NC 28277.

Otari ARS 1000DC (2), PB, \$650 ea. J Kesler, WKYZ, Rt 1 Box 313, E Bemstedt KY 40729. 606-843-2209.

Otari MX5050 8-trk in cons, 1/2", \$3000/BO; 8-trk in Ruslang cons, 1/2", new, \$4000/BO; 4-trk in cons, 1/4", \$2500/BO; 2-trk in cons, 1/4", \$2500; (3) Technics RSM-65, new, \$350 ea/BO; Sony TC-228 8-trk R/P, new, \$200/BO; Sony TC-777-4, mint, 1/4", 1/4-trk, \$350/BO. J Diamond, Blue Diamond, Box 102C Chubbic Rd, Canonsburg PA 15317. 412-746-3455.

TEAC A010S, stereo, uses 10 1/2", gd cond, \$400+s/h. L Spivey, WLLS, 1121 S Main, Hartford KY 42347. 502-298-3268.

Tascam DA-50 Pro DAT
R/P w/remote & manual,
recently overhauled, BO.
Steve, 703-998-7729.

Rax 100 mounting panels for Otari MX 5050s, \$35+s/h; Radio Syst DTC-1000 DAT rec w/minor ding on 1 corner, used 6 mos, \$1150+s/h. B Lord, Lord Bdcg, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

Otari MTR-12-4-C, exc cond, 100 hrs use, \$6000; (5) Otari OC-CB cndrtrs for MTR series, \$500 ea. C Hall, WZOU, 235 Bear Hill Rd, Waltham MA 02154. 617-290-0009.

3M M-79 1/4", 2-trk, very gd cond, built in roll around console w/above meter bridge, uses 10" reels, spds 7 1/2, 15 & 30 ips, w/hard cover manual, \$1200. W Dougherty, WLD Rcdg, Music Valley Rte 1, Mill Spring MO 63952. 314-998-2681.

Sony 8-trk w/auto locator, \$2500. R Leonardi, Voices, 16 E 48th St, NY NY 10017. 212-935-9820.

STUDER/REVOX

Factory Authorized Service
"Superlative Service"

Over 14,000 units serviced! Fast turnaround w/War. Huge parts inventory. New/Used Equip., Capstan shaft resurfacing.

STUDIO-SONICS
450 W. Rand Road
Mt. Prospect, IL 60056
708-670-0025

Ampex 351 mono, 7 1/2, 15 ips, tube mdl, overbridge layout in wooden roll around cons, gd heads, \$350. J Green, J Green Ltd, 1078 Barbara Ct, N Bellmore NY 11710. 516-221-1344.

Sony stereo w/bias adjustment, Dolby B & C dig counter & manuals, nds drive belt, \$60. W Dougherty, WLD Rcdg, Music Valley Rte 1, Mill Spring MO 63952. 314-998-2681.

Ampex AG440 & AG445 2-trks, (2) PB & 1 for parts, all elects, 1 roll around console. M Jordan, KTEI, POB 569, Kennett MO 63852.

ITC 750 (3) 2-trks w/manuals, \$400 ea+s/h. L Ayer, KRPL, POB 8849, Moscow ID 83843.

Tascam 102 stereo, \$150. J Ellingson, Voiceovers, 913 Warwick Dr, Cedar Falls IA 50613.

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

Studer B-67, (2) exc mech & elect cond, gd appearance, 1 in port case, \$1350, 1 in console, \$1600; A-67, gd cond, port case, \$1000. W McElroy,

Bias Rcdg, 5400 Carolina Pl, Springfield VA 22151. 703-941-3333.
Tascam 40-4 w/dbx & flight case, \$950; Tascam 48 8 trk, excel for sync, \$2950. W Gunn. 619-320-0728.

Scully 270 14" PB, 1 stereo plus 1 mono for parts, \$200/both; Ferrograph Super 7, 10", 3-7-15 ips, 2 trk, \$300. W Gunn. 619-320-0728.
Otari MX-5050 BQII 4 trk R-R, 2 yrs old, like new, \$2295; Dictaphone 8-day log-

EXPERT REVOX REPAIRS
Fast Turnarounds—Competitive Rates
Rebuilt A77s, \$800
Capstan shaft resurfacing, \$35.
JM TECHNICAL ARTS
30 Music Sq. W. #5
Nashville, TN 37203 (615) 244-6892

ging machines (2) avail, 1984 vintage, \$995 each. Phil Davis, Hall Electronics, 1305-F Seminole Trail, Charlottesville VA 22901. 804-974-6466.

Tascam 32 2-trk & 38 8-trk, like new, \$2000/both; Teac 3340 4-trk, 1/4" deck, \$375; Tascam 80-8 8-trk never really used/perfect, \$1600. W Gunn. 619-320-0728.

Ampex ATR800 mono, like new, \$1200 & AG440-8 1" 8-trk; Otari 7800 1" 8-trk, \$2900. W Gunn. 619-320-0728.

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, after 3PM CDT.

Want to Buy

Tascam 32/34 & rack ears. S Keele, WCNI, CT College, New London CT 06320. 203-447-1296.

PR99 case. 919-587-3451.

Nagra 3S/4S w/NAB hds; Sony TC880/8750; Revox B215. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Technics RS-1500/RS-1506 remote control unit. J Newberry, Golden Ntwk, 1450 Chapin Ave, Burlingame CA 94010. 415-348-4836.

Sony EM-1, open reel, port w/spring wind, circa 1962; Ficord & Freeman, port, open reel, will pay over mkt value. J Morinelli, 215-789-5472.

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. Relapped then sold. Amp Services, 224 Datura St No 614, W Palm Beach FL 33401. 800-826-0601, in FL 305-659-4805.

Ampex ATR100 taperecorders for parts. Circuit cards, heads, motors,

machine parts, or electronic parts. Call 818-907-5161.

CDs

Want to Sell

FOR SALE:
1 only—demo Marantz
CDR-1 Compact Disc
Recorder \$4750.00
Klay Anderson
801-272-1814

COMPUTERS

Want to Sell

Adeus CP2000 printer w/daisy whl, clean, whl slips, \$50/BO. M Guidotti, 408-946-9466.

Centronics 761 printer, gd cond, \$100+s/h. L Spivey, WLLS, 1121 S Main, Hartford KY 42347. 502-298-3268.

CONSOLES

Want to Sell

Tascam M-308 8x4x2 stereo mixer mic/line inputs & EQ in ea chnl, like new w/documentation, 1 owner, \$950; dbx 160x, like new, \$200. B D'Anjon, Ewing Enterprises, 2927 W 141st, Gardena CA 90249. 310-532-9216.

Snake, 16 phantom-pwr inputs w/ext ps; 250' Belden 19-pr cable/mil conns/ss strain reliefs, 10' Neumann XLR snake mates w/box or Belden snake, top qual, exc cond, \$750/BO/trade. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Sparta AS-30B 5-mixer stereo console, exc cond, \$450; Micro-Trak Sport IV port 4-mixer for rem use, built-in dialer, batt oper w/case, exc cond, \$250; Shure M-267 4-input rem amp, like-new cond, \$300. J Somich, Somich Prods, 1208 Stoney Run Trl, Broadview Hts OH 44147. 216-546-0967.


Opamp Labs 2008-RS 20-input, 8+2 cond, \$250+s/h. L Spivey, WLLS, 1121 S Main, Hartford KY 42347. 502-298-3268.

RCA BC 10A rem ctrl w/2 turntables, gd cond, \$250+s/h. L Spivey, WLLS, 1121 S Main, Hartford KY 42347. 502-298-3268.

Harris Executive, exc cond, 10-chnl, stereo, \$1000. T Toenjes, KQLZ, Box 103, Manhattan KS 66502. 913-437-6549.

DISTRIBUTOR DIRECTORY

The following distributors serving the broadcast industry would be glad to help you with any of your requirements.



FM-Antennas
Outstanding performance and quality you can be sure of. All antennas are completely tested on SWR's test range. Custom directional patterns are available.
Contact JIMMIE JOYNT
214-335-3425

CORNELL-DUBILIER MICA CAPACITORS
FROM STOCK
JENNINGS VACUUM CAPACITORS
FROM STOCK
JENNINGS VACUUM RELAYS
SURCOM ASSOCIATES
2215 Faraday Ave., Suite A
Carlsbad, California 92008
(619) 438-4420

... country, top 40, news, urban, talk, jazz, the classics, mixed bag ...
RADIO! The beat goes on!
CROUSE-KIMZEY OF ANNAPOLIS
tops in broadcast equipment
1-800-955-6800
ask for Kathleen

This Space Available
Call Simone
for details
1-800-336-3045

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



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

RadioWorld
5827 Columbia Pike, Ste 310
Falls Church, VA 22041

Select from these categories for best ad positioning:

- | | | |
|----------------------------|---------------------------|-------------------------|
| Acoustics | Consoles | Stereo Generators |
| Amplifiers | Disco-Pro Sound Equip. | Switchers (Video) |
| Antennas & Towers & Cables | Financial Services | Tapes, Carts & Reels |
| Audio Production (Other) | Limiters | Tax Deductible Equip |
| Automation Equip. | Microphones | Test Equipment |
| Brokers | Miscellaneous | Transmitters/Exciters |
| Cameras (Video) | Monitors | Tubes |
| Cart Machines | Movie Production Equip. | Turntables |
| Cassette & R-R Recorders | Receivers & Transceivers | TV Film Equip. |
| CATV-MATV Equip. | Remote & Microwave Equip. | Video Production Equip. |
| CD's | Satellite | Video Tape Recorders |
| CD Players | Software | Positions Wanted |
| Computers | Stations | Help Wanted |

Display Rates for Classified Advertising Effective January 1, 1991

| | 1x | 3x | 6x | 12x |
|---------------------------|------|-----------------|----|-----|
| 1-9 col inch (per inch) | \$55 | 53 | 50 | 45 |
| 10-19 col inch (per inch) | 50 | 48 | 45 | 40 |
| Distributor Directory | 90 | 85 | 80 | 75 |
| Professional Card | 60 | 55 | 50 | 45 |
| Classified Line Ad | | \$1.50 per word | | |
| Blind Box Ad | | \$10 additional | | |

To compute ad costs: Multiply the number of ad inches (columns x inches) by the desired rate schedule for your per unit cost. Example: a 3" ad at the 1x rate is \$165, at the 3x rate \$159, at the 6x rate \$150, at the 12x rate \$147, etc.

CONSOLES...WTS

Harris Gates 5-pot rotary board, FM stereo, 2 large S.C. cart machines, 1 FM Harris audio CPU MSP 95, gd cond, BO. M Canon, KULM, POB 111, Columbus TX 78934. 409-732-5766.

Daven • SHALLCO

Rotary Step Attenuators for Console Upgrades

| | |
|----------|-------------|
| Gates | Langevin |
| Harris | Continental |
| Autogram | LPB |
| Collins | RCA |
| Cetec | McMartin |

Broadcast Electronics
Sparta and others

Shalloco, Inc.

308 Components Drive
PO Box 1089, Smithfield, NC 27577
919-934-3135 info
800/876-3135 orders
VISA and Mastercard Accepted

Arrakis Digilink, 4 mos old, mint cond, re-warranty, \$7000. J Hart, Radio Genesis, 13701 W Jewell Ave #111, Lakewood CO 80228. 303-987-1211.

McCurdy SS8824 24 chnl dual stereo console w/on board mic processing, etc. 1984 vintage modular slide pot console, \$6995. Phil Davis or Jon Hall, Hall Electronics, 1305-F Seminole Trail, Charlottesville VA 22901. 804-974-6466.

Gates Yard Board, painted white, \$300; Bogen CSM remote mixer, \$125. W Gunn. 619-320-0728.

Want to Buy

Collins IC-10A. B Lacy, 95.7 KAR, 3611 Soncy #6A, Amarillo TX 79121. 806-359-4000.

Autogram, LPB, & related consoles. Will buy or trade for new equipment. Jon Hall, Hall Electronics, 1305-F Seminole Trail, Charlottesville VA 22901. 804-974-6466.

DISCO & SOUND EQUIPMENT

Want to Sell

TOA SM-60 (5), dual spkr w/stands, \$75 ea. J Diamond, Blue Diamond, Box 102C Chubbic Rd, Canonsburg PA 15317.

PPS-100 MIDI/SMPTE converter, \$150. R Leonardi, Voices, 16 E 48th St, NY NY 10017. 212-935-9820.

dbx 208 8-chnl noise red, \$2000/BO; dbx 154 & 155 4-chnl noise red in same rack, 8 chnls, mint, \$600/BO; Soundworkshop 262 stereo reverb, new, \$500/BO; ART DR1 dig reverb, new, \$750; ART dig reverb, new, \$750/BO; (2) Loft 450 delay line/flangers, new \$500 ea/BO; (2) Nexus 96-pt patch bays w/ 1/4 front, RCA back, new, \$300 ea/BO; (2) AB Syst 205A stereo pwr amps, 200 W, new, \$500 ea/BO; AB Syst 301 spkr witcher, new, \$250/BO; (2) ADA 2.56i dig delays, new, \$750 ea/BO. J Diamond, Blue Diamond, Box 102C Chubbic Rd, Canonsburg PA 15317. 412-746-3455.

JBL 4311, mint, \$750 pair/BO; (5) TOA SM-60 spot mons w/folding stands, \$100 ea/BO. J Diamond, Blue Diamond, Box 102C Chubbic Rd, Canonsburg PA 15317. 412-746-3455.

Symetrix SE-400 para EQ, stereo, new, \$450/BO; (2) phase shifters, new, \$250 ea/BO; (2) SG-200 stereo noise gates, new, \$300 ea/BO. J Diamond, Blue Diamond, Box 102C Chubbic Rd, Canonsburg PA 15317. 412-746-3455.

Shure Prologue 250 8" 2-way, port, \$35. J Ellingson, Voiceovers, 913 Warwick Dr, Cedar Falls IA 50613.

Duntech Sovereigns Mdl 2001, light oak, fine cond, Miami pickup/\$6000 +s/h. Dave, Insight Prods, 7441 Wayne Ave 10-D, Miami Bch FL 33141. 305-866-6048.

JVC 4-DD-5 CD-4 quad disc demod, unused, \$75/BO. D Pulwers, 703-751-9346.

Rocktron Hush II CX dual-chnl noise red syst w/box & manual, \$275; single-chnl noise red syst, \$100. P Ferrand, Ferrand Comms, 65 Alheron Ave, Nashua NH 03060. 603-889-1067.

AKG BX-20 reverb unit w/rem & manual, BO. W McElroy, Bias Rcdg, 5400 Carolina Pl, Springfield VA 22151. 703-941-3333.

Realistic 12-band stereo EQ w/stereo expander, brand new cond, \$70. W Dougherty, WLD Rcdg, Music Valley Rte 1, Mill Spring MO 63952. 314-998-2681.

CONSULTANTS

T. Z. Sawyer Technical Consultants

AM-FM-TV-LPTV

- FCC Applications & Exhibits
- Experimental Authorizations
- AM Directional Antennas
- High Power Antenna Arrays
- Frequency Studies
- Class Upgrades
- STL Applications
- Station Inspections

1-800-255-2632

FAX: (301) 913-5799 • 6204 Highland Dr. • Chevy Chase, MD 20815

MULLANEY ENGINEERING, INC.

Consulting Engineers
• Design & Optimization of AM Directional Arrays
• Analysis for New Allocation, Site Relocation, and Upgrades AM FM TV LPTV
Wireless Cable (MDS/MMDS/ITFS/OFS)
• Environmental Radiation Analysis
• Field Work
• Expert Testimony
9049 Shady Grove Court
Gaithersburg, MD 20877
Phone: (301) 921-0115
Fax: (301) 590-9757

North America RF & Audio

Mirkwood Engineering Services

Broadcast and Telecommunications Consultants

Multidiscipline Engineering and Planning Firm including • Application & Allocation Services
• Project, Engineering & Construction Management • Site Acquisition
• Rural & Remote Site Installations
• Field Service • Studio Design & Installation
50 Park Ave. Claremont, NH 03743
(603) 542-6784

PC - SOFTWARE

AM FM TV Search Programs
Contour Mapping-STL Paths
RF HAZ-1990 POP Count
FAA Tower-Draw Tower

Doug Vernier
Broadcast Consultant
1600 Picturesque Dr
Cedar Falls, IA 50613

800-743-DOUG

W. LEE SIMMONS & ASSOC., INC.

BROADCAST TELECOMMUNICATIONS CONSULTANTS
1036 William Hilton Pkwy
Ste 200F
Hilton Head Is., SC 29928
1-800-277-5417
803-785-4445
FAX: 803-842-3371

EVANS ASSOCIATES
Consulting Communications Engineers

TV • FM • AM • ITFS • Satellite
FCC Applications, Design
and Field Engineering
Video/Data/Voice • Light Fiber &
Microwave • Wide-Area Networks & STL's
216 N. Green Bay Road
Thiensville, WI 53092
(414) 242-6000 • FAX (414) 242-6045
Member AFCCE

Shaffer & Associates, Inc.
Consulting Engineers

- FCC Applications
- Propagation Studies
- AM, FM, TV, LPTV, MMDS
- Radiation Field Measurements
- Tower Construction/Maintenance

3050 Post Oak Blvd., Suite 1700
Houston, Texas 77056
(713) 621-4499 (713) 621-5751 Fax

Congratulations You've found THE CARD!

Radio Systems Engineering
"For all your Engineering Needs"

AM - FM - TV - Translators - LPTV
FCC Applications - Design - Installation

Call, fax, or write today!

(800) 551-1667

fax: (702) 898-8731

4289 Roonridge - Las Vegas, NV 89120

Teletech, Inc.

BROADCAST CONSULTANTS AND ENGINEERS

- FCC Applications & Field Engineering
- Frequency Searches & Coordination
- Tower Erection & Maintenance
- Facility Design & Construction

CONTACT:
Kenneth W. Hoehn
23400 Michigan Ave
Dearborn, MI 48124
(313) 562-6873

Consulting Communications Engineers

- FCC Data Bases
- FCC Applications and Field Engineering
- Frequency Searches and Coordination
- AM-FM-CATV-ITFS-LPTV

OWL ENGINEERING, INC.

1306 W. County Road. F,
St. Paul, MN 55112
(612) 631-1338 "Member AFCCE"

MLJ
Moffet, Larson & Johnson, Inc.

Consulting Telecommunications Engineers
Two Skyline Place, Suite 800
5203 Leesburg Pike
Falls Church VA 22041
(703) 824-5660
FAX: 703-824-5672
Member AFCCE

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

20 yrs exper on air, PD, OM, prod, remotes, traffic. G Gilpin, 919-739-8219.

Professional Broadcaster experienced in calling on broadcasters. Currently employed, marketing software and systems, looking for new challenges. Based in Southeast. Open to all offers. Write to: Radio World, POB 1214, Falls Church VA 22041. Attn: 93-01-02RW.

New DJ/trainee wants to break into NC mkt, any format/shift, anywhere, tape & resume avail. John, 919-838-5731.

Former CE seeks engrg pos, will relocate, knowledgeable in repair, maint, oper, alignment of station, studio, auto equip. 305-962-2181.

20 yr radio vet seeking FT on air w/sales, C&W format, CHR/easy listening. 501-337-7218.

Take charge, revenue, ratings, driven GM, 25 yrs sales exper, prog expert, new construction, updates, prefer South/Midwest. John, 502-247-0090.

DJ w/4 yrs exper in Christian radio, some prod work. 908-671-6491.

21 yr old, 6-yr AT, 3 yrs PD/MD at C&W station, Dec coil grad w/youth, talent & exper. Jason, 717-423-6200.

Beginning on-air personality seeking entry-lvl pos in announcing/prod; exper in oper CD plyrs, carts, turntables, copy & news writing, will relocate. Tracy, 210-654-7530.

20+ yrs exper in news, prod, copywriter, morning man, mgmt, hard worker, team plyr, good voice, consider all offers. Box 174, PA 17364.

1991 college grad w/mass media degree & 2 yrs radio exper seeks on air/prod promos/traffic pos, any format/location, will give over 100%. 603-434-7928.

Chief Engineer - BSEE, hands-on maintenance, installations, applications, modifications, custom design, computer hardware/software. At present job 18 yrs. Write to: Radio World, POB 1214, Falls Church VA 22041. Attn: Box #93-23-01RW.

Quick fix prog, sales, mktg & engrg expert; freelance for struggling stations anywhere. 813-849-3477.

Prod, 8 yr vet, personal proc gear, 24-trk exper, team plyr. D Carls, POB 1397, Marietta GA 30061. 404-425-2674.

Sales & mktg experts, sensational exper & plan to add \$30K/month min to any station w/decent signal & pop cvrg. 813-849-3477.

Exper AT seeks SE C&W/AC/oldies, local/topical/listener improvement. J Reynolds, 919-628-9338.

Radio/TV prod, camera, announcing/entry lvl. 804-474-2934.

25-yr radio vet seeks Chf/Asst Chf pos, will relocate, refs avail. D Hallow, 815-633-8111.

13 yrs exper, announcer in all formats except classical, 5 yrs mgmt exper, willing to relocate, pref small mkt, tape & resume upon request. Mike, 703-728-2323.

HELP WANTED

NETWORK NEWS ANCHORS and reporters to start early 93 in Washington D.C. and White Springs, Florida. Send tape and resume to Kent Phillips, PO Box 456 (UPS or Fed-Ex use Three River Street), White Springs, Florida

SALES ENGINEER experienced salesperson needed in out Baltimore office. Call Ashley Scarborough at Radio Resources at 1-800-547-2346.

ABOUT OUR EMPLOYMENT SECTION

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

POSITIONS WANTED: Any individual can run a "Position Wanted" ad, FREE of charge (25 words max), and it will appear in the following 2 issues of Radio World. Contact information will be provided, but if a blind box number is required, there is a \$10 fee which must be paid with the listing (there will be no invoicing). Responses will be forwarded to the listee, unopened.

Mail to: BROADCAST EQUIPMENT EXCHANGE
PO Box 1214, Falls Church, VA 22041
Attn: Simone Mullins

SERVICES

REMOTE EQUIPMENT RENTALS

COMREX and GENTNER
1, 2 & 3-Line Extender Systems
MARTI and TFT
450, 455 & 161 MHz RPU Systems
SWITCHED-56 SYSTEMS
Call or FAX Dwight Weller
WELLER AUDIO-VISUAL
ENGINEERING
Phone: 410-252-8351 FAX: 252-42621

UNITED STATES TOWER SERVICES, LTD.

5263 Agro Drive
Frederick, Maryland 21701
301-874-5885
Quality Construction, Installations, Sales,
and Maintenance since 1970.

BROADCAST DESIGN & CONSTRUCTION, INC.

- Facility Relocation
- R.F. Systems
- Soundproof/Acoustical
- Custom Cabinetry

24 HOUR EMERGENCY SERVICE
(313) 465-3226

ROHN.
Broadcast Towers
Furnished & Installed

Guyed or Self-Supporting
Solid or Tubular
20 Year
Warranty!
Call Mike Fleissner
toll free
1-800-225-ROHN

CUSTOM SOFTWARE

- PC DOS BASED
- NOVELL NETWORK
- DIGITAL AUDIO
- DEVICE CONTROL

PROJECTS PERFORMED WORLDWIDE
mediacomp
VOICE : (519) 893-6639 FAX : (519) 893-8390



Don't gamble with your advertising dollars.

Advertise in Radio World and reach 18,000+ subscribers.
Call Simone at 1-800-336-3045 today!

DISCO...WTS

Dolby 301 A-type stereo, discrete, \$500. W Gunn. 619-320-0728.

Klipsch Lascales 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, after 3PM CDT.

FINANCIAL SERVICES

Want to Sell

FOR LEASE
12kW FM TRANSMITTER
CSI 12000E
AMERICAN BROADCAST
FINANCIAL CORP.
414-482-2638

EQUIPMENT Financing, Lease Purchase Option. Need equipment for your radio, television or cable operation? New or Used. No down payment. Carpenter & Associates, Voice 501-868-5023 Fax 501-868-5401.

FINANCING ON ALL RADIO EQUIPMENT

IMMEDIATE

- Easy to qualify
- Fixed-rate, long-term leases
- Any new or used equipment & computers
- 100% financing, no down payment
- No financials required under \$50,000
- References available

Call Mark Wilson (800) 275-0185

EXCHANGE NATIONAL FUNDING

Use Our Experience For Your Business

LIMITERS

Want to Sell

UREI LA-4 stereo pair, comp/limiter, like new, \$700. J Somich, Somich Prods, 1208 Stoney Run Trl, Broadview Hts OH 44147. 216-546-0967.

Mod Sci Modminder, 6 mos old, works well, \$2000/BO. P Thurst, WPTR, POB 12279, Albany NY 12212. 518-456-1144.

CRL P/MC-300A (2) single-chnl, gd cond w/manual. C Hicks, WEAX, W Park Ave, Angola IN 46703. 219-665-7310.

Ashley CL50 peak detection, compressor, superb cond, \$125 ea/BO+s/h. J Emmer, Paragon Bdceters, 509 3rd St, Peckville PA 18452.

Dorrough 310 discriminate processor, \$300/BO; PR&E Multimax MX AM, \$200/BO. L Houck, Rollin Rcdg, 210 Altgelt, San Antonio TX 78201. 800-798-5468.

Optimod 8100A, exc cond, \$3500/BO. T Green North Star, Hwy 35 E, Bay City TX 77404. 409-245-4642.

BE AGC, \$250. K Jones, KTLR, 105 W Moore, Terrell TX 75160. 214-563-1071.

Optimod 8000A, mint cond, \$2000/BO. P Thurst, WPTR, POB 12279, Albany NY 12212. 518-456-1144.

Orban 8000 w/new parts, fact calib, \$800. K Jones, KTLR, 105 W Moore, Terrell TX 75160. 214-563-1071.

Aphex 103A type C aural exciter, \$150. J Ellingson, Voiceovers, 913 Warwick Dr, Cedar Falls IA 50613.

Texar audio prisms, pair, \$1995; Orban 418A compressor limiter, \$395; Orban 111/B stereo reverb, \$295. Phil Davis, Hall Electronics, 1305-F Seminole Trail, Charlottesville VA 22901. 804-974-6466.

Want to Buy

AM Optimod 9100. S Manuel, WWJB, 55 W Ft Dade Ave, Brooksville FL 34601. 904-796-7469.

WE BUY OPTIMOD 8000 & 8100 414-482-2638

Orban 8100A & 8000A optimods. Will buy or trade for new equipment. Jon Hall, Hall Electronics, 1305-F Seminole Trail, Charlottesville VA 22901. 804-974-6466.

MICROPHONES

Want to Sell

Audio Technica 813R cardioid, super cond w/cases, \$125 ea/BO+s/h. J Emmer, Paragon Bdceters, 509 3rd St, Peckville PA 18452.

Beyer M500 diaphragm, nds work, \$75/BO. M Guidotti, 408-946-9466.

EV 635, exc cond, \$50/BO. J Diamond, Blue Diamond, Box 102C Chubbic Rd, Canonsburg PA 15317.

RCA BK-1A (3), exc cond, BO. M Melucas, KIMM, 713 E Ohio St, Rapid City SD 57701. 605-342-1071.

Sony C-351 (2) condensers, \$200 ea; (2) AKG C/414/48, \$800 ea; beyer M107 dynamic, \$100. R Leonard, Voices, 16 E 48th St, NY NY 10017. 212-935-9820.

Shure SM57 dynamic cardioid w/case & 20' of cable, \$75. J Ellingson, Voiceovers, 913 Warwick Dr, Cedar Falls IA 50613.

Neumann U87, exc cond w/new elastic suspension mount, windscreen, \$999. A Pearce, KRAK, 1436 Auburn Blvd, Sacramento CA 95815. 916-923-9240.

Sennheiser HD414 stereo, open air w/new ear pads, \$25. J Ellingson, Voiceovers, 913 Warwick Dr, Cedar Falls IA 50613.

Telex FMR-25/WT25 wireless lapel mic, 171.905 MHz, \$150. C Stoll, KRCL, 6270 Colby, Oakland CA 94618. 510-654-3958.

Sennheiser 421/trade for equally gd R/P working cart mach. P Wasson, WKII, 3151 Cooper St #56, Punta Gorda FL 33950. 813-488-4589.

Peerless MB 520 (2) w/pwr splys, mint cond, \$500/BO; (3) AKG D2000E, new, \$125 ea/BO; (2) Sony ECM-33FP, new, \$200 ea; (6) Sony ECM-22, mint, \$150 ea/BO; (2) Sony C-22, mint, \$150 ea/BO; (6) Sony ECM-21, mint, \$100 ea/BO; Fostex M55RP, new, \$350/BO; EV 635, used, \$50/BO. J Diamond, Blue Diamond, Box 102C Chubbic Rd, Canonsburg PA 15317. 412-746-3455.

Shure SM-611C (2), very gd cond w/spec sheet, windcreens & cases, \$70 ea/\$125 pair. W Dougherty, WLD Rcdg, Music Valley Rte 1, Mill Spring MO 63952. 314-998-2681.

Telefunken M-250, U-67, 221-A; Neumann U-67, KM-56, UM-57; RCA KV3A-10,0001, 44-BX, 77-DX, BK-4, BK-5, 74-B, varicustics; Altec M-20, M-11, M-30 tube type mics. Trade or sale. Tracy Eaves, 615-821-6099 (evenings before 10PM EST).

EV 676 supercardioid mics 3/\$200; EV RE10 mic, \$125. W Gunn, 619-320-0728.

Telefunken tube mic pre amps V-76, U-73 limiter's; RCA BA-21As, BA-1As; Altec tube mic-pres. Tracy Eaves, 615-821-6099 (evenings before 10PM EST).

Telefunken M921 dual (2-way, not front/back) nickel capsules, cardioid only, classic tube mic; Neumann KM84 pair, mint, \$1100. W Gunn. 619-320-0728.

Want to Buy

AKG C24. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Shure SM-5B (3). D Mettler, WFBQ, 6161 Fall Creek Rd, Indianapolis IN 46220. 317-257-7565.

WE BUY E/V, SENNHEISER & NEUMANN 414-482-2638

77-DX's, 44-BX's, KU-3A's On-Air lights. Top price paid. Fast response. Bill Bryant Mgmt, 2601 Hillsboro Rd, G12, Nashville TN 37212. 615-269-6131.

RCA 77DXs/44BXs ribbon, chrome/TV grey, gd cond, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625, after 3PM CDT.

MISCELLANEOUS

Want to Sell

Shallco 820Q-2B3 10K stereo rotary faders w/Q 2; 320Q-2B3 600-ohm stereo rotary fader w/Q 1; Daven 600/600 2dB/step rotary fader w/Q 2; Langevin RMS-1430 mono fader w/Q 3, \$35; (2) UTC A11 A20 & A21 xfomers, Triad S-58X, Freed Q6a-7, Ampex 4580116-20 & 4580116-10 for AG35x series, \$10 ea. M Guidotti, 408-946-9466.

Consoles, video, test gear, sell/trade. G Kirby, Gray Fox Video, 13613 US 36, Marysville OH 43040. 614-261-8871.

Want to Buy

50s studio rec equip; hi-fi tube gear, 45/78 recs. K Gutzke, 7134 15th Ave S, Minneapolis MN 55423. 612-866-6183.

Conductors Score, 1945 scholastic/radio versions of Little Red Riding Hood/other classics. F Sodry, Vidicon Ave, 6 Van Horn St, Demarest NJ 07627.

Pwr Inverter, 115 VAC, 400 Hz output, 8 amps. G Kirby, Gray Fox Video, 13613 US 36, Marysville OH 43040. 614-261-8871.

We Have Access To NEW & USED

- Towers • Antennas
- STL's • Transmitters
- Transmission Line • Exciters
- Financing Available • and lots more

Let us be your one-stop shopping. We have used towers and ALL your AM needs.

Economy RF Construction Company

Joe McClish, Austin, TX
512-288-2011 Fax: 512-288-5980
Mon-Fri — 8am EST to 5pm Pacific

Circle (126) On Reader Service Card

R-R & cart racks, white & oak bases, BO. J Phillips, WZOM, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

Phasemaster T10000 rotary phase converter, gd cond, BO. D Murray, WKLT, 745 S Garfield Ave, Traverse City MI 49684. 616-947-0003.

Anvil rack case, large w/wheels, 6' high, \$1000. R Robinson, 203-269-4465.

Sony educ training tapes on TV prod, color systems, dig elects, basic video rec, exc cond, \$50/set. C Burke, Chnl 19, Atlantic Ave, Aberdeen NJ 07747. 908-290-2840.

TIE Comms 516B telephone key syst w/12 stations, 1 master; TFT 730A sub-carried mon, 67 kHz, BO; (2) Ampro 2505B P/B carts, works; Belar RFA-1 amp, new on 96.9, \$450/BO. T Green, North Star, Hwy 35 E, Bay City TX 77404. 409-245-4642.

1/16" (2) console knobs, (1) 1-7/16" knob, (6) rotary attenuator scale plates, console switches, \$10. M Guidotti, 408-946-9466.

Dayton W3056 5000 W gener, 220 & 110 AC output, \$1250. K Jones, KTLR, 105 W Moore, Terrell TX 75160. 214-563-1071.

Bardwell McAllister 2000 W large stage lights w/barndoors, clamp, \$200 ea; 1000 W Kleig boards, \$100 ea. 212-969-0240.

Radio sales (16) VHS training tapes covering 30 topics, \$2000. R Trumbo, KNLE, POB 117, Quincy CA 95971.

Stabaline AC pwr regulator, (4), 3-phase, (2) pwr 25 kW FM xmtrs, \$2000, (2) pwr 10 kW FM xmtrs, \$1500. C Hall, WZOU, 235 Bear Hill Rd, Waltham MA 02154. 617-290-0009.

Gentner Versapatch (2) prewired patch bays, perf cond, used 6 mos, \$360 ea+s/h; free patch cords w/purchase of above. B Lord, Lord Bdcgt, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

NOS UTC chokes, (1) CG-104, 10HY 350MA, (2) CG-44 30HY 100MA, \$75+s/h; Hammarlund SP600 rcvr, tube type, 54-54 MHz, heavy, \$100+s/h. L Spivey, WLLS, 1121 S Main, Hartford KY 42347. 502-298-3268.

Superior Elec Stabaline pwr conditioner, \$140+s/h, used 6 mos. B Lord, Lord Bdcgt, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

RCA 11717 on-air warning light, circa 50s, art deco design, trade/Crown 824 recorder/similar; (39) major music prod albums, 20 volumes, mint, \$40+s/h. J Morinelli, 215-789-5472.

Conductors Score, 1945 scholastic/radio versions of Little Red Riding Hood/other classics. F Sodry, Vidicon Ave, 6 Van Horn St, Demarest NJ 07627.

Pwr Inverter, 115 VAC, 400 Hz output, 8 amps. G Kirby, Gray Fox Video, 13613 US 36, Marysville OH 43040. 614-261-8871.

We Have Access To NEW & USED

- Towers • Antennas
- STL's • Transmitters
- Transmission Line • Exciters
- Financing Available • and lots more

Let us be your one-stop shopping. We have used towers and ALL your AM needs.

Economy RF Construction Company

Joe McClish, Austin, TX
512-288-2011 Fax: 512-288-5980
Mon-Fri — 8am EST to 5pm Pacific

Circle (126) On Reader Service Card

R-R & cart racks, white & oak bases, BO. J Phillips, WZOM, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

Phasemaster T10000 rotary phase converter, gd cond, BO. D Murray, WKLT, 745 S Garfield Ave, Traverse City MI 49684. 616-947-0003.

Anvil rack case, large w/wheels, 6' high, \$1000. R Robinson, 203-269-4465.

Sony educ training tapes on TV prod, color systems, dig elects, basic video rec, exc cond, \$50/set. C Burke, Chnl 19, Atlantic Ave, Aberdeen NJ 07747. 908-290-2840.

TIE Comms 516B telephone key syst w/12 stations, 1 master; TFT 730A sub-carried mon, 67 kHz, BO; (2) Ampro 2505B P/B carts, works; Belar RFA-1 amp, new on 96.9, \$450/BO. T Green, North Star, Hwy 35 E, Bay City TX 77404. 409-245-4642.

1/16" (2) console knobs, (1) 1-7/16" knob, (6) rotary attenuator scale plates, console switches, \$10. M Guidotti, 408-946-9466.

Dayton W3056 5000 W gener, 220 & 110 AC output, \$1250. K Jones, KTLR, 105 W Moore, Terrell TX 75160. 214-563-1071.

Bardwell McAllister 2000 W large stage lights w/barndoors, clamp, \$200 ea; 1000 W Kleig boards, \$100 ea. 212-969-0240.

Radio sales (16) VHS training tapes covering 30 topics, \$2000. R Trumbo, KNLE, POB 117, Quincy CA 95971.

Stabaline AC pwr regulator, (4), 3-phase, (2) pwr 25 kW FM xmtrs, \$2000, (2) pwr 10 kW FM xmtrs, \$1500. C Hall, WZOU, 235 Bear Hill Rd, Waltham MA 02154. 617-290-0009.

Gentner Versapatch (2) prewired patch bays, perf cond, used 6 mos, \$360 ea+s/h; free patch cords w/purchase of above. B Lord, Lord Bdcgt, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

NOS UTC chokes, (1) CG-104, 10HY 350MA, (2) CG-44 30HY 100MA, \$75+s/h; Hammarlund SP600 rcvr, tube type, 54-54 MHz, heavy, \$100+s/h. L Spivey, WLLS, 1121 S Main, Hartford KY 42347. 502-298-3268.

Superior Elec Stabaline pwr conditioner, \$140+s/h, used 6 mos. B Lord, Lord Bdcgt, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

RCA 11717 on-air warning light, circa 50s, art deco design, trade/Crown 824 recorder/similar; (39) major music prod albums, 20 volumes, mint, \$40+s/h. J Morinelli, 215-789-5472.

Want to Buy

Marantz 4400; Sansui QRX series, any cond. R Longseth, Surround Plus, Box 64, Emery SD 57332. 605-449-4759.

REMOTE & MICROWAVE EQUIP

Want to Sell

Moseley MRC-1620 studio & xmtr units w/modem, manuals & TM20 software, \$3000/BO. J Ryan, KIQY, 743 Main St, Lebanon OR 97355.

Gentner EFT-3000 3-line frequency extender set of 2 units, \$5250/BO. Dwight Weller, 410-252-8351.

Harris 9100 facilities ctrl, \$5500. B Murdoch, WVAZ, 800 S Wells, Chicago IL 60607. 312-360-8183.

Marti STL-8, exc cond. B Lacy, 95.7 KAR, 3611 Soncy #6A, Amarillo TX 79121. 806-359-4000.

COMREX RENTALS

1, 2 and 3-Line Extenders
Switched 56 Systems
Call Steve Kirsch for details
Silver Lake Audio
(516) 623-6114 FAX: 377-4423

Marti RPT-15 161.76, new, 200', 1/2 65', 7/8" feedline, 3.5 element, 450 MHz. J Phillips, WZOM, 414 Washington Ave, Defiance OH 43512. 419-782-8591.

Moseley DRS-1AR 20-chnl dig display w/manuals, SCA, gd cond, \$500/BO; RCA BTR-15BW 15-chnl w/Hallikainen dig display w/manuals, gd cond, \$500/BO. R Bauer, Price Bdcgt, 35 Century Park Way, SLC UT 84115.

Marti, \$250. K Jones, KTLR, 105 W Moore, Terrell TX 75160. 214-563-1071.

McMartin AM EBS, \$250. K Jones, KTLR, 105 W Moore, Terrell TX 75160. 214-563-1071.

Moseley TRC15, gd cond, \$1000+s/h. L Spivey, WLLS, 1121 S Main, Hartford KY 42347. 502-298-3268.

RENTALS RENTALS RENTALS

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

Moseley TRC-15A, exc cond, \$750. T Toenjes, KQLZ, Box 103, Manhattan KS 66502. 913-437-6549.

Marti RPT-25 25 W UHF rem, very clean, \$475+s/h. J Davis, KRBK, 500 Media Pl, Sacramento CA 95815.

Marti RMC-2AX studio & xmtr, 20 chnls, \$300; (4) Sinclair STL ant reflector w/o driven element, \$150 ea. G Arroyo, 407-830-0800.

McMartin TG-2 EBS decoder. R Whillock, KITE, 838 G Sidney Baker, Kerrville TX 78028. 210-792-4560.

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

MOVIE PROD EQUIP

Want to Sell

Athena 4000 16mm film proj w/var spd, \$500+s/h; RCA TP66 16mm film prof w/optical sound in wood crates, \$100 ea/\$500 for 8+s/h. J Davis, KRBK, 500 Media Pl, Sacramento CA 95815.

MCI DRCR-9 9-chnl, \$900. M Jordan, KTEI, POB 569, Kennett MO 63852.

Sine Syst RFC-1/8 RP8/AFS-1, \$1400/BO; Motorola bus band syst, \$150. J Rabb, WKGX, POB 1080, Lenior NC 28645.

Want to Buy

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

Mark P-9A72GN-1 (2) 6" grid parabolics for 950 MHz STL; Marti STL-10 xmtr & rcvr. D Kelley, KCQL, 303 Ash St, Aztec NM 87410. 505-334-7558.

Marti STL-8 & STL-10 equipment. Will buy or trade for new equipment. Jon Hall, Hall Electronics, 1305-F Seminole Trail, Charlottesville VA 22901. 804-974-6466.

SATELLITE EQUIPMENT

Want to Sell

Harris 6550 rcvr, \$500/BO; Wegener 1601 rcvr card w/down converter, \$125/BO. M Guidotti, 408-946-9466.

Sci Atl 7300 wideband BPSK rec, 7325 dig proc unit, SEDAT card, 2 DATS cards, voice cue decoder card, \$5250/BO. T Green, North Star, Hwy 35 E, Bay City TX 77404. 409-245-4642.

Heil SCPC, like new, used only a few hrs, stand-alone/in conjunction w/existing sat, \$300. J Parks, 203-347-2565.

Wegener 1601 mainframe w/1601 pwr sply, 1630-01 card for CNN news, 6 mos use, BO. M Daigle, WSJR, 6 10th Ave, Madawaska ME 04756. 207-728-4000.

Wegener 1600 mainframe w/1629 demod & tone decoders for Pure Gold SMN format w/Adcom rcvr, \$1000. M Jordan, KTEI, POB 569, Kennett MO 63852.

SCPC SATELLITE AUDIO RECEIVE EQUIPMENT. New and used, many brands, complete units, downconverters, commercial LNB's. All in excellent condition, good prices, perfect for low cost SCPC uses. SASE for list. Universal Electronics, Inc. 4545 Groves Road #13, Columbus OH 43232. 1-800-241-8171.

Want to Buy

Sci Atl 7.5 MHz card to rcv talknet. 316-251-3800.

Ku-band exciter, working cond. 212-969-0240.

STATIONS

Want to Sell

Class C FM, 10 kW AM in Miles City, MT, exc signals, mint equip, \$595K. Paul, 612-222-5555.</

STATIONS...WTB

FM in trouble, I will GM it out. G Stuart, POB 1622, Reading PA 19603.

Non-comm FMs, dark/on-air, CPs welcome, AMs considered. L Henley, 205-749-4312.

STEREO GENERATORS

Want to Sell

Moseley SCG 4T 67 kHz, \$150. M Everhart, KXYQ, 111 SW 5 #1550, Portland OR 97204. 503-226-6731.

Dorough 80-B, works, \$100. A Russell, WNLC, 90 Foster Rd, Waterford CT 06385. 203-442-5328.

Want to Buy

Subcarrier & demod w/at least 7 kHz bandwidth. J Davis, 806-259-3511.

SWITCHERS (VIDEO)

Want to Sell

Pana WV-600P spec effects gener, splits, supers, wipes, \$100/s/h. G Kirby, Gray Fox, 13613 US 36, Marysville OH 43040.

TAPES/CARTS & REELS

Want to Sell

Pams Jingles ref tapes, 1951-1976, BO. R Kaufman, Pams Prods, POB 462247, Garland TX 75046. 214-271-7625.

CHR-A/C thousands, 3.5, 5.5 & 7.5 min lengths, \$3 ea. M Seeber, KXGO, 215 4th St #A, Eureka CA 95501. 707-445-8104.

Bonneville Lite AC library, pristine cond, 101+ disks, \$2500. T Backer, WXHC, Box 386, Homer NY 13077. 607-749-9942.

Fidelipac Mastercart II, (100), new, 70" length, \$2.50 ea. M Guidotti, 408-946-9366.

C-90s, \$.20 ea/1000, \$.25 ea/500; 3M & Ampex, 7" x 1/4", 1800', one pass ea, \$2 ea/100; 10 1/2" x 1/2", plastic, empty, gd cond, \$1 ea/50. L Wagner, 407-299-1299.

200 carts, used, \$3 ea. J Kesler, WKYZ, Rt 1 Box 313, E Bernstedt KY 40729. 606-843-2209.

Fidelipac, Audiopack, (400), various, used, BO; BE 8-rack Lazy Susan rack; single racks, hold 25, BO. R Meyers, Benchmark, 4700 SW 75 Ave, Miami FL 33155. 305-264-5963.

Audiopak AA-2 (560), nd rblt, BO. B Henry, KLLK, 12 W Valley St, Willits CA 95490. 707-459-1250.

Fidelipac 300 B, (2), new, 16 min long, \$10 ea; VIF NAB adaptors, unused, \$30 pair; various, 7" boxes, \$12/40. M Saady, 1st City Rcdg, 141-60 84 Rd Apt 3E, Briarwood NY 11435. 718-876-2062.

Scotchart IIs, some new, some used 6 mos, \$2-\$3 ea+s/h; (32) Fidelipac cart racks hold 25, \$20 ea+s/h. B Lord, Lord Bldg, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

Airchecks from 50s/60s/70s/80s. B Eckart, Oklahomas Classics, Box 803, Mustang OK 73064.

TEST EQUIPMENT

Want to Sell

Philips PM6507 curve tracer, \$1475/BO/trade. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

OK SA-6/PC BH-50 elec desolder sucker/circuit bd holder, very gd cond, \$50. L Spivey, WLLS, 1121 S Main, Hartford KY 42347. 502-298-3268.

Westcom Hameg HM103-3 oscilloscope, \$275+s/h, used 6 mos. B Lord, Lord Bldg, 13313 SE 208th St, Kent WA 98042. 206-631-2374.

HP 8415A vector impedance mtr, exc cond w/o probes, \$2500; Leader LDM-170 distortion analyzer, gd cond, \$100. G Arroyo, 407-830-0800.

Want to Buy

Crown RTA2 real-time analyzer; Tek 570 tube curve tracer; Lambda & HP pwr splys. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

TRANSMITTERS

Want to Sell

Harris 2.5 H3 FM, 2.5 kW w/TE3 exciter on 95.9 MHz, \$7500. D Rose, KAAA, 2534 Hualapai Mtn Rd, Kingman AZ 86401. 602-753-2537.

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**

RCA BTA-5U/100, runs, nds work, \$5000. A Russell, WNLC, 90 Foster Rd, Waterford CT 06385. 203-442-5328.

McMartin/Harris 10-20 kW FM, gd cond. G Gilbert, CSRG, POB 50539, Denton TX 76206.

Gates FM1H 1000 W, on air; Bauer 607 1500 W FM, very clean, exc cond. S Bock, WQEQ, RD 1 & Walnut St, Freeland PA 18224.

NEW BROADCAST ELECTRONICS, INC.'s Solid State FM 1KW with FX-50 only \$16,500, 500 watt also available.

Call Dave White 217-224-9600

Gates BC-1G 1 kW AM, \$2000. M Everhart, KXYQ, 111 SW 5 #1550, Portland OR 97204. 503-226-6731.

RCA BTF 3B 3 kW, \$2000. A Burgos, WNZN, POB 764, Lorain OH 44052. 419-588-3700.

STILL USING A TUBE EXCITER?

Upgrade it with solid-state technology on a single 3x5 PC board for only **\$189.95** MODEL PLFM-100 **JT Communications** 579 N.E. 44th Ave., Ocala FL 32671 **904-236-0744**

CCA FM 10000 G new, 10 kW, 10 hrs, \$45K. L Tighe, WRNJ, Box 1000, Hackettstown NJ 07840.

Collins 830D-1A, exc cond w/exciter & manuals, \$2900. T Toenjes, KQLZ, Box 103, Manhattan KS 66502. 913-437-6549.

FM TRANSMITTERS

- 15 watts FM 1985 Harris MX-15
- 1.0 kW FM 1970 Harris 1H3
- 1.5 kW FM 1967 Bauer 607A
- 2.5 kW FM 1977 Collins 831-D1
- 8.0 kW FM 1979 CCA 8000E
- 12.0 kW FM 1982 CSI 12000E
- 20.0 kW FM 1975 RCA BTF-20E1
- 20.0 kW FM 1973 CCA 20000 DS

PMA MARKETING, INC.
"TRANSMITTING SAVINGS TO YOU"
414-482-2638 FAX 414-483-1980

Harris HT3.5 2 yrs old, 4000 W. E Alderman, 503-686-9530.

Acrodyne TLU1KACT 1 kW on chnl 15 w/new spare tube, single phase AC sply. H Larson, TV15, 615 Tank Farm Rd, San Luis Obispo CA 93401. 805-544-1515.

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

Low pwr AM, \$3000. J Kesler, WKYZ, Rt 1 Box 313, E Bernstedt KY 40729. 606-843-2209.

Old/nonworking exciters, junk prices only. J Cunningham, KEOR, Rte 2 Box 113B, Stonewall OK 74871.

5 kW AM & 20/25 kW FMs, ref Continental/Collins/Harris, late 70s/late. D Kelley, KCQL, 303 Ash St, Aztec NM 87410. 505-334-7558.

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

TUBES

Want to Sell

NEW EIMAC TUBES
Howell Sales
Phone/Fax:216-747-1841

Penta prem output KT88, \$35; KT99B, \$55; EL34HD, \$15; 12AX7B, 6072M. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Harris FM-2.5K with MS-15 exciter, excel cond. 816-635-5959.

Harris FM-10G, gd cond, priced to sell. 816-635-5959.

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

ECONCO
Quality Rebuilt Tubes

Approximately 1/2 the Cost of New

Call for Our Price List

800-532-6626
916-662-7553

FAX 916-666-7760

Circle (4) On Reader Service Card

4-400A, (2), \$75 ea/BO; (5) 6146A, \$10 ea/BO; 798A, \$10/BO. M Guidotti, 408-946-9466.

Eimac 4CX250B, new, \$100/BO. C Hicks, WEAX, W Park Ave, Angola IN 46703. 219-665-7310.

4-1000A, 8877, 4CX250B, 4CX1500B, 4CX3000A & more. We carry large inventory all major brands, Eimac, Amperex, RCA, etc. Call Stew 1-800-842-1489.

Want to Buy

6072; 5651; 5691; 5692; 6005; 6084; 6386; 7308; 6A05; 6BL7; 6DN7; 6EJ8; 6EM7; 6GK5; 6HU8; 6JK6; 6XK8; ECC808; ELL80; 300B; 2A3; 13CW4; VF14; AC701. R Katz, Allegro Sound, 15015 Ventura Blvd, Sherman Oaks CA 91403. 818-377-5264.

Gold Lion KT-88/British/USA KT-88s, new/used. R Gleen, WJGR, 1718 Shannandona, Wimauma FL 33598. 813-634-1940.

WANTED! Transmitting Tubes

We BUY & SELL all types of transmitting/receiving tubes.

C&N Electronics
Harold Bramstedt
6104 Egg Lake Road
Hugo, MN 55038

(612) 429-9397 ext.23
(800) 421-9397 ext. 23
FAX (612) 429-0292

Circle (2) On Reader Service Card

Link 103 test jig & building equip, Bri/American. F Sodry, Vidicon Ave, 6 Van Horn St, Demarest NJ 07627.

WANTED: TUBES

I pay cash or trade for all types of transmitting or special purpose tubes.

Mike Forman
1472 MacArthur Blvd. Oakland CA 94602
[510] 530-8840

TURNTABLES

Want to Sell

Shure SS39B (8) stylus, new, \$10 ea. M Reichard, 219-482-9288.

Russco Cue-Master (2) w/arm, \$100 ea; Studio-Pro w/arm, \$100/BO. M Guidotti, 408-946-9466.

Technics SL1200 MK2, new, \$525; (2) Ramko XCLSCM preamps, new, \$150 ea. T Green, North Star, Hwy 35 E, Bay City TX 77404. 409-245-4642.

Harris-Gates CB-77, (2), new \$350 ea; (2) Micro Trak 303 ea; (2) Shure M-121 stereo, new, \$125 ea. V Mlyneis, 8211 Essen Ave, Parma OH 44129. 216-884-3705.

Want to Buy

Empire Mdl 98 tonearm for Mdl 398-598, satin/gold/chrome, mint cond. J Morinelli, 215-789-5472.

Moving coil cart phono preamp, ref 0.09 mV in/3.0 mV out. D Pulvers, 703-751-9346.

VIDEO PROD EQUIP

Want to Sell

Sony BVE-3000, cables & manuals, \$500. C Burke, Chnl 19, Atlantic Ave, Aberdeen NJ 07747. 908-290-2840.

TRANSCOM CORP.

Serving the Broadcast Industry Since 1978

Fine Used AM & FM Transmitters and Also New Equipment

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

- 1 kW FM1978 Collins 831C2
- 2.5 kW AM 1982 CCA 2500D
- 2.5 kW FM 1978 CCA 2500R
- 2.5 kW AM 1976 McMartin BA2.5K
- 3 kW FM 1975 CCA 3000D
- 5 kW AM 1979 Harris MW5A
- 3 kW FM 1974 Harris FM3H
- 5 kW AM 1968 Harris BC5H
- 3.5 kW FM 1979 Syntronics SI-F-3
- 5 kW AM 1972 CCA AM5000D
- 5 kW FM 1989 Harris HT5
- 5 kW AM 1977 RCA BTA 5L
- 15 kW FM 1975 AEL 15KG
- 50 kW AM 1977 CCA AM50,000D
- 25 kW FM 1988 TTC 25,000

1077 Rydal Road #101
Rydal PA 19046

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

ACTION-GRAM

Equipment Listings

Radio World's Broadcast Equipment Exchange provides a FREE listing service for all broadcast and pro-sound end users. Simply send your listings to us, following the example below. Please indicate in which category you would like your listing to appear. Mail your listings to the address below. Thank you.

Please print and include all information:

Contact Name _____

Title _____

Company/Station _____

Address _____

City/State _____

Zip Code _____

Country _____

Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a paid basis. Line ad listings & display advertising are available on a per word or per inch basis.

WTS WTB Category: _____

Make: _____ Model: _____

Brief Description: _____

Price: _____

I would like to receive or continue receiving

Radio World FREE each month.

Yes No

Signature _____ Date _____

Please Circle only one entry for each category:

I. Type of Firm

- D. Combination AM/FM station
- A. Commercial AM station
- B. Commercial FM station
- C. Educational FM station
- E. Network/group owner
- F. Recording studio
- G. TV station/teleprod facility
- H. Consultant/ind engineer
- I. Mfg. distributor or dealer
- J. Other _____

II. Job Function

- A. Ownership
- B. General management
- C. Engineering
- D. Programming/production
- E. News operations
- F. Other (specify) _____

*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.

Broadcast Equipment Exchange

Phone: 703-998-7600 PO Box 1214, Falls Church, VA USA 22041 FAX: 703-998-2966

Give Your Production People Some POWER!

THE SP-6 IS LOADED WITH FEATURES! Like a powerful equalizer section that gives your talent greater creative freedom; four auxiliary sends that can be used for special effects, headphone feeds, or IFB mixes; both 8-track and stereo bus assigns for multi-track and dubbing work; plus a choice of mono mic/line or stereo input channels. And, to keep things fast and productive, it even includes full machine control logic, control room and studio mutes, plus tally systems—just like you'd expect on an on-air console. The SP-6 provides independent headphone, control room and multiple studio monitors, and (of course) an automatic stereo cue/solo

system. Our unique track monitor section will speed your production pace, allowing simultaneous stereo mixdown during the multi-track bed session.

A powerful group of accessory modules will increase your production control, like a 7-station intercom module that links this console with other Wheatstone consoles and talent stations throughout your complex; a full-function tape recorder control panel; an 8-position source selector to enhance input capability; additional studio modules to accommodate multi-studio installations; and finally, a digital event timer and a precision clock.

So contact Wheatstone, the company with the integrity and experience you can count on.



 Wheatstone® Corporation

5720 V.I.P. Parkway, Syracuse, NY 13211 (tel 315-455-740/fax 315-454-8104)

Circle 144 on Reader Service Card

SP-6

Wheatstone's Finest

We've taken all that we know, all that you've asked for, and the very best of today's technology and components to bring you our finest radio console: the A-6000.

The A-6000 has all the features you could need (or even MIGHT need) but with a family of over 125 input module combinations, you're free to choose the features you DO need: like a built-in routing switcher with individual alpha channel displays, so you can configure your console to suit changing program requirements; Wheatstone's exclusive Bus-Minus™ system, the ultimate tool for news and sports events; four mix-minus busses, bringing real power to talk formats; logic controlled program and mix-minus buses, giving you complex function from simple switch commands; a full array of stereo and mono send controls for studio or effect

mixes; and of course, an equalizer option for your production suite. You can even add features later; you can relocate any module anywhere in the mainframe at any time, preventing obsolescence as format needs change.

And while Wheatstone is well known for superior technical performance, the A-6000 surpasses even our own previous consoles in virtually every measurement category.

The A-6000 has the appearance, features and power to excite the most demanding program and production staff; its engineering, performance and thoughtful design will help your technical staff achieve excellence. So contact Wheatstone, the people with knowledge, experience and a commitment to excellence.



Wheatstone Corporation

6720 V.I.P. Parkway, Syracuse, NY 13211 (tel 315-455-7740 / fax 315-454-5701)

Circle (111) On Reader Service Card
World Radio History

A-6000