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**Test and
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 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-

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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

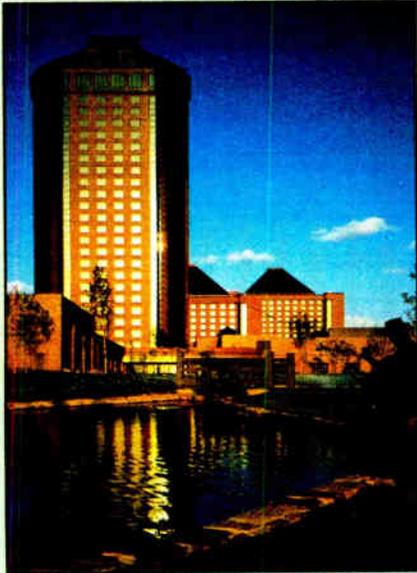
The RAB is presenting "Executive Symposium," an exclusive session limited to the first 200 managers to register. The session will be taught by NewCity Communications President and CEO

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

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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 ►

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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.

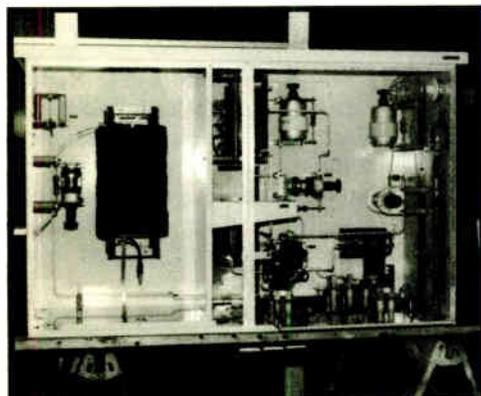
FCC Creates EBS Working Group

► 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."



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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-



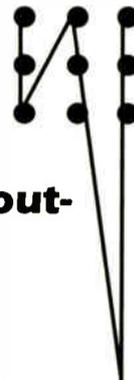
shaped grid. The nine dots have to be connected by drawing four lines, while never lifting your pen off the page.

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

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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

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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.

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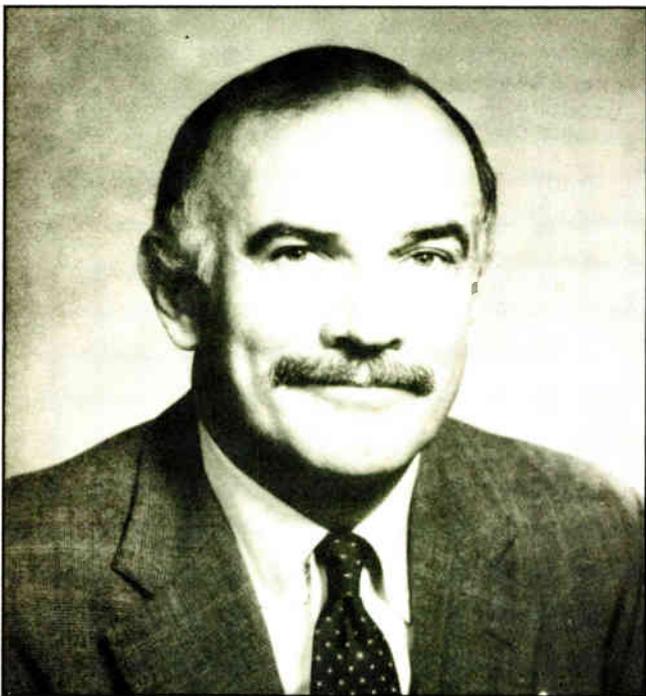
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Industry Makes Predictions For 1993

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 ▶

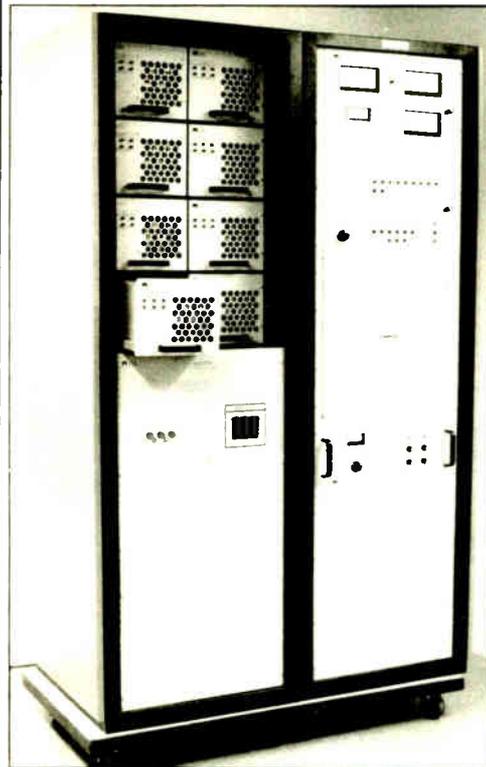
1993 will see the continuing impact of developments from 1992. FCC liberalization of duopoly will probably bring with it as much change as did the opening of the FM band to broadcasting. The economics of our business stink due to overpopulation of stations and concentration of listeners in the top few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

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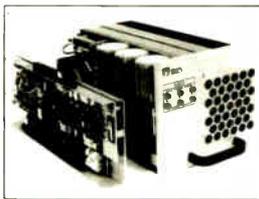
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008	030	052	074	096	118	140	162	184
009	031	053	075	097	119	141	163	185
010	032	054	076	098	120	142	164	186
011	033	055	077	099	121	143	165	187
012	034	056	078	100	122	144	166	188
013	035	057	079	101	123	145	167	189
014	036	058	080	102	124	146	168	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
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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
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MANAGING
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Connect the dots. Use only four lines.
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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



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OPTIMOD-FM

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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 ▶



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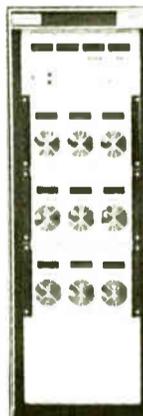
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Low-Dollar Accounts Build Revenues

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.

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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.



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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.

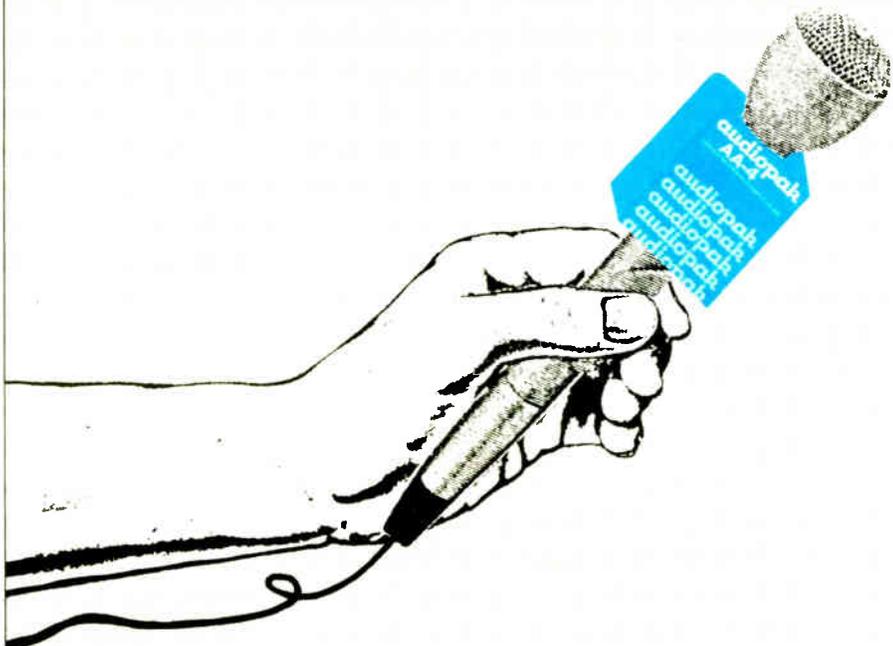
I firmly believe that advertising professionals who have enough foresight to stop trying to hold back the tide will eventually enjoy the opportunity to ride that tide. Advertising clients will respond favorably to them as consultants who are selfless enough to actually recommend newspapers, TV, direct 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.

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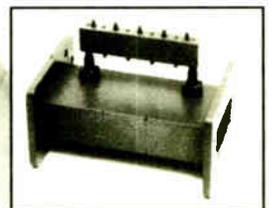
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Wall, Floor and Ceiling Treatments

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

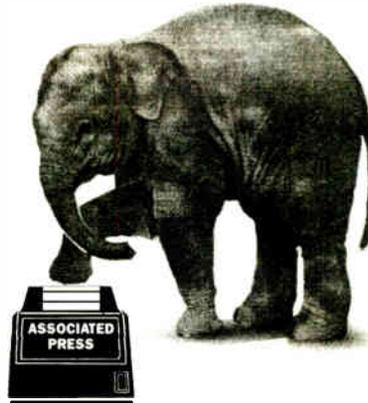
required, there are many approaches, all of relatively the same cost.

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 ►

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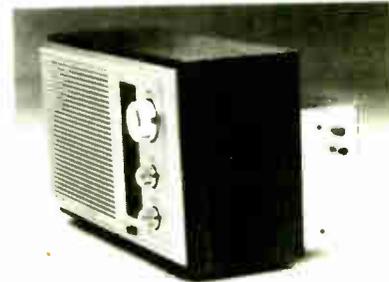


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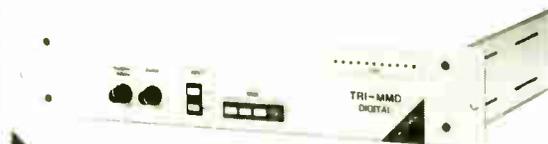
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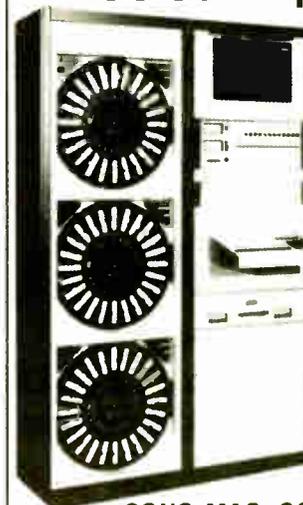
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Radio AAHS: Niche Programming for Kids

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.

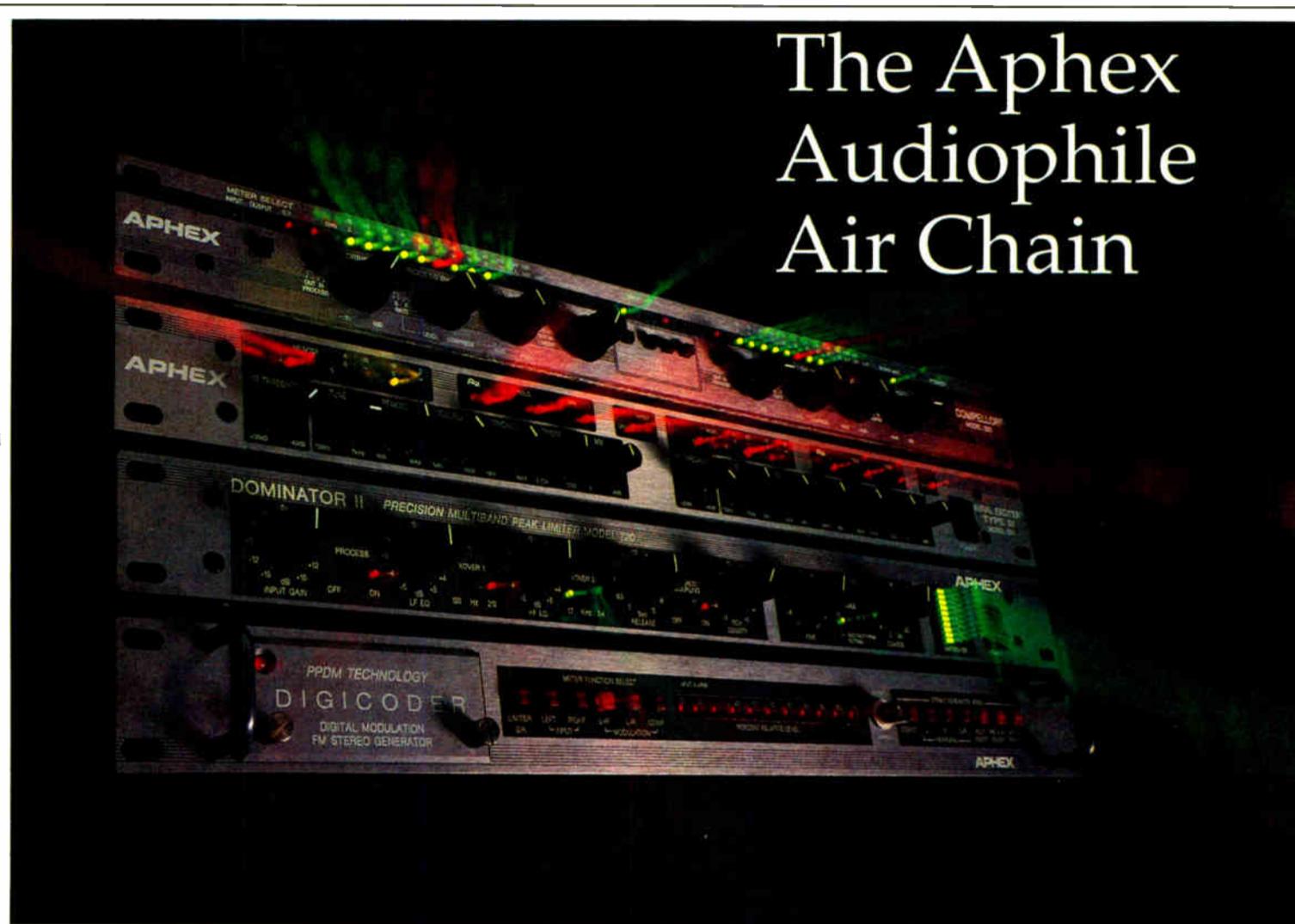
"Kids want to be involved," Barnett says. "And we talk to a child of 7 or 8 exactly like we would talk to any adult. Because the kids know we're not talking down to them, they look at us as a confidant, someone they can talk to."

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."



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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.

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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.

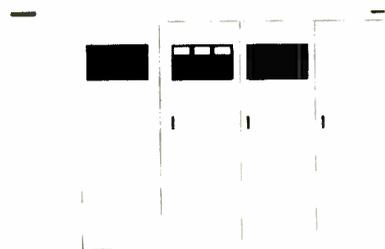
Furniture concerns will vary greatly depending upon budgetary and functional limits. Here are a few ideas that I often incorporate. The biggest "we wish we

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.



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"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.

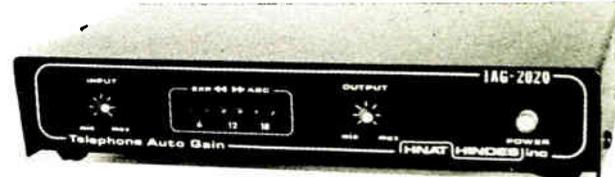
Next time we will discuss goals and objectives and motivating the employee.

□ □ □

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

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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 Doobie 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**.



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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.

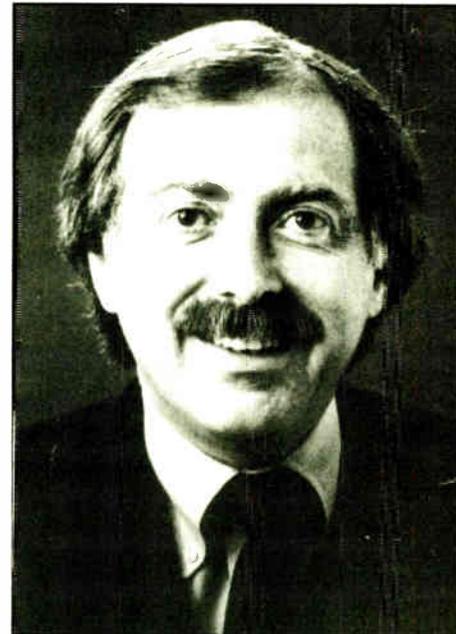
With a budget to balance and a deficit to make up, there will be the continued threat of spectrum fees, user fees and spectrum auctions. While auctions and spectrum fees might be appropriate for

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 ►

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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.

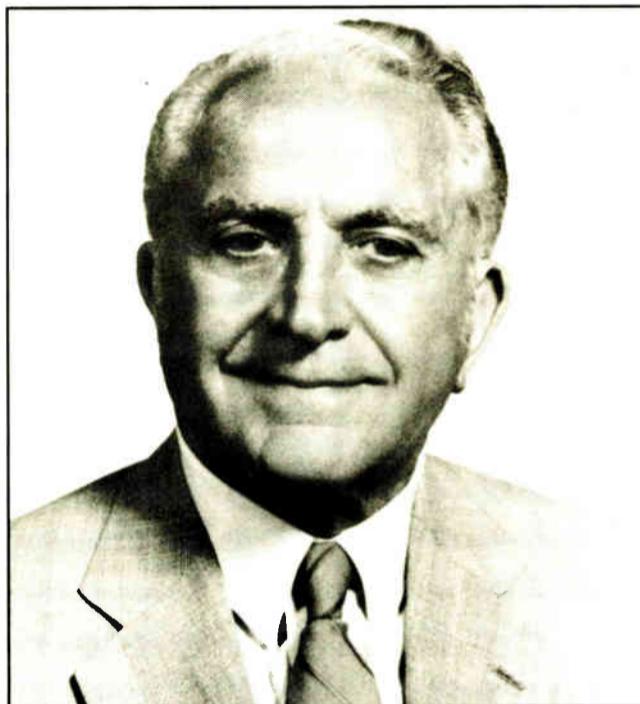
Regarding another band, there has been significant interest in the 28 GHz band as evidenced by the volume of waiver requests to provide video, voice and data services. The Commission at our December meeting adopted a Notice of Proposed Rule Making seeking to redesignate the 28 GHz band from fixed point-to-point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

Radio's Only Comprehensive Reference Guide

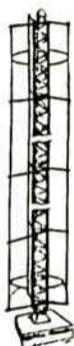
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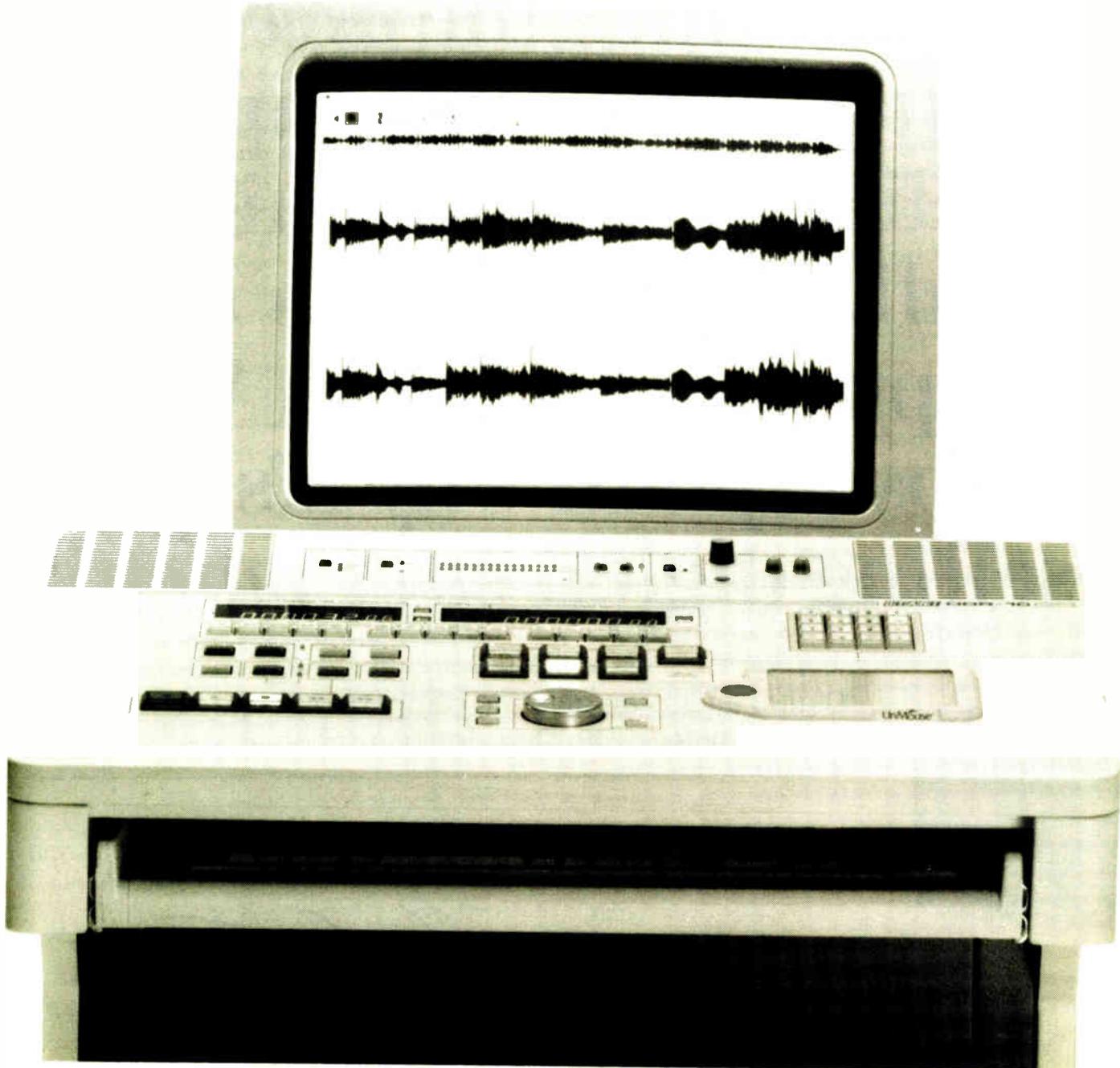
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OTARI

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.

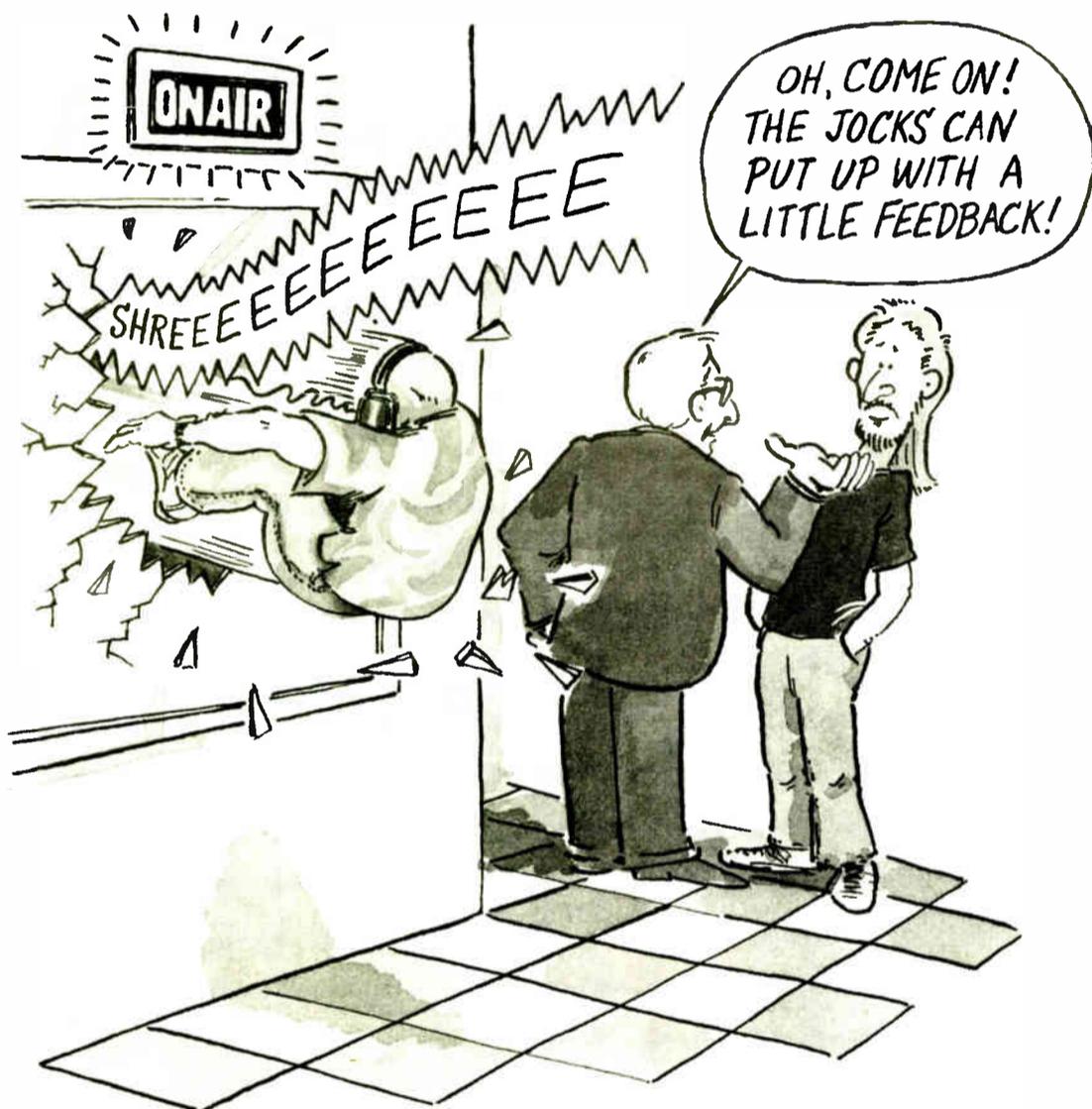
"You may not even need a meter for radio," the NBC executive said. "We already know the average person listens to between two and three stations during the typical week. To attempt to install a high-tech device to get at these two or three stations is a waste of time and money."

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."



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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.

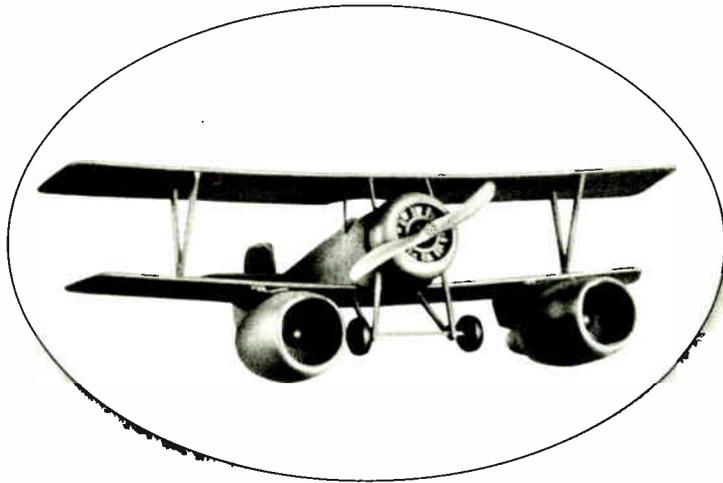
The only trouble is that it's hard, if not impossible, to figure out what rule (obscure or otherwise) the Commission may decide to enforce next. Good luck.

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.

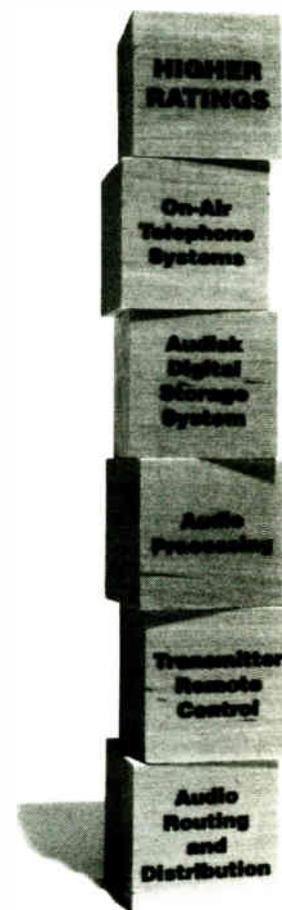
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Understanding Inductive Reactance

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

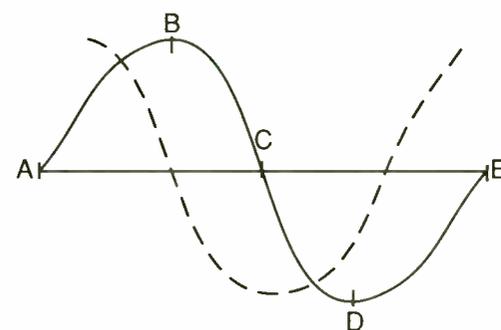
not occur within the same time frame. The induced voltage is dependent upon current change for its development. Within a coil, voltage and current are 90 degrees out-of-phase.

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.

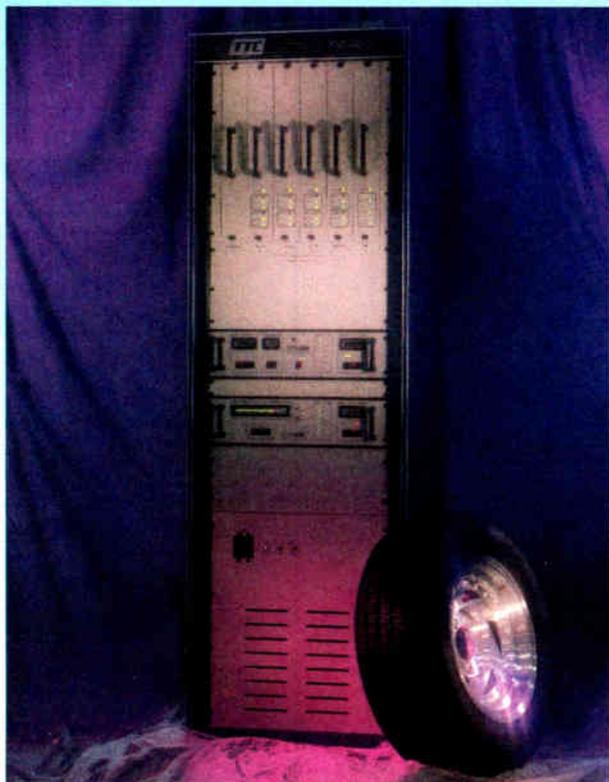
Local revenue continued its growth trend; every region of the country, with the exception of the West, posted a gain for the month to boost local revenue levels by four percent. The

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.

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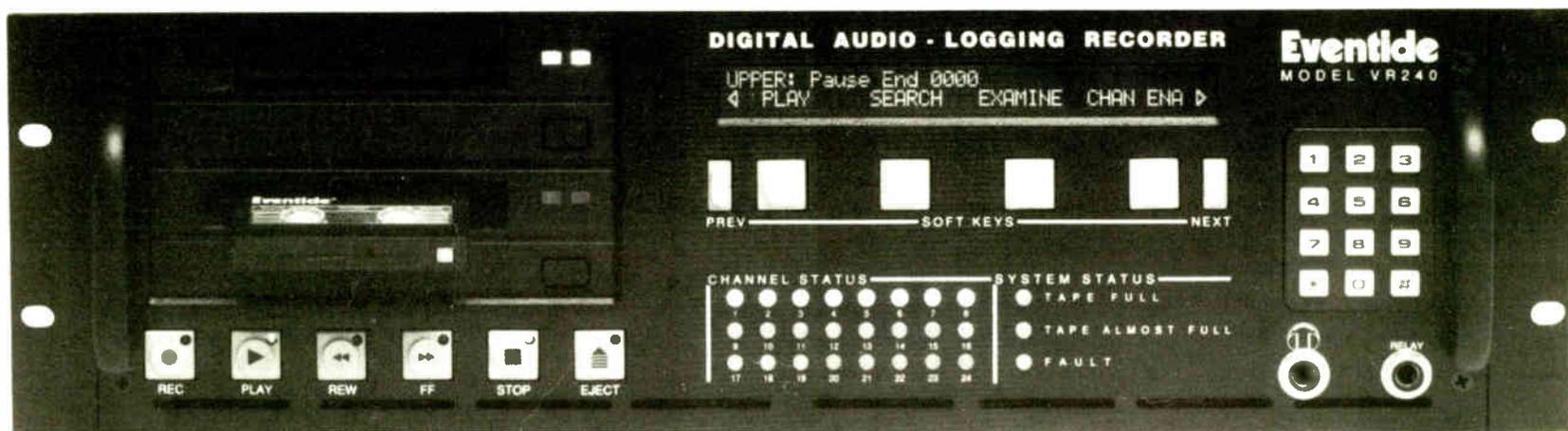
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Without an easy, practical, multi-channel logging system, you're missing what's going on with your crosstown competitors, what your talent (and call-ins) *really* said on the air, when that commercial *actually* ran, who called your contest lines,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

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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.



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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,

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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 Quicksort 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. Quicksort 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.
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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.

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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.

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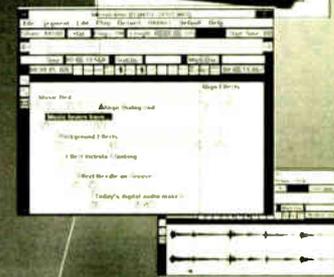
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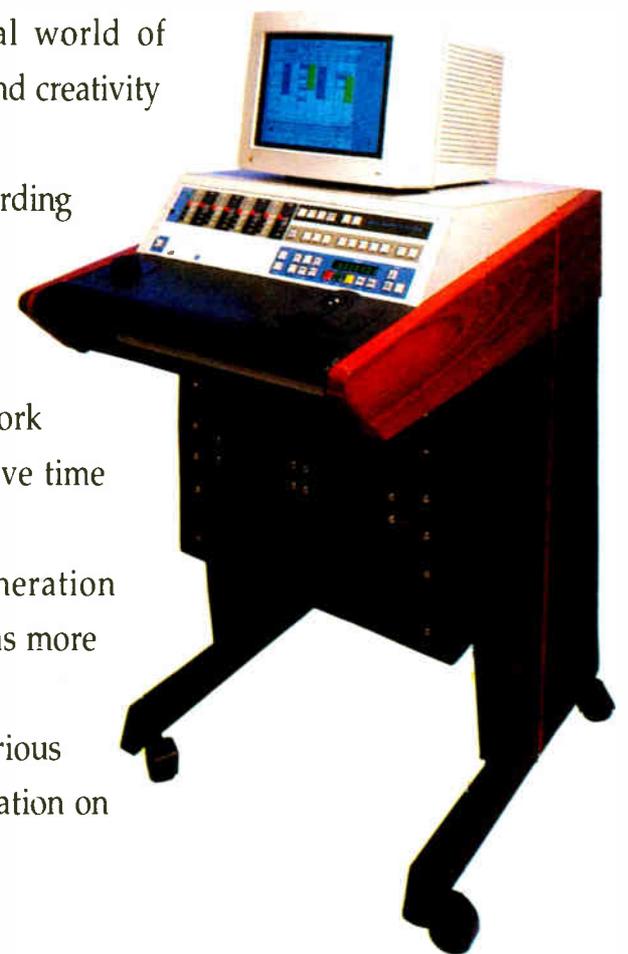
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DESIGNS THAT MAKE THE DIFFERENCE

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World Radio History

COMDEX Show a Computer Wonderland

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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."

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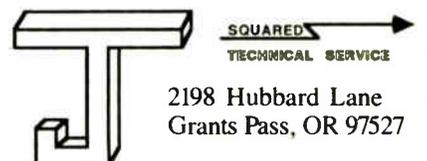
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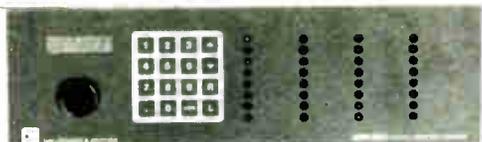
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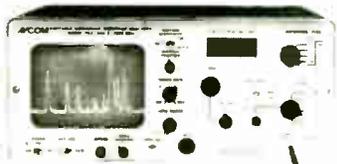
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PSA-65A Portable Spectrum Analyzer - \$2855

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.

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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.

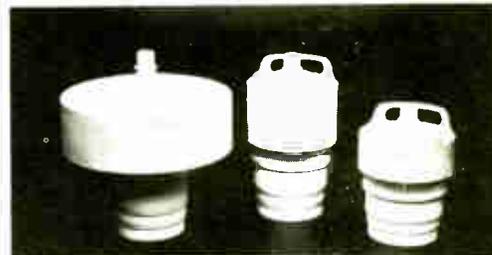
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READER SERVICE NO. 11

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.

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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

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Jeff Andrew, WGCI-FM, Chicago

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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

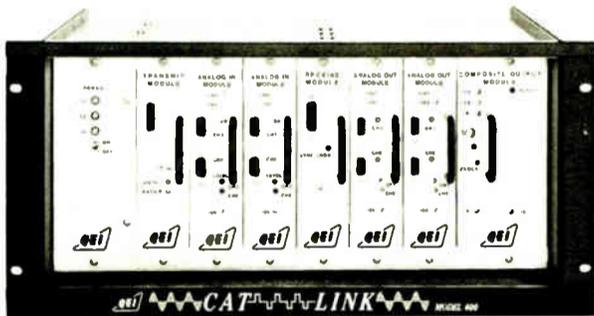
CAT-LINK is cutting phone bills for stations that don't have a clear microwave path. With CAT-LINK, a single bidirectional DS1 line replaces multiple Class A telco lines, providing multi-channel STL and TSL over the same link. Already available virtually anywhere, DS1 service is getting cheaper every 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.



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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

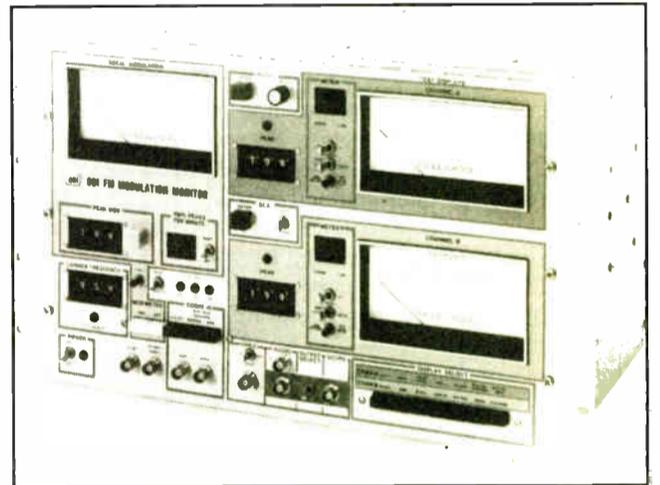
for computer-based tracking of modulation, the 691 with VPDTO works very well.

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.

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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.

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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.

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USER REPORT

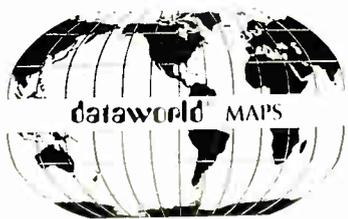
WGBH Maximizes with the ModMinder

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.

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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

... 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.

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



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.

modulation data. Then, using the MSI software, you can compare and contrast modulation histograms, as shown in the accompanying printout.

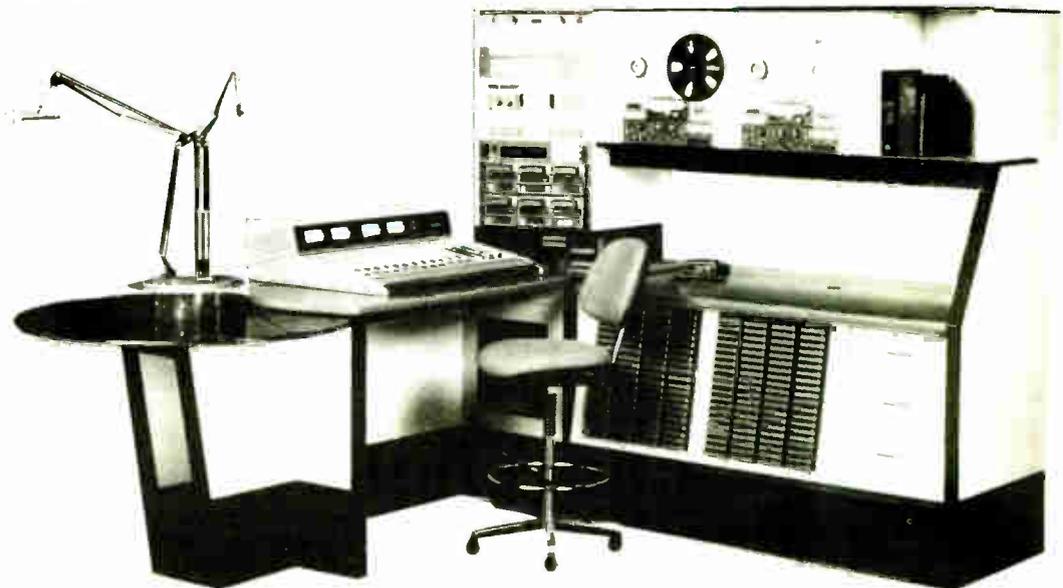
I would've killed to have this back when I was working for Boston's "Kick-Ass Rock-and-Roll" station. Right now, the ModMinder and its software are helping us here at WGBH-FM to be one of Boston's cleanest and most natural sounding stations.

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.

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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.

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-

IA 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.

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

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

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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,

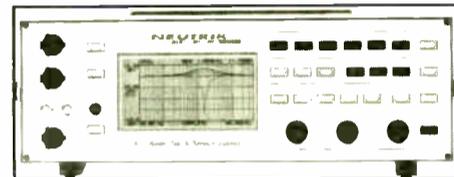
noise floor, crosstalk and allows quick adjustment of record and playback azimuth.

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.

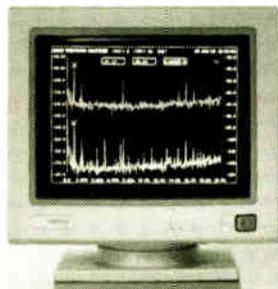
The automated System One – the industry standard for bench and factory.

- 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.



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You can measure...

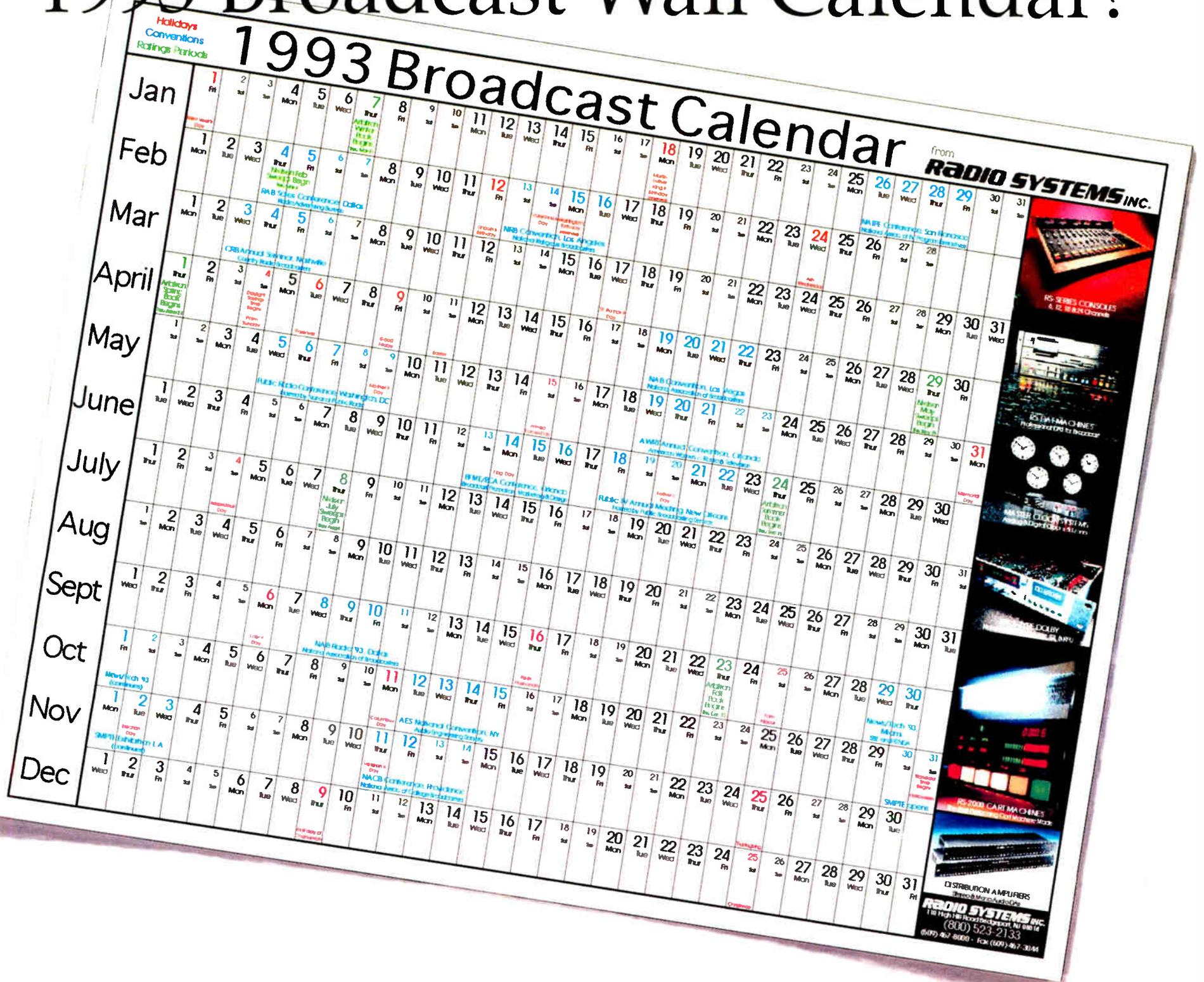
with the best monitor and the most accurate test set.

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.

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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

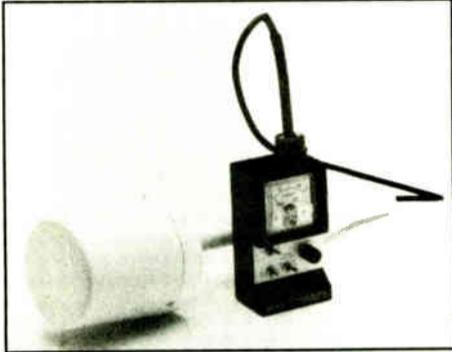
Giesler Broadcast - Houston, TX
 Northeast Broadcast Labs - S. Glens Falls, NY
 Technet Systems Group - Auburn, NH
 Jim Walters Co. - Honolulu, HI

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.



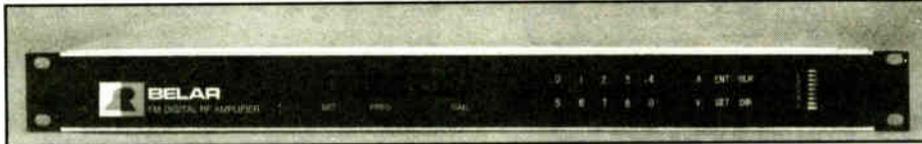
This broadcaster compliance meter operates over the 50 to 220 MHz frequency band, where separate E and H field components must be measured to ensure compliance. In the past, the surveyor has changed probes to measure different fields, increasing the amount of equipment, time and cost required.

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

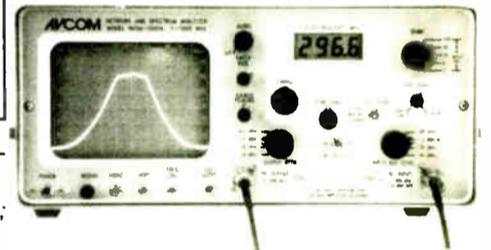
RICHMOND, Va. The NASA-1000A by AVCOM of Virginia is functional as both a network and spectrum analyzer.

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.



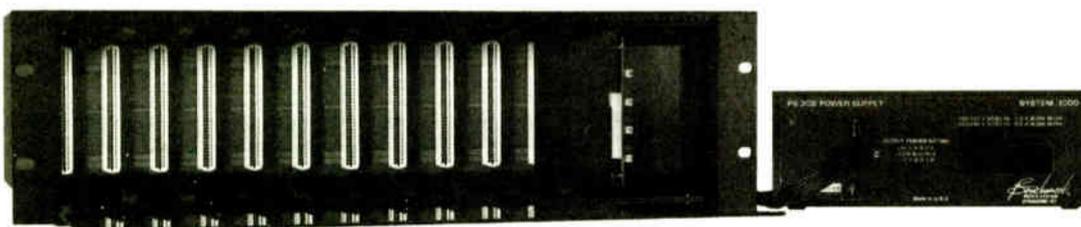
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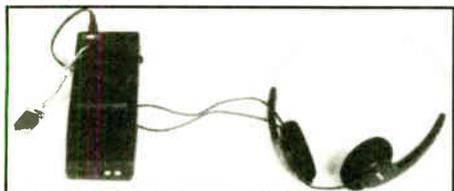
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RE America's d940 Monitors Audio I/Os with Headphone Interface

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.

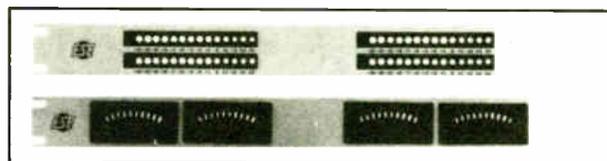
Potomac Instruments' 1750-CS "Comparator/Status" unit can be used in a number of ways (high/low temperature alarm, high/low voltage monitor, signal level alarm, etc.) to solve problems typical at broadcast facilities, but tower light monitoring was its design goal.

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

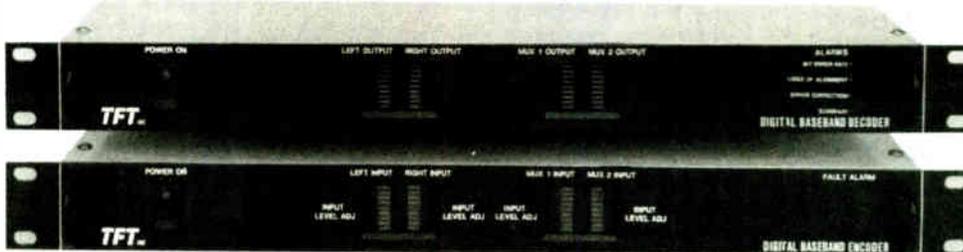
EL SEGUNDO, Calif. ESE has introduced the ES-215, an LED audio level indicator with rackmount options. In addition, the ES-216 is now available with the rackmount option.

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.

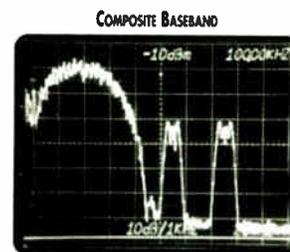
also from TFT:

9100 Composite STL

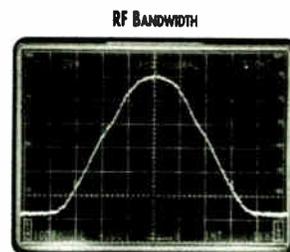
- ◆ Frequency-synthesized, field-programmable Tx and Rx.
- ◆ Patented IF Modulation for superior performance.
- ◆ Very sharp cavity RF filter, phase linear IF SAW filter.
- ◆ Interoperable with DMM92.

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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.



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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.

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- Automatic pattern changes
- Automatic site changes
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- 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?

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TECHNOLOGY

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MARKETPLACE

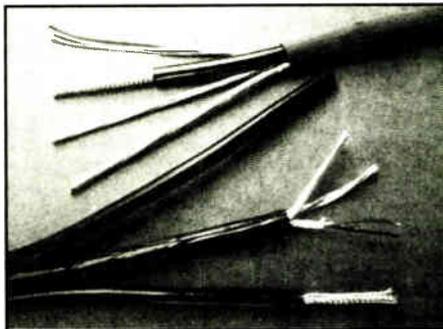
Radio World's Marketplace, a compendium of new and recently introduced radio broadcast products, appears monthly in Buyers Guide.

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**.



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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.

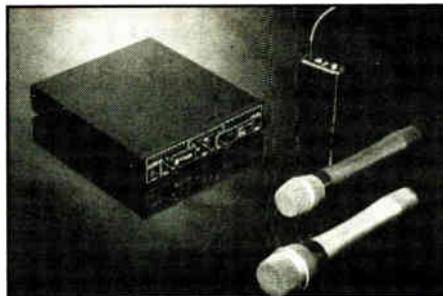
The UL-approved, plastic insulated pen verifies that power is turned off at the transmitter site and acts as a guide to find a breaker that has not been turned off.

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

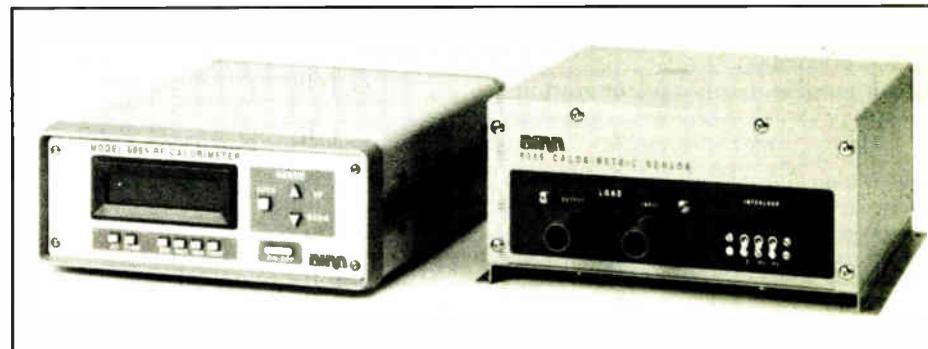
A new laboratory grade, high power, broadband calorimeter has been announced by Bird Electronic Corp.

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.

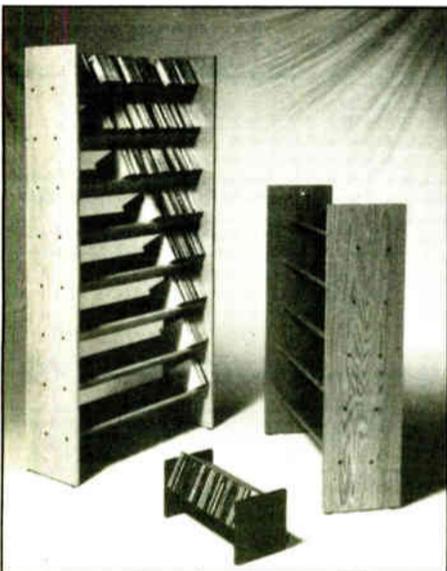
For information, contact Jawxillion (JX) Loeb in California at 510-351-3500; fax: 510-694-3991; or circle Reader Service 163.

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.

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

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.

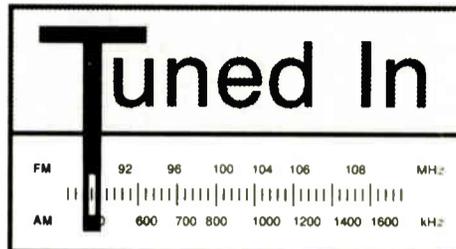
LaMarca joined the company in 1991 as program director. His radio background includes working at B100, 91X, XTRA and Noble

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.



ADVERTISER INDEX

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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; Peplows. 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.

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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.

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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.

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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.

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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.

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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.

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Systemation ntwk superswitch. G Finney, WPWB, 7137 Heather Ln, Macon GA 31206. 912-788-2124.

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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.

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BE 5000 mono R/P, \$400. S Keeffe, WCNI, CT College, New London CT 06320. 203-447-1296.

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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.

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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.

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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.

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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.

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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.

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Steve, 703-998-7729.

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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.

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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-

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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 Keeffe, 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.

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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.

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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.

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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.

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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 reduc, \$2000/BO; dbx 154 & 155 4-chnl noise reduc 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 reduc 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.

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Ashley CL50 peak detection, compressor, superb cond, \$125 ea/BO+s/h. J Emmer, Paragon Bdcters, 509 3rd St, Peckville PA 18452.

Dorrrough 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.

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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.

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Shure SM-5B (3). D Mettler, WFBQ, 6161 Fall Creek Rd, Indianapolis IN 46220. 317-257-7565.

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