

*****3-DIGIT 857
 0101 000292502 9422 BUL
 BARRY NISHKIND
 2033 S AUGUSTA PL
 TUCSON AZ 85710

10

Radio World



Studio Sessions

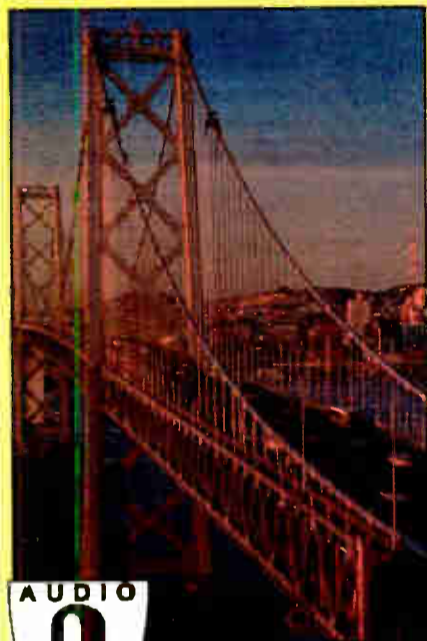
See pp. 43-60

Vol 18, No 22

Radio's Best Read Newspaper

November 2, 1994

AES Goes to San Francisco For 1994



Begins on p. 40

WME Debuts with Clinton, Hundt

by Lucia Cobo

LOS ANGELES The first day of World Media Expo opened with participation from President Clinton and FCC Chairman Reed Hundt but closed with no real political answers or insights into the administration's telecommunications policy.

In a morning address via satellite, Clinton applauded journalists and broadcasters. "I am honored to help kick off the first joint meeting of the NAB and the RTNDA," he said. World Media Expo, which debuted Oct. 12-15 at the Los Angeles Convention Center, also featured the Society of Broadcast Engineers (SBE) and the Society of Motion Picture and Television Engineers (SMPTE).

Short on insight

The brief speech focused mainly on the administration's political agenda of the last 20 months, and Clinton carefully steered clear of mentioning issues such as the National Information Infrastructure, spectrum fees for users or any type of regulatory issues.

Likewise, Hundt carefully avoided sharing any specific answers to questions posed to him in a one-on-one session with NAB President and CEO Eddie Fritts. Hundt encouraged broadcasters to contact him directly at the FCC to ask him questions or share their insights on different issues but gave vague answers at best

when pressed at the session.

On the status of the revamping of the Emergency Broadcast System, Hundt would only say that it would be "one to two months" after the FCC Oct. 20 meeting before the issue would be voted on.

As for satellite DAB vs. terrestrial delivery, Hundt said he expected the commission to look at the matter in the next several months. On what his personal view might be on the issue, Hundt responded: "I know you won't argue that our pro-competi-

tion commission should absolutely bar innovative uses of this new technology."

The lack of a riveting political agenda did not dampen the spirits of the participants in the various conferences. Sessions held for the NAB Radio Show were standing-room only in many cases. The opening reception sponsored by the Interep Radio Store was as festive as any held in the past radio-exclusive gatherings.

[Complete coverage will follow in the continued on page 6 ▶



FCC Considers Tower Upkeep Rule Changes

by Thomas Pear

WASHINGTON A plan is circulating through the FCC that would shift the primary burden of tower maintenance from radio broadcasters who lease space to tower owners.

The FCC also intends to shift costly construction permit applications for tower modifications from antenna tower tenants to tower owners.

A team of FCC officials studying the issue is developing a formal rule-making proposal that could be released for public comment as early as January, according to FCC FM Branch Assistant Chief Robert Greenberg.

Unfair system

Presently, tower owners are not required to file with the FCC, and there are no FCC regulations on the books that hold tower owners separately accountable for tower violations. The commission's only recourse to protect low flying aircrafts from hazardous paint jobs and poor tower lighting is to penalize those who rent tower space.

"Today our only way is to go after the stations," FCC Audio Services Division Chief Larry Eads said.

In some cases, stations doled out thousands in fines for tower violations, while tower owners paid nothing, said John Marino, an engineer and director of technical conferences for the National Association of Broadcasters (NAB).

"It's very unfair for broadcasters to get fined," Marino said. "It's been a situation where a lot of broadcasters were unhappy."

With the blessing of the NAB, the FCC could change unfair tower regulatory burdens in a number of different ways that would at least shift some tower responsibility away from renters.

The FCC could make tower owners solely responsible to properly maintain towers, or the commission could make owners equally responsible for maintenance with those leasing space.

One likely scenario, however, would make tower owners primarily responsible for maintaining towers and have tenants as secondarily responsible for tower

continued on page 12 ▶

CCA Broadcast Transmitters...
 The Very Definition of Reliability.

re-liable (adj) 1: suitable or fit to be relied on: DEPENDABLE. 2: giving the same result on successive trials 3: possessing the same qualities of dependability as a transmitter manufactured by CCA Electronics in Fairburn, Georgia

360 Bohannon Road • Fairburn, Georgia, USA 30213
 (404) 964-3530 • FAX: (404) 964-2222



24-HOUR SERVICE,
 365 DAYS-A-YEAR

CCA

NEWSWATCH

Harris, SBE to Host RF Seminars

Valley Forge, Pa. Harris Allied, in conjunction with the Philadelphia Society of Broadcast Engineers (SBE), will sponsor a RF seminar on Nov. 15.

Harris Allied also is sponsoring another RF seminar in Laurel, Md., Nov. 17 in conjunction with the Baltimore and Washington SBE chapters.

Dana Myers, a senior instructor at the Harris Allied technical learning center, will cover a variety of engineering topics at both seminars, including solving problems with RFI, grounding, transmission line test-

ing, UHF and VHF antenna design and accurate VSWR measurement, said Harris Allied Field Representative Frank Grundstein.

Harris Allied is requesting reservation for the seminars, so anyone interested in the Pennsylvania seminar should call Grundstein at 619-642-3969. Anyone interested in the Maryland seminar should call Carl Davis at 919-469-0405.

NAB on Cameras, Mics in Court

WASHINGTON NAB President Edward O. Fritts recently issued a state-

ment expressing the organization's indignation at a U.S. Judicial Conference vote to keep cameras and microphones out of federal courtrooms.

"An entire branch of our federal government has chosen to conduct its business outside the public view," the NAB president said.

Spectral Expands

WOODINVILLE, Wash. Spectral has expanded its base of operations.

The company recently leased additional production space adjacent to the Woodinville, Wash., complex they moved into last May.


"Last May's move nearly doubled our space to keep up with the company's growth," said Spectral co-chairmen Tom

Jorgenson and Lance Korthals in a joint statement. "To prepare for the future, we have increased that space by another 70 percent. This will allow us to accommodate larger engineering and sales staffs as well as expand and reconfigure our manufacturing, shipping and receiving operations to optimize workflow and increase our production capacity."

Spectral is a manufacturer of Windows-platform Digital Audio Workstations.

Arbitron Gets Better Responses

New York The Arbitron company reports that its survey responses increased this past summer.

The radio ratings company noted that the first 13 markets surveyed in the summer of 1994 posted a 6.4 point response rate gain over the equivalent rates for the summer of 1993. 

When looking for a digital audio system for automation of satellite programming or live assist, there would appear to be many choices. But if you're looking for a system which is flexible enough to give you total control without sacrificing your sanity, there is only one choice. The Phantom by RDS.

You will see the difference as soon as you see the Phantom in action. The display provides you with all of the information you need to see in a clean, concise manner, without the crowded look that you'll find in other systems. If you are familiar with the most popular software on the PC, then you may already know how to use the Phantom. The Phantom's pull-down menus guide you through all of the steps involved in setup and daily operation, from creating and scheduling clocks to creating and editing logs.

The PHANTOM Digital Audio Automation

The Phantom ends the confusion of automation by keeping everything organized. The Phantom simplifies your daily operations by keeping information such as input changes, voice changes, and clock changes in their own individual schedules rather than in the log. You can leave those liners and other voice drops out of the log because the Phantom will do them for you. The Phantom allows you to date new schedules to begin weeks, months, or even years in advance. When your satellite network informs you that there will be a voice substitution on Thursday, two weeks from today, you can prepare for it *today*.

The Phantom can retime spots to fit them cleanly into a satellite break without inserting silence, overlapping, or running late. The Phantom



can create reports to keep you informed on a number of topics, from a list of expired spots to an analysis of potential mistakes in your log. The Phantom also maintains a history of system activity.

The Phantom has the features that others would want you to believe are theirs exclusively. The Phantom remains *completely* functional during recording, sensing relay closures and starting breaks as easily as it does when it is not recording. The Phantom can fill incomplete breaks with spots from a list you specify without ruining product separation.

While other systems tie your hands and limit your flexibility by only offering 3 or 4 inputs, the Phantom gives you 6 stereo inputs, using its AMX-84 solid state switcher, with the option of increasing the number of inputs to 14 or more. If your station is News/Talk, you know how important this can be.

The Phantom allows you to change the sampling rate, digital format, and stereo/mono settings at will to meet your needs for an individual spot. The Phantom offers a number of digital formats, including the new Dolby AC-2 format, as an option.

Call us today to find out how your station can benefit from the advanced technology of the Phantom and the experience of RDS.

1-800-521-5222

912-987-2501 • FAX: 912-987-7595

P. O. Box 980, Perry, GA 30169



**REGISTER
DATA
SYSTEMS**

Index

FEATURES	
Tips on Air-Cooled Transmitters by Don W. Patrick	11
Tribulations of Replacing Damaged Coils by Fred Greaves Jr.	12
Epson ActionNote Series Worth a Look by Barry Mishkind	14
BUYERS GUIDE	
USER REPORTS	
Harris HT-30s Power Chicago FM by Gordon S. Carter	17
Compact BE Transmitter Breaks the Rules by Richard Furr	18
Reliable, Problem-Free Nautel FM by Lee Rust	20
Customized CCA Transmitters Key in Rebuild by Chris Hicks	21
New QEI Quantum Shows its Mettle by Tom Andrews	22
RDS Debut Smooth Thanks to MSI by Woody Tanger	22
Bext Fits the Bill Following Power Increase by Bill Glenn	26
RE Makes RBDS Easy to Implement by Ron Bartlebaugh	26
Continental Unit Proves Reliable by Ted Townsend	29
TECHNOLOGY REPORTS	
Larcant-TTC	32
Energy-Onix	33
Inovonics	37
Crown Broadcast	37
Broadcast Electronics	38
Tectan	38
AES PREVIEW	
Show Offers Role to Radio in '94 by John Gatski	40
Sessions Schedule	40
Manufacturer Line up for AES	57
STUDIO SESSIONS	
Discover Zen with Audio-Technica by Ty Ford	43
Compression Has Ever So Slight Effect by Mel Lambert	44
DCL: Best of Both Worlds by John Diamantis	46
Audix PH-15 Clear in Tight Spots by Bruce & Jenny Bartlett	50
Trials of Capturing Live Music by Mike Joseph	52
Radio Pioneers Leave Artistic Legacy by Frank Beacham	55

Seattle SBE Looks Ahead

by Lucia Cobo

BELLEVUE, Wash. Today's challenges in broadcast engineering and the role of new technologies dominated the discussions, exhibits and sessions at Electronic Media Expo '94, held here in Bellevue Oct. 5-6 at the Meydenbauer Center.

Engineers from as far away as Idaho and Montana flocked to the annual regional gathering organized by the Society of Broadcast Engineers Chapter 16 (Seattle). More than 200 audio and video companies exhibited products and services to roughly 2,500 industry professionals.

National teleconference

SBE President Chuck Kelly moderated a national SBE teleconference, held in conjunction with a panel discussion on "New Technologies and Their Impact on the Broadcast Engineer." The picture is not rosy, according to Beaverton, Ore.-based technical writer Jerry Whitaker. But neither is it "all bleak" for terrestrial broadcast engineers.

As broadcasting evolves and the use of digital technology changes the way broadcasters must do their jobs, success demands that engineers create a vision now that will lead them successfully into tomorrow, he said.

"People want programming, not technology," he added. They don't care how their radio works, just that some station on the dial carries programming they want to hear.

In other words, said Kelly, broadcasters need to embrace new technology because of the added services it can provide radio's customers, not because it is new technology per se. The important issue, Kelly continued, is that it "improves the cost-benefit ratio."

continued on page 6 ▶

Group Opposes WOWO Downgrading

by Thomas Pear

RANDOLPH, Mass. A movement is building against lowering the nighttime signal of Fort Wayne, Ind., clear channel WOWO(AM) to make way for New York AM station WLIB to remain on-air after sunset.

Peter George of Randolph, Mass., recently formed the WOWO Listeners Guild to stop the lowering of the station's nighttime signal. The month-old organization has 10 members and soon will have an e-mail address so people can join instantly.

"I don't think it's right to destroy an American icon just for the sake of giving New York City another full-time station," he said. "I think people have forgotten the human interest of this station and instead are using it as a commodity."

Good memories

George first tuned into the clear channel station, which reaches 28 states and four Canadian provinces, 26 years ago.

"I was into the music," he recalled. "They were playing 'Abraham, Martin and John.' It was a big hit at that time. 'I've been a listener ever since.'"

But unfortunately for WOWO supporters like George, the FCC already snubbed more than 200 letters of protest—most of them from the Fort Wayne area—when it approved the sale of the station from the Wayne Broadcasting Co. to the Inner City Broadcasting Co. (ICBC), WLIB's parent company.

FCC officials said the letters do not count as formal petitions to deny because their filings did not meet various legal specifications.

"Unfortunately, the people who want to save WOWO's signal don't have high-priced lawyers," George said.

However, the WOWO guild is trying to solicit *pro bono* work, and George hopes the guild can establish a test case to save other clear channels from stations wanting to power up their AM signals.

"Could you imagine the AM band without a clear channel station like WBZ, WLW or WHAS?" he asked rhetorically.

George was quick to point out that he has the utmost respect for Inner City

Broadcasting and said he sometimes listens to its New York FM station WBLS when he visits the "Big Apple." But the WOWO guild founder does not wish to see a historic clear channel broadcast sacrificed.

After ICBC lowers WOWO's nighttime signal for WLIB, it intends to resell the station to Pathfinder Communications Corp., which plans to run WOWO locally in the Fort Wayne area.

Power reduction

Sources said WOWO could reduce transmitter power from 50 kW to 10 kW and modify its directional pattern to produce a 1 kW null toward New York City.

Peter Tannenwald, an attorney representing Pathfinder, declined to comment on the signal lowering. "It really hurts my client's situation to have a lot of publicity about this," he said.

An application for the second sale of WOWO from ICBC to Pathfinder is pending, but the period to file objections against the second sale closed in September.

Although the FCC has a formal petition to deny the second sale from former WOWO employee Barbara Crouse, it is misfiled.

The wording of the petition refers to the initial sale of the clear channel station

from Wayne Broadcasting to ICBC, but the petition itself is filed with the permit application of the second sale, making the petition to deny moot.

However, those opposed to lowering the station's nighttime signal will have a third chance to file grievances before the FCC because the actual lowering of the station's nighttime signal will involve a third petition. At press time the third petition was not filed. Arthur Goodkind, an attorney representing ICBC before the FCC, previously said that lowering WOWO's signal would have little effect on most of the station's nighttime audience.

Outside market

The rationale is that people outside WOWO's immediate market usually do not receive a clear signal and do not bother to tune it in.

"Basically that's bull," said George.

Ralph Lovely, one of the numerous Fort Wayne WOWO listeners who filed a letter of protest against the first WOWO sale, stated in his letter that the clear channel station served as an icebreaker with people he encountered while traveling from Fort Wayne to Washington.

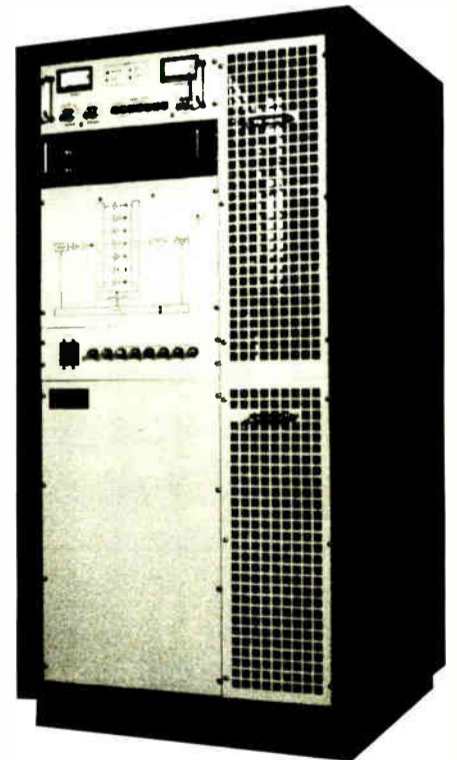
When he told people he was from Fort Wayne they would reply: "Oh yes, WOWO." ☺

Minimal Floor Space Lots of Air Space

The 3.8kW combines a small package and solid state modules into a reliable, efficient transmitter.

Features include

- 100% Solid State
- Single Phase Power Supply
- Broadband Design
- Self Protected Amplifiers
- VSWR Protection Circuit
- No Tuning
- Totally Self Contained



Call Continental First



Continental Electronics Corporation

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

6.94-014

ULTRAMOD® . . . UM2000 FM STEREO MODULATION SYSTEM



The **UM2000** is a complete FM processing and stereo generating system featuring:

- Dual band, stereo AGC and peak processors of exceptional clarity.
- Digitally synthesized stereo generator with separation exceeding 60dB at 1 KHz, and typically 55 dB at 15 KHz.
- Dual composite outputs for feeding main and auxiliary transmitters or STL's.
- Separate Pilot output for composite processor interfacing.

CALL TODAY!

HNAT HINDES Inc

42 Elaine St., Thompson CT 06277
203-935-9066 or 203-935-9242
FAX: 203-935-9919

—FOR BROADCASTERS WHO SPEND THEIR OWN MONEY—

Circle (30) On Reader Service Card

Circle (124) On Reader Service Card

Uncovering News in the Wings

WASHINGTON World Media Expo and the participating conferences are now safely over, and is it ever good to be home. As I wrote in my news wrap-up piece, not much happened in the way of political news related to radio.



The technical snafu at the Westin Bonaventure Hotel probably ranks as the hot topic of conversation at the show—you see, its computer and phone system crashed on day one of the show and hundreds of registrants spent all of Wednesday in line, waiting to check in to their hotel rooms.

Many of the guests and the companies that had booked a total of 51 hospitality suites were in a real quandary. Eventually things were smoothed over, and the Westin refunded everyone involved the equivalent of one night's bill, but talk about a hassle. And for many, thousands of dollars in lost business.

Speaking for myself and for **RW**, I can tell you that my big news at the show was Broadcast Electronics. It turned out the phone lines in the daily newsroom were incompatible with my laptop modem and software.

I think I inadvertently blew up the laptop communications software from trying to send this issue's front page story. I could not get it to work from my hotel, from the newsroom, from the pressroom or from the Holiday Inn (where the daily newspaper staff was headquartered).

Friday noon rolled around and I still had not been able to establish a superhighway link to D.C. (and I'm a good driver...). **RW** had a 5 p.m. deadline for printing. Anyway, Dave Newton and Kim

Winking came to my rescue and sent the front page story and my Seattle SBE story via their laptop on the exhibit floor (via CompuServe). I am forever grateful to them and to BE for making it possible for me to breathe again and go to press on time.

Thank you. Thank you. Thank you.

★ ★ ★

But there was some other news, even if it felt we had to dig really deep to find it. Before I share some of it with you though, I'd like to thank everyone who made themselves available for interviews and articles for the World Media Expo daily newspaper. It was hard work, but thanks to you we were able to raise the caliber of that publication beyond what other show dailies have ever been in the past.

But back to some of the news swirling around the show and waiting for me when I returned home.

★ ★ ★

Word on the street is that Telos Systems recently contracted with the Institut für Rundfunktechnik GMBH (IRT) to



Dr. Ferd's
Wall Wart
Remover

license the code for Layer II MUSICAM. In the past, Steve Church, company president and chief designer of its Zephyr ISDN transceiver, has confirmed that

MUSICAM can be supported (easily) by the unit's current hardware.

When the code is "ported over" to the Zephyr a few months from now, the Zephyr will (as of now) become the first broadcast codec to offer full-duplex communications incorporating the three most commonly used coding methods—ISO/MPEG Layer III, MUSICAM and G.722.

If you already purchased a Zephyr, relax, word has it the company will provide free software upgrades when the Layer II MUSICAM implementation is completed.

As I understand it, Telos intends to offer both the single channel and joint-stereo modes presently used by broadcasters. Switched 56 and ISDN transmission data rates will be supported and Layer II MUSICAM will be fully integrated with the internal terminal adapter.

Company execs had no comment, but I understand that Telos has a couple of design goals in its Layer II implementation. No. 1, the company will be fully compliant with the Layer II standard and will incorporate IRT's latest enhancements to the code. No. 2, Telos can now develop inverse multiplexing schemes for complete compatibility with existing Layer II codecs.

★ ★ ★

My trip out west was a long one, but very interesting and personally gratifying. I attended the Electronic Media Expo in Seattle (see page 3 for the story) and had a chance to visit with BSW.

Not only do they have a very nice and effective installation (they are the second



Representatives from Earls, the Children's Wish Foundation and CKRX 1090 Rocks show off the more than three tons of giant pumpkins donated this fall, for the Giant Pumpkin Auction.

LETHBRIDGE, ALBERTA This summer, CKRX 1090 Rocks asked listeners to grow something a little different in their gardens. It asked them to grow giant pumpkins as part of its Wishing on a Pumpkin Promotion.

CKRX 1090 Rocks provided listeners with seeds and growing instructions in early spring and left the rest to them. This fall, more than three tons worth of pumpkins were donated back to them.

The pumpkins will be used in a Giant Pumpkin Auction, with all proceeds going to the Children's Wish Foundation, an organization that fulfills the wishes of children suffering from terminal illnesses.

largest distributor of broadcast equipment in the U.S.), but they truly are among the nicest and most hospitable folks in the business.

In fact, the producers of the NBC hit television series, "Frasier," tapped BSW to outfit the radio studio and control room where Frasier and Roz "work the phones" on television.

The gang at BSW can supply the biggest and the best as well as the smallest and most important needs. My personal favorite is a new product the company is selling, "Dr. Ferd's Wall Wart Remover." Pictured on this page, the wall wart remover would make a perfect stocking stuffer for that lovable engineer in everyone's life. Not to mention—it solves a pesky little problem prevalent in most stations for only \$8.95.

Till next time.

Transmitter Control can be a Bear

You need to make sure you can stay on the air and stay legal. At the same time, you need to keep operating costs under control.

Choosing the right remote control system is the first step.

The ARC-16SA* from Burk Technology lets you control your transmitter from any phone. You can establish off-premises control points for unattended operation, or supervise non-technical operators by phone.

The annual savings can be thousands of dollars.

The ARC-16SA is part of a modular system. For full-time control, add a studio unit. Multi-site options make it easy to control several transmitter sites or even control studio equipment such as program automation.

Call now for your copy of our new catalog, then ask us to show you how we can improve your operation and your bottom line.

Call TOLL FREE
1-800 255-8090

BURK
TECHNOLOGY

7 Lomar Drive, Pepperell, MA, 01463 (508) 433-8877

Circle (61) On Reader Service Card

World Radio History

READERS FORUM

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

Best thing since sliced bread

Dear RW,

Kudos to your Aug. 24 article pertaining to the SBA's repeal of the Opinion Molder Rule, allowing money to become available for media outlets.

This is probably the best thing that's happened to radio since duopoly. With a growing list of dark AMs and FMs in the industry, we can count on seeing more first-time operators coming into the business who have been unable to do so because of the lack of funding.

There are many individuals out there who are innovative enough to rescue failing radio stations. Unfortunately, there are drawbacks.

Assigned FM channels that were opened up after Docket 89 and are not on the air yet soon may be finding their way to the airwaves, thus strangling the dial even further and taking another station's already depleting chunk of revenue.

Either way, the positives outweigh the negatives. Let's just hope some competent individuals benefitting from this can do enough to dig us back out of the hole we've fallen into.

Ken Hawk
Consultant
Toledo, Ohio

people in order to protect themselves from attacks by Honig's office.

As you know, if an accusation is made, the burden of proof is on the accused; a chilling effect is thus created, which is probably what Honig wants.

He states in his article that there are no quotas, but as a practical matter we know this is untrue. Tell me, before a renewal is challenged, what research is done? Is the station manager or personnel director investigated to find evidence of discrimination? Are the application files reviewed? Are other minority employees interviewed about their experience? Or do they just look at the numbers?

I understand the concept of affirmative action; I just think it is a flawed concept. Maybe it would be well to paraphrase Newton's first law: For every affirmative action, there is an equal but opposite (negative) reaction.

Honig says he has the best job in Washington; I'm glad he has a job. He should remember that groups do not suffer, only an individual human being can feel pain. The FCC guidelines and indiscriminate challenges by Honig's office are creating a climate of fear that causes real suffering.

Kym MacKinnon
Travelers Rest, S.C.

A Fighting Chance For AM

Progress doesn't come about without some second guessing. But when the facts add up there should be no turning back.

This is the case with the sale of WOWO(AM) in Fort Wayne, Ind., and the reality that the new owner will reduce its nighttime power, ending the station's full-time 50 kW status it has held since going on air in 1925.

Inner City Broadcasting Co. (ICBC) purchased the WOWO combo with the intention of lowering the nighttime power of the AM so its New York outlet WLIB(AM) can become a full-time station. ICBC in turn plans to sell WOWO to Pathfinder Communications that said it will focus WOWO on the Fort Wayne community, where the group owns another station.

When the FCC changed the rules allowing stations to purchase co-channel stations and alter transmission schemes to benefit new owners, regulators hoped the action would strengthen the radio industry. That is happening in this case in two ways.

Once WLIB is allowed to broadcast 24 hours the operation will be able to better compete in New York, the number-one listener and number-two revenue market. In reality WOWO(AM) had become a regionally-programmed station with a wide-reaching signal, so for Pathfinder what matters is that local listeners will not suffer.

Of course some of those listening to WOWO outside Fort Wayne will not be able to tune in their old friend. This is an emotional subject because the thought of losing a part of radio history is disturbing.

Fortunately there still are many Class A clear channels—including both the old 1-A and 10B classes—broadcasting in markets large enough to support such stations that offer quasi-national programming.

By scanning down the AM Class A channel assignments you will find other instances like WOWO and WLIB on 1190 where a medium-market station is protected by a large-market co-channel station.

This is the free-market economy at work. The radio spectrum is a scarce resource so if there are premium signals that can be allocated more efficiently, they will be.

—RW

GUEST COMMENTARY

Safeguard Your Job with a Journal

by Frank S. Colligan
Telecommunications Consultant

BETHESDA, Md. Too much can never be said to "Keep Your Employees Safe from Harassment." (RW Sept. 21) I would like to fill in a point or two concerning the article. There are three things in this area that are very important. They consist of documentation, documentation and documentation. While it may be painful at first, you'll get used to it. Later on you'll find it interesting from a historical standpoint and, who knows, the material might develop into a book on the subject.

Keep a handwritten diary. Write it all down complete with dates, times, locations and who else heard and/or saw what happened. Keep your diary and its existence confidential. That's easy. Subsequent to any incident of harassment, retreat to the privacy of the nearest restroom and write it all down. Also jot down a note or two about some unrelated events that happened at the same, or close to the same, time such as the weather conditions that day. Was it raining or shining? Jot down whom you went to lunch with and even what you had to eat. This serves notice on a future would-be cross examiner that your notes are quite authentic and that tactics of his, designed to discredit your memory, simply have no hope of success. Make copies of your diary pages but not on the office copy machine. Copy them at some copy shop where you pay for them. Get and keep receipts and copies of those too. Obnoxiously tiny receipt slips are easily kept by pasting them, chronologically, into a scrapbook. It is imperative that you tell no one what you are doing. Don't get into gossipy conversations. Listen for concretely useful information, but don't discuss your situation with others. It could come back to haunt you as a member of the rumor loop. Remember that wise old World War II admonition that is still true, in fact truer today than ever, "Loose lips sink ships." Don't lose your ship in a sea of gossip. If someone else tells you he or she is being harassed, give him or her a copy of Sue Jones' article and just say, "I've been advised not to discuss it," and then not another single word.

If harassment occurs in front of a third party, you can say to the third party, "Did you hear/see that?" If any other parties did, your remark will engrave the entire incident more deeply in their memory for use later on. Then, of course, go jot it all down.

After a week or two of diary keeping, and if reasonable requests by you have not stopped the harassment, show your boss copies, and only copies, of just a page or two of your diary. On that day, leave your original diary book at home. Tell him you are showing him copies of just a few notes regarding a particular incident. You might make them part of a typed memo to the boss. Down towards the lower left corner of the memo type, "CC: To file."

By this time, many readers should find that what I have said so far has a familiar ring to it. Hint: Keep good records. Author of hint: the I.R.S. By keeping your diary confidential, at first, you get an overwhelming head start that will leave your adversary buried in the dust. He probably will not have been keeping one.

The very act of handwriting your own diary will do wonders for your memory of the facts. A student once admitted to me that he had written up a few "cheat-sheets" a week or so before an important quiz. Quiz time came and the result was that he did not need to consult any of them at any time during the quiz. In a sense, writing up cheat sheets is a great way to study. Just tear them up well before the actual quiz.

The language style of your notes is important. You want to write as if you were already a witness on the stand in a court proceeding. Be a good witness of the truth, the whole truth and nothing but the truth. Stick to the facts in as few words as possible and yet be thorough and complete. Avoid any coloration by avoiding adjectives and adverbs. Don't use either unless absolutely necessary. Don't get off on tangents, and do avoid even accidental hearsay. Make your notes as contemporaneous as possible by writing about a particular incident as soon as possible after it happens. A major part of the judicial process is to separate facts from a conglomeration of hearsay, opinion, gossip, small talk, etc. A good diary that follows those rules and leaves nothing open to any speculation can make your lawyer's job a breeze, the court's job a breeze and your adversary's lawyer's job impossible. Make yourself cross-examination proof. Major but inherently frivolous I.R.S. cases have been melted down by "Dear Diary....."

Finally, never leave your diary in the office after hours. Keep it on your person at all times. Your diary is an extension of your memory, and as such it is also a part of your memory that never forgets.

Others bear burden, too

Dear RW,

I must take exception to David Honig's guest editorial "FCC on Track with EEO" in the Aug. 24 issue. I know from personal experience that the effects of these guidelines are unfair, not just to those unfortunate applicants who are denied employment for no other reason than the color of their skin or because of their sex, but to all the other employees and their families who must bear the burden of short staff while management scrambles to find the "right" applicant for the job, passing up more qualified

Radio World

Vol. 18, No. 22

November 2, 1994

Editor-in-Chief.....Lucia Cobo
Managing Editor.....John Gatski
Associate Editor (News).....Thomas Pear
Associate Editor.....T. Carter Ross
Contributors.....Frank Beacham/N.Y.
Bruce Ingram, Pamela Watkins, Nancy Reist
Technical Editor.....John Bisset
Technical Advisor.....Tom McGinley
Editor (International).....Alan Carter
Editor (Radio World Magazine).....Charles Taylor
Editorial Assistant.....Whitney Pinion



Radio World (ISSN: 0274-8541) is published bi-weekly 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 1994 by Industrial Marketing Advisory Services, Inc. All rights reserved.

—PRINTED IN THE USA—

Next Issue of
Radio World
November 16, 1994

Clinton, Hundt Reveal Little Insight

► continued from page 1
next issue, Nov. 16.]

The mood among participants was justifiably high. The Radio Advertising Bureau (RAB) just announced that advertising revenue in radio continues to grow in double-digit monthly increments.

Feeling good

Business hopes also ran high among exhibitors as this combined exhibit floor of the NAB, RTNDA, SBE and SMPTE opened for the first time.

Digital news dominated the floor. USA Digital Radio displayed a video "mobile tour" taped in Chicago where the consortium has both an AM and an FM digital audio station on the air.

Arrakis Systems and Wegener Communications announced a strategic alliance that created what the two called the first integrated digital satellite controlled workstation.

Comrex demonstrated that a small digital codec, the company's G.722, can make any radio show mobile—with a planned three-day broadcast of Talk America Radio Network from its booth. The first day of broadcasting went off without a hitch.

The large exhibit floor, however, almost dwarfed both exhibitors and attendees alike. None of the four associations was prepared to release attendance figures for the first day, but traffic on the floor seemed steady if not jam-packed full of people.

The Radio/Audio Pavilion occupied the center forward part of the hall but was not readily evident as a section unto itself. Radio/audio exhibitors adopted a wait-and-see attitude as to the benefits of a combined floor.

Arrakis Systems' Mike Palmer said he believes the exposure to the four-association membership crowd to be beneficial for the audio companies. "It is interesting to us to expose our products to other industries," he said. "Digital audio has so many more applications than just radio."

Bradley Broadcast's Paul McLane concurred: "We are excited about the combined floor. We have more potential audiences in one shot than we would normally see," he said.

Different markets are not necessarily what everyone is after, according to some exhibitors. But the enhanced setting does provide some added advantages.

What World Media Expo should provide, said Energy-Onix Marketing VP ERnie Belanger, "is a chance for us to expose our product in a less hurried environment than Las Vegas."

Equipment distributor BSW was looking forward to the show. "We are excited about the exposure to customers we would not ordinarily see," said BSW's Tim Schwiager. "Much of our equipment has applications for other markets."

Some exhibitors refrained from going on the record but expressed concerns that video might take over the show,

much like at the spring gathering. One audio booth executive commented, "My first thought as I walked in and saw the huge BTS booth was, 'This is going to look more and more like the spring show.'"

Positive outlook

Naysayers were quickly shot down by more enthusiastic company executives. Radio Systems' Dan Braverman put it suc-

cinctly: "If this show begins to look more like the spring—that is fine with me. NAB and the exhibitors are taking us (radio) more seriously."

Not only would the exhibit floor expose products to new audiences, but, according to some, it could provide companies the ideal ground for prospecting business alliances with other companies.

ITC's Charlie Bates said the company is looking for just such opportunities. "We have created alliances that we will be announcing shortly...(A)nd we will be looking for the additional exposure for our products," he said.

Seattle Show Looks at Future

► continued from page 3

Understanding the language of cost benefits and customer satisfaction demands that engineers broaden their individual scope beyond the workshop and develop management skills that will help them reclaim their role in steering their facilities forward.

In short, they need to "motivate, prioritize and learn to communicate effectively up and down the company ladder," said Whitaker.

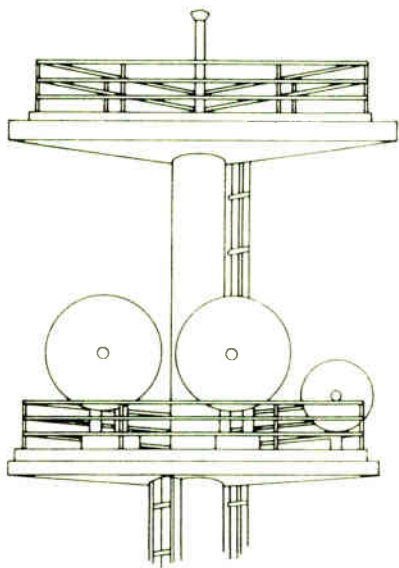
Whitaker and Kelly concurred that education and planning are crucial to avoiding professional disasters. In addition, engineers must face each day with the question, "How am I going to earn my job today?"

Part of planning for the future involves a responsibility to aspiring

engineers. "Mentors are important to help foster new blood," said Kelly.

Both Kelly and Whitaker stressed the need for continuing, hands-on education and training. Conventions and technical seminars were listed as two of the most important forums for engineers.

Electronic Media Expo '94 sessions included a variety of topics related to actual implementation of new technologies in the workplace. The most noteworthy sessions included: "Hard Disk Audio Systems: Users Panel Discussions," "Digital Audio Transmissions Via Internet and ISDN," "Current State of Remote Control," "MIDI Survival Skills for Broadcasters" and "Practical Implementations of RBDS."



"I recommend STABILINE® Voltage Regulators for any brand of transmitter that is being placed in a harsh operating environment."
— Steve McElroy, CCA ELECTRONICS

"A STABILINE® Voltage Regulator is a 'must buy' for radio station owners who want to protect their equipment investment."
— Ernie Belanger, ENERGY-ONIX

How to tame transmitter power problems.

WHR Series STABILINE® Voltage Regulators for AC power systems up to 660 volts.

Transmitters placed in remote, unattended locations such as mountain tops and wilderness areas depend on long utility power lines for service. Unfortunately, the lines often produce poor voltage regulation and other damaging power aberrations. Poor regulation can reduce power tube life by as much as 70% and the performance of associated equipment is similarly affected.

For example, a 15% undervoltage can decrease power tube life because cold operation promotes contaminant buildup in the tube. Conversely, a 10% overvoltage decreases life because increased temperature accelerates the decarburizing process.

The problems can be easily corrected.

Cost-effective WHR Series STABILINE® Voltage Regulators are the preferred choice of broadcasters worldwide for use with transmitters, receiving stations, studios and mobile production vehicles. These high power voltage regulators maintain constant voltage to your sensitive equipment even when the power line input voltage and system load vary widely.

Features include:

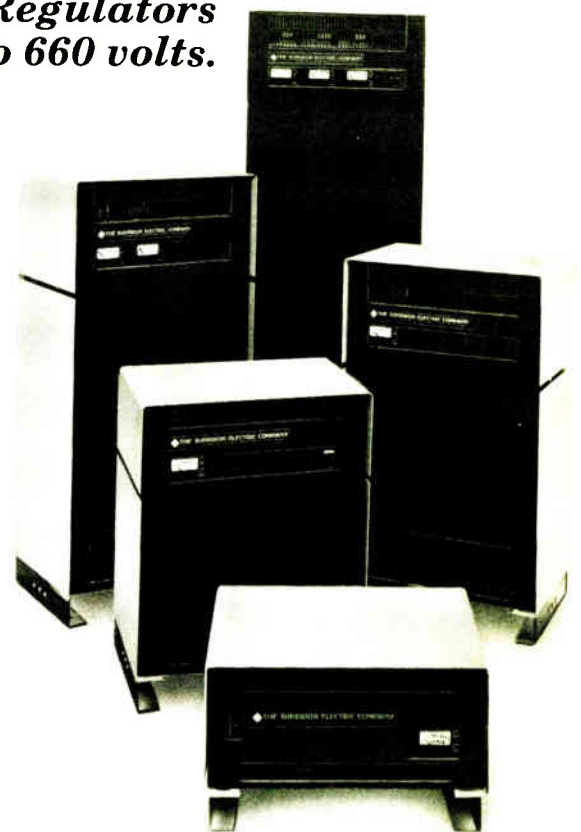
- Hold output voltage within $\pm 1\%$
- Power ratings from 2 to 1680 kVA

- Maintenance bypass plus other standard options
- 99% typical efficiency
- High overload capacity
- 19-inch rack mount versions
- Designed for UL and CSA approvals

A host of options allow you to customize your application.

Standard options include:

- Single or three phase models
- Analog or digital control
- Bypass switch
- Ammeters
- Frequency trip meter
- Tropicalization
- Manual raise-lower switches
- Zig-zag neutral generation
- Single or individual phase control
- High energy transient suppression
- Input voltage range alarm contacts



For Catalog WHR692 and to learn how WHR Series STABILINE® Voltage Regulators can be the solution to your power problems, write, fax or phone Ted Gladis at

1-800-SUP ELEC
(1-800-787-3532)
in USA and Canada

SUPERIOR ELECTRIC

WARNER ELECTRIC

383 Middle Street • Bristol, CT 06010
203/582-9561 • Fax: 203/582-3784

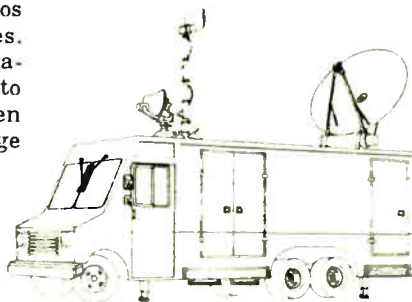


Circle (64) On Reader Service Card

World Radio History

3-phase, 500 kVA WHR Series Voltage Regulator

"Our production vehicles don't leave without one."
— Ron Crockett, SHOOK ELECTRONICS



TECHNOLOGY IN ACTION

New Jersey Implements New EBS Plan

by Jerry LeBow
President
Sage Alerting

STAMFORD, Conn. If waiting for the FCC to rule on EBS is getting you down, perhaps you and your State Emergency Communications Committee (SECC) should do what New Jersey did and implement your own modernized statewide EBS system.

The New Jersey SECC and New Jersey State Police did extensive research and evaluation as to what technology or systems were available. They needed a very

power plants within the state.

What officials needed was a reliable, rugged, expandable and simple-to-operate system that would allow the state, the counties or even the National Weather Service to gain virtual immediate access to all mass media or to selectively broadcast information on only one or more radio, TV and cable facilities.

New Jersey came to the EBS modernization project with a number of assets.

First, it had a well-organized State Emergency Communications Committee chaired by Richard Archut, chief engineer of WKDN-FM in Camden. Archut is a knowledgeable broadcaster and someone who really cares about EBS.

The second asset is eight existing CPCS-1 FM radio stations that cover the entire state with strong signals. Finally, the New Jersey State Police microwave network with numerous communications towers was made available as part of the EBS modernization project.

New Jersey requires a very reliable and redundant two-way EWS system that does not put all of its eggs in one basket.

To accomplish this, two independent radio communications paths were employed, one using the state police microwave network for voice and the other path using encrypted 2400 baud X.25 store and forward packet data. The concept is that if the microwave network failed, data and control

messages would continue to provide information and control to broadcasters and could provide crawls for cable facilities. If the packet network failed, the microwave system would be used as the back-up.

Another requirement was that the system must provide automatic capture of the main audio and/or video of radio, TV and cable facilities under certain agreed upon conditions. Stations receive advanced information on computer screens in front of the operator. A count-down clock shows the time remaining before the message. The stations have an inhibit switch that can be used if they feel

that the emergency message is not for their area.

The system users, including the National Weather Service and state police, need to get their message on the air very quickly without the burdensome and error-prone interface with disc jockeys, TV master control and cable operators.

The system had to allow selection down to an individual radio station or area or receiver, and the system needed to interconnect with the neighboring states of Pennsylvania, Delaware and New York.

Interface requirements

Finally, the new EWS system had to interface with an existing cable television audio and video override system called EAS, which had been installed in New Jersey. All of the activation centers and virtually all of the primary stations have back-up power via diesel generators.

Every site, including radio stations, activation centers and nodes are backed up with UPS power that will operate the system without external power.

The New Jersey EWS system has no connections to the public switch telephone network (PSTN), making the system totally independent.

The State Police Emergency Operating Center in West Trenton is the focal point for emergency management within the state. Ultimately there will be 21 county emergency operating centers, all of which will have the capability of providing audio and/or video messages to the local media in their area.

The first phase of this project is to link the West Trenton EOC site to eight primary New Jersey stations and four AM and FM stations in New York, Delaware and Pennsylvania with both voice and data communications. To facilitate this project, three former state police frequencies in the 44 MHz band were made available to EWS.

The first frequency carries encrypted data packet communications. Each of the eight primary radio stations, three activation centers and four state police communications towers act as nodes in the two-way store and forward encrypted data communications system.

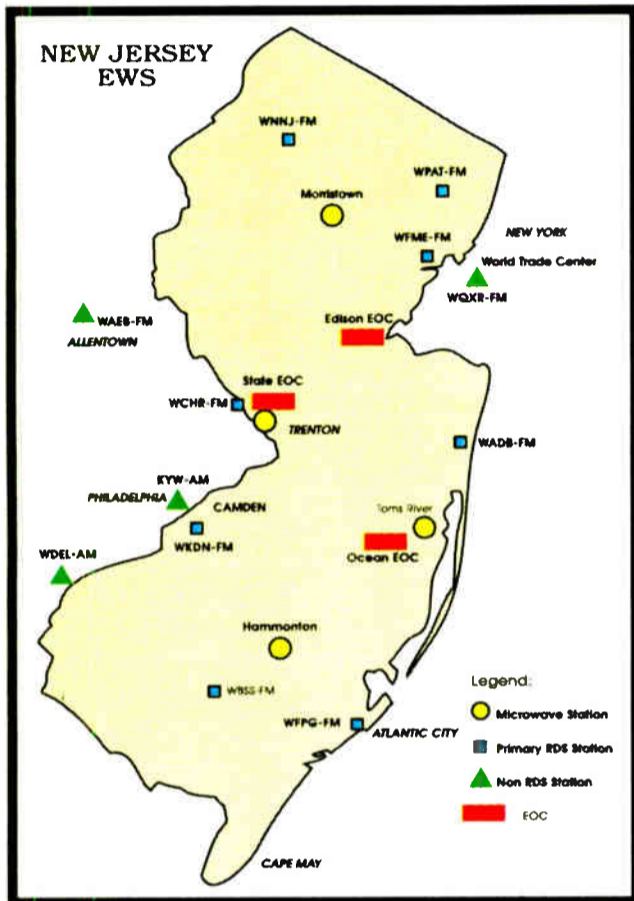
The two-way 2400 baud encrypted X.25 packet, data and control signals are relayed throughout the state with maximum latency of two seconds.

The EWS system automatically self-heals if the primary communication path is disabled. Because it is a two-way system, EWS notifies senders when their message was received at its destination and when

system actuation has taken place.

Audio for the New Jersey EWS is carried on the state police microwave network to four microwave tower sites. From there it is remodulated onto a 44 MHz frequency for the "last mile" delivery to the primary radio stations. An RDS signal generated at the eight primary stations carries both text and control messages to all secondary radio and TV stations, 34 cable headends and the four secondary stations in adjacent states and to the public. The audio messages synchronized with the RDS signal are carried on the main channel of one or

continued on page 9 ▶

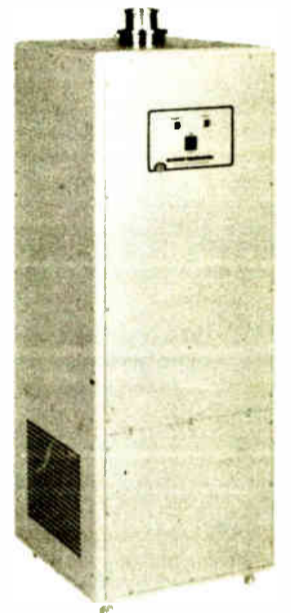


comprehensive audio and data alerting system that would cover the entire state utilizing its mass media facilities. After reviewing FCC EBS field test data and other options, New Jersey concluded that the Sage EWS technology using RDS was the way to go.

New Jersey system

New Jersey State Police manage the New Jersey EBS System. The state has been the site of numerous recent disasters and near disasters, including severe winter storms, chemical releases, natural gas pipeline explosions, transportation accidents and the ever-present threat from three nuclear

Question:
Ever wonder why transmitter manufacturers operate Altronic dummy loads at NAB and other trade shows?



Answer:
The best performance and the most dependable dummy loads built.



ALTRONIC RESEARCH INC.

WATER AND AIR COOLED MODELS FROM 1000 WATTS TO 1,500,000 WATTS

P.O. Box 249
Yellville, AR 72687
(501) 449-4093

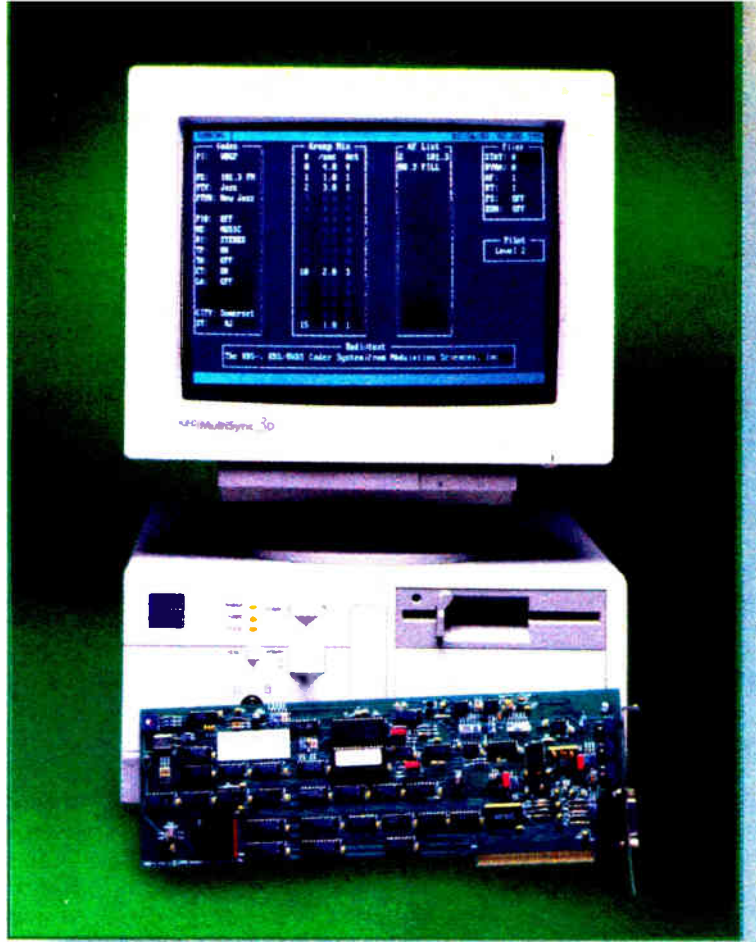
Circle (55) On Reader Service Card

Circle (143) On Reader Service Card

The RDS-1 keeps getting better, because it's the industry's first and only software controlled RDS Coder. That means that changes to the RDS Standard, and our own ongoing upgrades, are as simple as loading a new disk in your RDS PC.

The RDS-1 gives you flexibility and control you can't get anywhere else, like 255 Radiotext messages of unlimited length, full automation of RDS functions, and easy setup right out of the box. Animate your station on your listener's radios *while you transmit profit-making Transparent Data*. Only the RDS-1 does it all!

Now the wait is over!



Model RDS-1 RDS System Generator & Software

Modulation Sciences gives you everything you need to put



to work today

Our new RDS Data Receivers give you profit-making access to the *full* RDS data stream. Now you can lease the RDS data channels that conventional RDS receivers ignore. Use the RDS-X2 to feed billboard displays, provide stock market updates, and actuate remote control.

Individually addressable, the RDS-X2 gives you and your data transmission customers robust, error-corrected reception of any and all RDS data, plus audio and composite outputs. And innovative features like onboard data filtering, Antenna Diversity and Beacon Tuning™ make RDS datacasting simple and reliable.



Model RDS-X2 RDS Data Receiver

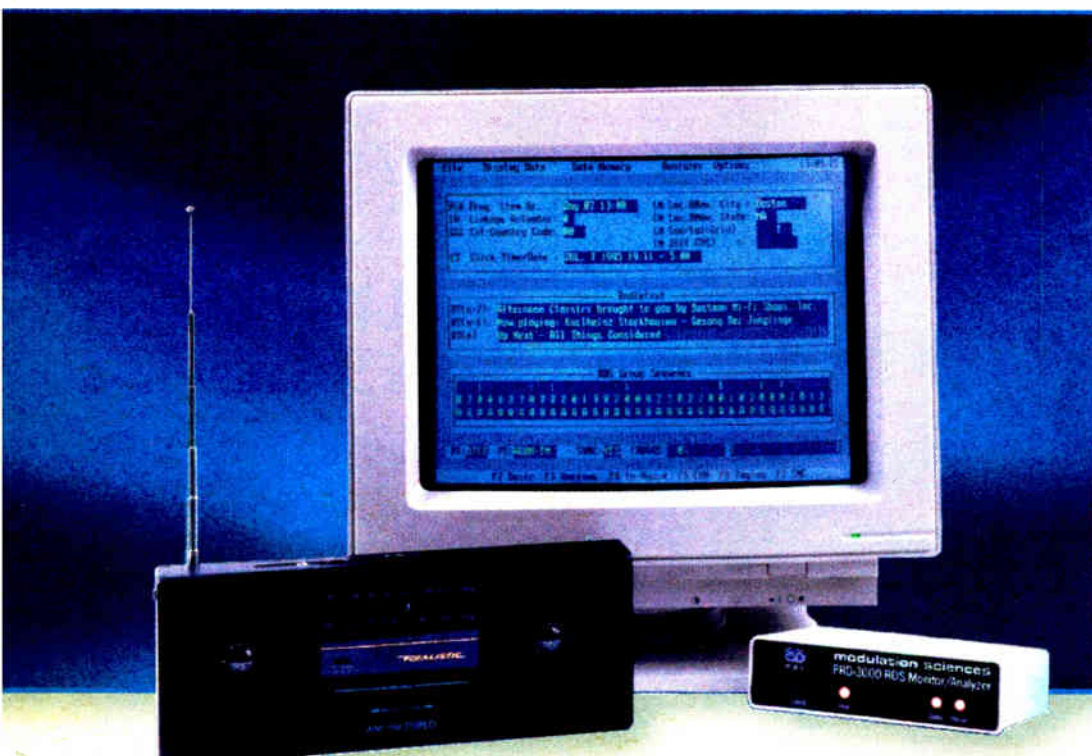
Whether you're already on the air with RDS, or only thinking about it, you need our new RDS Monitor. The PRD-3000 decodes, displays, analyzes and stores the complete RDS data stream, and it measures RDS injection level to 1/10 of 1 percent.

Data is displayed on any desk or laptop DOS or Windows® PC. Plugged into our optional tuner, the PRD-3000 lets you examine the most minute details of your RDS signal, *and everyone else's*. Like all MSI products, the PRD-3000 is supported by a bold three year warranty.

There's no longer a reason to wait for RDS to happen. All the tools you need are here today – courtesy of the RDS Authority . . .

modulation sciences, inc.

12A World's Fair Drive • Somerset, NJ 08873 USA
Voice (908) 302-3090 • Fax (908) 302-0206
Toll Free in USA (800) 826-2603



Model PRD-3000™ Precision RDS Decoder/Monitor/Analyzer

New Jersey Adopts EBS

► continued from page 7

more of the primary stations.

The New Jersey EWS is frequency agile, providing automatic tuning to the desired primary station or fall-back station. In virtually every area in the state except the mountainous northwest corner, at least two primary stations provide excellent coverage. If the designated primary station fails, receivers in schools, homes, hospitals as well as receivers at the primary and secondary stations and activation centers automatically retune to the designated back-up station.

Connection to weather service

The National Weather Service has centralized its New Jersey activities primarily into the Mount Holly Weather Forecasting Office. The National Weather Service said that WRSAME—the Weather Service's 520 baud FSK data systems designed specifically for its 162 MHz NOAA stations—is planned for installation in Mount Holly, allowing the weather service to enter the New Jersey EWS system via their 162 MHz NOAA transmitters.

These WRSAME transmissions will be automatically monitored and decoded by the EWS at actuation centers and at the primary radio stations. Confusing WRSAME codes will be translated into clear text messages and then into RDS by a Sage EWS computer. Priorities of WRSAME or commands from the state or county and other EOC's are programmed by the users into the multiple actual controller at each site.

Public alerts

Emergency alerts will be broadcast on the main channel of the eight primary stations and by the 34 cable TV headends. These audio messages also will be rebroadcast by most other AM, FM and TV stations.

Initially, no automatically tuned receivers were purchased for the system; however, these home and institutional receivers and automatic alerting smoke detectors will be available for sale to the public throughout the state as soon as the New Jersey EWS system is fully installed.

These warning units, which automatically lock onto the appropriate alerting station for their area, can be turned on selectively (down to an individual receiver) to provide alerting any time of the day or night.

It is believed such institutions as schools, public building operators, nursing homes and hospitals will purchase these units to enhance security to their occupants. These receivers can directly interrupt PA and background music systems in malls, elevators, hospitals, airports and schools.

All RDS radios in the state will respond to PTY 31 (emergency code) by turning themselves on and/or raising the volume and stopping a cassette or CD. Many modules of RDS receivers both for home and cars are now available from such companies as Delco, Denon, JVC, Panasonic, Pioneer and Blaupunkt.

The current status

Approximately two-thirds of the New Jersey Emergency Warning System has been installed. The target cut over is on or before Dec. 31. The final installation will include site-specific software and the Multiple Actuation Controllers that act as an input or "front end" to the EWS system, monitoring the National Weather Service WRSAME

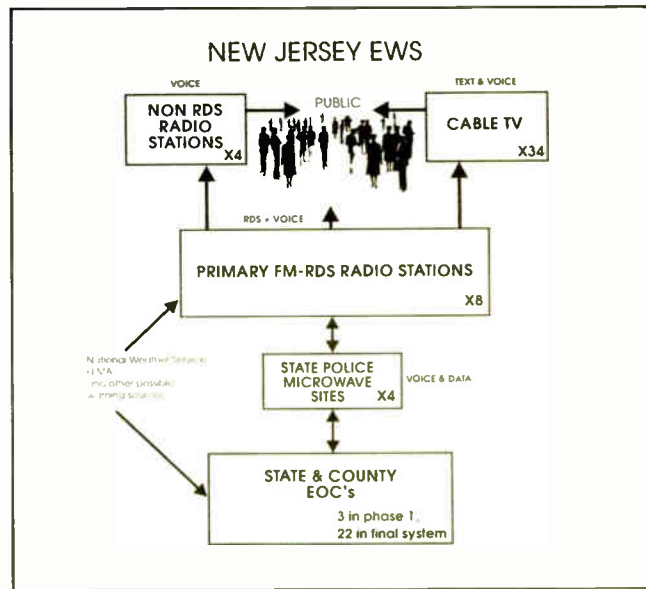
transmissions on 162 MHz, the state's EMRAD (Emergency Radio System), on 39 MHz and other sources of information.

All transmissions, including audio and data, are logged on a hard disk and are available for review, replay and print out. The software at the radio stations and the activation centers can be customized by the individual users allowing them to enable or disable features, including the automatic capture of mass media facilities for various levels of emergencies. This software is time sensitive, location sensitive and event sensitive allowing each area to fine tune to its community's needs.

In Phase 2 of the New Jersey EBS modernization program there is a plan to install activation centers in each of the 21 county EOCs. Recently three additional counties have received funding for their activation centers that will be included in the initial system.

□ □ □

For information, contact Rich Archut at WKDN-FM at telephone: 609-854-5300, or Jerry LeBow, Sage Alerting Systems, at telephone: 203-357-1464.



The Legend Continues.

The Old Standard.

Our M267 Mixer is more than the best selling mixer of the last ten years. It's the most versatile, the most durable, and the best performing. You trust it in your rack — you trust it on the road. And while production environments have changed, your mixer remained the same. Until now.

The New Standard.

Our new M367 Portable Mixer gives you all the reliability and durability of the M267, plus a list of new features and improvements. We made it over 25 dB quieter with a low noise circuit — ideal for digital formats. We added two more mic line inputs, bringing the total to six. We added peak LEDs. And we gave it 12 and 48-volt phantom power for your condenser mics.

What we didn't change was its toughness. It's still made with a rugged all-metal chassis and manufactured in the USA with legendary Shure durability.

The New Features.

Without increasing the size, we were able to pack in dozens of new features and improvements. The M367 has all the features of the M267, plus:

- Input peak LEDs
- Detachable power cord
- Two XLR outputs
- Easy-access side battery compartment
- Headphone monitor circuit
- Output peak/limiter LED
- Balanced, 2-position mix bus
- Adjustable limiter threshold
- Battery/AC VU meter illumination
- Monitor input sensitivity selector
- Program/monitor input selector

With the Shure M367 mixer, we've just raised the standards. It's time you raised yours.

**For The Shure Dealer Nearest You,
Call 1-800-25-SHURE.**



THE SOUND OF THE PROFESSIONALS... WORLDWIDE. **SHURE®**

Circle (12) On Reader Service Card

World Radio History

**Complete System
Starting at \$17,950**



Orban DSE 7000

We Took The *Work* Out Of Workstation.

The Orban DSE 7000 is the fastest digital workstation for radio production. Of course it's friendly. There's no setup. No confusion. No trouble. In fact, you can literally plug it in and play in thirty minutes or less. No training. No computer wizards needed.

The DSE is everything you need. Ask anyone who has a DSE and they'll

tell you there's no comparison. We invite you to call or fax us for a complete user's list.

With the DSE you'll produce the best sounding spots in one-third the time. It's the easiest way to increase your production and your profits. Plus, boost your creativity to a whole new level.

Harris Allied makes it easy to get your DSE 7000. Simply make one free call.

After all, nobody wants to work harder than they have to.

1-800-622-0022

Fax 317-966-0623

Southern CA 1-800-690-2828

 **HARRIS
ALLIED**

Tips on Air-Cooled Transmitters

by Don W. Patrick

FORT SMITH, Ark. Some air-cooled broadcast transmitters use an air pressure sensor to protect the PA. We have a 15-year-old Harris FM20K that has this type of system.

A three-phase, 220 V motor drives a fan with some 600 cfm output, and this air is directed into the PA cavity. The "out-flow" duct is smaller than the "in-flow" duct. Therefore, more air is trying to come in than go out. This creates a positive pressure within the PA cavity. A diaphragm-type sensor samples the cavity, senses the positive pressure and closes the circuit, allowing the PA filament voltage to come on.

black, with only one CFM more than that required to keep the switch closed? Is the tube running within minimum limits and hotter than it should be?

The second and more serious problem with the air pressure type system can be very costly, monetarily *and* with air time. If anything blocks the out-flow duct, the pressure goes up but the airflow goes down.

Two years ago, a big block of ice fell off the tower and centered the vent cap, crushing it down to the duct. This reduced the out-flow duct to some 20 percent of its original size. The pressure went way up which made the sensor very happy, but only 20 percent air flow made the PA very unhappy, and it melted in disgust.

A new \$1,800 PA plus an ice shield over the vent took care of that problem. Some two months later, we started popping off the air.

A drive back to the mountain revealed the out-flow duct screen partially blocked by small pieces of foam rubber. This had come from a liner in the in-flow duct that the factory had advised customers to remove some years before. As the blockage increased, the air flow decreased but the pressure went up. Once again we had a happy sensor and an overheated, damaged final.

To correct this problem permanently and gain a cooling system

performance gauge, I built a "flow" sensor.

Pickup a small copper hinge, a 1/8-inch copper rod and a small (6"x6") piece of thin copper sheet. Solder the rod to the

hinge (Figure 1) and the sheet to the end of the rod, leaving some of the rod sticking out behind the hinge.

Then, glue a mercury switch with silicon seal to the rod just behind the hinge. Run the wires from the mercury switch to the hinge point and off to the transmitter control line at the pressure switch. Cut a hole in the out-flow duct and install the new sensor and close or cover up the hole.

Be sure the rod will move up and down freely (Figure 2). Adjust the travel of the rod (with the air running) so that with a

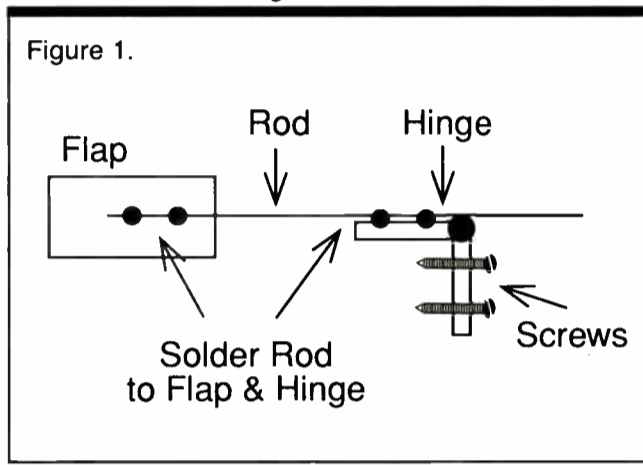
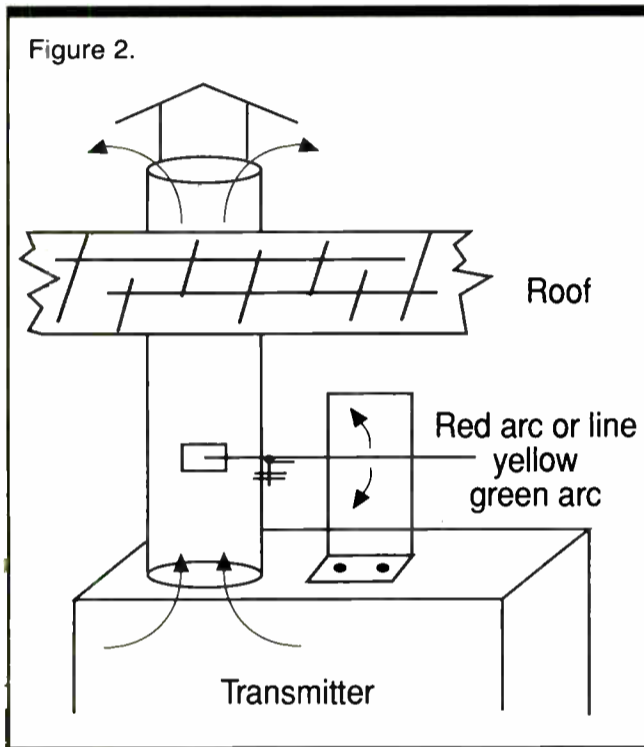
6"x6" Flap in the air stream or clamping a lead fishing weight to the rod on the flap side of the hinge or on the outside of the hinge. Now you have both air pressure and air flow to protect your

Serious problems with the air pressure type systems can be very costly.

transmitter. Once this is done, you can attach a piece of metal alongside the rod and color code it. Paint on a green arc for normal, yellow for reduced and red for temperature increasing and pending trouble. Just a glance will tell you that something like a dirty filter is reducing your air long before it causes any problem.

On most, you will have to add weights to the rod between the hinge and the flap plus reduce the flap size.

Don W. Patrick is a contract engineer for AM, FM and TV stations, certified by the SBE as a professional broadcast engineer. Contact him at 501-646-6141.



clean system, the rod is held not quite all the way up. Then by restricting the intake, set the mercury switch to trip just before the pressure switch trips due to low air flow.

These limits can be adjusted by any combination of reducing the size of the

There are two problems with this type of system. One, which is relatively minor, is that the cooling system tells you *nothing* about its condition. Are the fan impeller blades dirty or is the filter

ProGold™ Maximum Performance & Protection for Connectors

The Only Product that Conditions & Protects Plated Surfaces and their Base Metals!



Even the finest equipment cannot guarantee noise-free operation. One "dirty" connection anywhere in the signal path can cause unwanted noise, distortion and signal loss.

Considering the hundreds (if not thousands) of connections in electronic equipment today, it is only a matter of time before they begin to fail.

CAIG ProGold works unlike any other contact cleaner, enhancer or lubricant. Due to its unique properties, not only does it deoxidize and clean surface contamination, but it penetrates plated surfaces and molecularly bonds to the base metals. This increases conductivity and contact surface area and reduces arcing, RFI, wear and abrasion (the major cause of intermittent signals, distortion and signal loss).

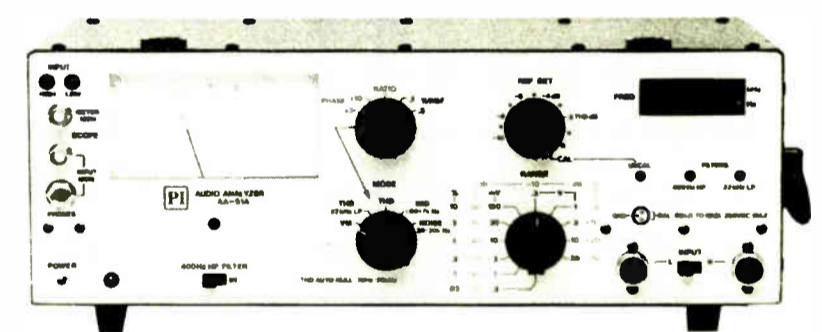
Use **ProGold Conditioning Treatment** to improve and maintain the performance & reliability of all electrical components & equipment.

CAIG Products ... used by those who demand best!

Boeing McIntosh Labs
Diebold, Inc. Motorola
Dolby Laboratories RCA
Federal Express Switchcraft
General Electric Tektronix
Hewlett Packard Texas Instruments
Honeywell Xerox Corp
John Fluke Mfg. & many more!

CAIG LABORATORIES, INC.
16744 W. Bernardo Dr.,
San Diego, CA 92127
TEL: (619) 451-1799
FAX: (619) 451-2799
1-800-CAIG-123

AA-51A AUDIO ANALYZER NEW \$3650; UPGRADE \$1545



- | | |
|--|---|
| MEASURES: | FEATURES: |
| <input checked="" type="checkbox"/> HARMONIC DISTORTION | <input checked="" type="checkbox"/> AUTO-NULL THD+N |
| <input checked="" type="checkbox"/> VOLTS | <input checked="" type="checkbox"/> SHIELDED & BALANCED STEREO INPUTS |
| <input checked="" type="checkbox"/> dB; dBm (600 ohms) | <input checked="" type="checkbox"/> COMPATIBLE WITH NAB TEST DISKS |
| <input checked="" type="checkbox"/> FREQUENCY | <input checked="" type="checkbox"/> FREQUENCY READOUT |
| <input checked="" type="checkbox"/> WOW & FLUTTER | <input checked="" type="checkbox"/> SWITCHABLE HIGH-PASS AND LOW-PASS FILTERS |
| <input checked="" type="checkbox"/> STEREO PHASING | <input checked="" type="checkbox"/> VERNIER SET-LEVEL CONTROL |
| <input checked="" type="checkbox"/> SIGNAL + NOISE | <input checked="" type="checkbox"/> HEADPHONE INPUT MONITOR PORT |
| <input checked="" type="checkbox"/> INTERMODULATION DISTORTION | |
| <input checked="" type="checkbox"/> DIFFERENTIAL GAIN OF STEREO CHANNELS | |

PLEASE CONTACT US FOR COMPLETE DETAILS

PI Potomac Instruments, inc.
932 Philadelphia Ave., Silver Spring, MD 20910
Phone 1-301-589-2662 • Fax 1-301-589-2665

Tribulations of Replacing Damaged Coils

by Fred Greaves Jr.

YORK, Pa. When an RF coil takes a direct hit by lightning, the current within the coil can be in the thousands of amps.

The turns in the coil, due to the large magnetic field generated, will collapse toward each other resulting in a very asymmetrically wound coil.

The value of the coil no longer will be what it was intended to be, and if used in a high-voltage area of your AM system, it will be prone to arcing. It is not a good idea to just readjust the coil. Replacement is in order.

Replacing a coil sounds easy enough. Just look at the label and order another one. But what do you do if the label is missing?

It's fairly easy to determine the value of this type of coil with a few mechanical measurements and a little math. First, measure the overall length of the coil, then the radius and count the number of turns.

The formula for determining the inductance in microhenrys (μH) is:

$$\begin{aligned} \mu\text{H} &= (R * T)^2 / 10L + 9R \\ R &= \text{Radius of the coil in inches} \\ T &= \text{Number of turns} \\ L &= \text{Length of the coil in inches} \end{aligned}$$

For instance, take a look at a real coil, where: $R=6"$; $T=22$; and $L=12"$. Therefore: $\mu\text{H}=17.424/174=100.1$

You now know that the damaged coil was 100 μH , but if you don't have such an animal on the shelf, count number of active turns used in the damaged coil, and use the following formula to determine the inductance actually used in the circuit:

$$\mu\text{H (used)} = (\mu\text{H} / T) * T \text{ (used)}$$

For example, if the number of turns used in the coil was only 5 3/4 then:

$$\mu\text{H} = (100.1 / 22) * 5.75 = 26.2$$

You really don't need a 100 μH coil. Any coil you have over 30 μH will do nicely. When selecting a replacement, be sure the current rating is the same or

If you don't have an RF generator or bridge to properly adjust the coil, you can determine where to set the tap as follows: The total inductance of the coil

If you set this coil up for slightly less than eight active turns and install it, your system should come back to life. It should be pointed out that the previous measurements and adjustments are but approximations; however, by using these procedures, you can get your system up and running without having immediate access to expensive test equipment.

After making this type of repair, you will want to get the necessary equipment as soon as possible so that the affected network can be properly adjusted.

□ □ □

Fred W. Greaves is assistant director of engineering for Susquehanna Radio Corp. in York, Pa. Contact him at telephone 717-852-2127.

Replacing a coil sounds easy enough. Just look at the label and order another one. But what do you do if the label is missing?

greater than the damaged coil.

You find a coil on the shelf that measures 10 inches in length and 8 inches in radius and has 9 turns; by using the formula for determining the inductance, you determine that this coil is 30 μH .

divided by the number of turns in the coil will tell you the inductance per turn.

$$\begin{aligned} \mu\text{H} / T &= \mu\text{H per turn} = 3.33 \\ T(n) &= \mu\text{H(used)} / 3.33 = 7.86 \end{aligned}$$

Tower Responsibility

► continued from page 1

maintenance, giving the FCC a way to enforce tower regulations if the agency cannot contact tower owners.

"For example, if the tower owner disappears and doesn't pay the power bill on a tower close to an airport, and we want to maintain the lights on it, we could revert back to licensees," Greenberg said. "We wouldn't create a hazard."

Extra tower costs

Currently, tower lessees are also responsible for filing the sometimes costly construction permit applications for tower modifications, even when their antennas will remain at the same location on the tower, footing attorney and engineering fees for the permit process.

"If you have 10 radio stations with antennas on a tower and the guy on top decides to raise the tower 50 feet, based on (FCC) Mass Media bureau rules, all 10 would have to file construction permit applications because the tower height is

being increased," Greenberg said.

Although stations choosing to take advantage of the heightened tower by raising their antennas would still need to file construction permits, stations keeping their antennas at the same tower location would not and could save money.

The FCC plan also would remove tower information from the radio permit process and require tower owners to file separate tower applications.

"It will save the FCC and licensees hundreds of thousands of dollars," said Mary Beth Richards, special counsel to the FCC for reinventing government.

Although towers still would have to comply with federal standards and faulty towers still would be grounds for application dismissals, the burden of providing tower specifications would be shifted

to tower owners.

Lengthy tower descriptions in broadcast applications would be replaced by tower registration numbers.

A proposed tower data base would list towers by their registration numbers and once the agency receives an application for a broadcast license, it can use the number to see if a tower complies with federal regulations and allow the FCC to

There are no FCC regulations on the books that hold tower owners separately accountable.

track owner of hazardous towers, Greenberg said.

This could again reduce operation costs for radio stations by reducing the amount of attorneys and engineering consulting fees stations shell out for tower descriptions in their license applications.

However, Jim Weitzman, a Washington communications attorney, speculated that "such savings could prove illusory where the station itself owns the tower or the tower owner passes along his new regulatory costs and duties to tenants through lease agreements."

Significant change

Most significant for the FCC, the proposed rule changes would reduce the costly, desk-cluttering and time-consuming paper work involved in tower applications.

On a national scale, the tower licensing proposal would consolidate the number of tower applications from 850,000 to 70,000. FCC Chairman Reed Hundt said in a recent address to the Networked Economy Conference.

"Because there would be less tower filings to deal with, we could do it faster," Richards added.

The process for changing the tower license rules began last year when a team of FCC employees from different bureaus within the commission were appointed to form an interdepartmental think tank to facilitate antenna structure regulations for tower.

The think tank, dubbed as the "Tower Standardization Team," recently recommended to the FCC quality council—the agency's upper management echelon—that the bureaucracy change its rules. ☺



**528E Voice Processor —
Make a big impression.**

**Voice Symmetry.
High Definition Mic Pre-Amp.
Compression.
Downward Expansion.
De-Essing.
Parametric EQ.**

Voice talent is expensive. So why not get your money's worth?

Scan any AM or FM dial in the U.S. or Canada and you'll hear Symetrix voice processing technology at work. Creating better sounding voices. Attracting more listeners. Everyday.

The new Symetrix 528E continues our tradition of providing broadcasters with powerful, reliable, easy to use tools.

Six processors in one box. From the company who invented "voice processing".

Symetrix

Tel 206.787.3222 Fax 206.787.3211
Toll Free 800.288.8855

**A voice is a terrible
thing to waste.**

Total voice control. All in one box.

Some People Think That Radio Production People Are Too Demanding.

NOT TASCAM. Radio and broadcast production demands durable equipment that performs unrelentlessly twenty-four hours a day. That's why you'll find TASCAM equipment in practically every production facility in the country. And that goes for the TASCAM DA-88 modular digital multitrack, as well. It offers you incredible flexibility and a quicker production alternative to elaborate workstations, yet it costs less than a good cart machine. Bottom line is you get the benefits of digital and the ease of use of analog.

No matter how you look at it, the DA-88 is the smartest way to ease into digital production and it's the essential complement to any digital audio workstation. It gives you one hour and forty-eight minutes of crisp digital audio (8-tracks) on a low cost standard Hi8 video tape. Better yet. It works just like any other TASCAM deck — no learning curve. That means hassle free, quick production, especially on those smaller projects with crazy deadlines.

So if you're a demanding broadcast production person, demand the best value in digital multitrack —

THE TASCAM DA-88



- DIGITAL DEMANDS
- NO LEARNING! SHOULD ALREADY KNOW HOW TO USE
 - LOW COST REMOVABLE MEDIA
 - QUICK PRODUCTION USE
 - SERVICE & SUPPORT WHEN I NEED IT
 - MODULARITY & EASY INTEGRATION
 - BUILT TO TAKE A BEATING

TASCAM
Take advantage of our experience.

KEYBOARD CONNECTION

Epson ActionNote Series Worth a Look

by Barry Mishkind

TUCSON, Ariz. Unlike most of the staff at a station, engineers and salespeople have something in common: Their office location moves around as fast as they do.

The engineer cycles between the studio and the transmitter or a remote broadcast. The salesperson makes calls all day long on different clients.

In past years, one of their most useful tools usually has been somewhat difficult and/or costly to take into the field and has been left on the desk, largely inaccessible. To those who don't normally leave the office during the workday, it might be hard to explain how valuable a computer can be to analyze the transmitter plant, to quickly display a presentation of the station's audience or cpm, or to fill out a sales contract.

A good value

At one time laptop, or notebook, computers with enough memory and hard-drive space or with screens easy to read were heavy, expensive and not always reliable. However, as the prices came down, the number of portable computers rose dramatically, further driving prices down and making them a very good value for the sales and engineering departments.

Nevertheless, browsing computer shops can be a little frightening. To get a large

hard drive, good screen and a fax modem, prices can easily run between \$4,000 to \$5,000 or more. On the other hand, since each individual situation lends itself to a particular hardware solution, careful shopping will often uncover a cost-effective unit.

Here are a few quick examples.

Examples to consider

An engineer needing access to the FCC rules and some technical programs might find a simple black-and-white notebook with reasonable disk space and speed may do fine, and cost under \$1000.

On the other hand, salespeople often are out where a color display of charts and graphs highlighting the station's strong points can be very effective. Perhaps there might be pictures or even sound bites of the air product. A larger complement of hard drive space, speed and bright color screen can make these impressive, though the cost of the computer can go up substantially as well.

Since there isn't enough room to review all the different models, let's take a look at one of the best values, the Epson line of notebooks.

Epson has a long reputation for reliable computers, backed by a strong service organization. (More on that later.) The notebook series, called ActionNote™, manages to mate these strengths with a tempting price point.

The series starts with the 4SLC2/50, a

low-power, clock-doubled 80486 computer. With street prices starting at a little more than \$1,000, the unit comes with hard drives from 80MB to 260MB and a 2400/9600 data/fax modem. Four megabyte of RAM is standard. This can be an ideal unit for an engineer who might, for example, plug into the phone system and dial up the transmitter from anywhere. (Several systems permit instant interrogation of the transmission system and diagnosis of problems from wherever the engineer happens to be.)

If you prefer a color screen, the ActionNote 500C is a good choice. Using a passive matrix color LCD screen, a clock-doubled 50 MHz CPU and a trackball, this unit can be "stuffed" with a 260MB hard drive and a built-in 14.4 fax modem... and still come in at about \$2,000. Smaller hard

drives and a 24/96 fax modem can be had at an even more modest price.

Then there is the ActionNote 700 series with choice of a mono, passive-color or active-color matrix screen, PCMCIA slots and a built-in trackball. By the time this column reaches you, the newest models, 750 and 766 (with CPUs running at 50 and 66 MHz), should have been introduced. These machines move up into the \$2,000 to \$3,000 territory but can have special features such as removable hard drives and flash memory cards and local bus video for faster displays.

Of course, buying the machine is only the beginning. Customer support will be important. Epson has set some high standards, including lifetime technical and parts support using a toll-free 800 number. Warranty support is good, with on-site service provided. The 750 and 766 Series even include a three-year special road care service where parts are shipped overnight to you in an emergency.

A good feel

One of the most important features to look for when buying a notebook computer is the keyboard "feel." While everyone's preferences are different, I can tell you the keyboards on the Epson machines "feel" good, and unlike some, are not so different from the desktop keyboards as to be confusing to the fingers as you go back and forth. And while a cheap price from a mail order firm may be tempting, you really should "try" the keyboard before buying.

Here's what you should look for in a keyboard: (1) The key size—avoid computers with narrow, compressed keyboards; they are hard to type on. (2) The keys should have a good firm feel. (3) Avoid computers using a function key to make many keys do double to triple duty. That gets confusing. (4) Make sure the arrow keys are dedicated and in a true cross or inverted "T" alignment. The inverted "L" style is simply harder to use.

Other considerations: You can't expect one battery to hold up for an entire day. Newer batteries will give several hours of solid service, even with the hard drive

running. However, if you need to rely on battery power, a spare would make sense.

Do you plan to use Windows? If so, be sure to get a machine with at least 8MB of RAM and plenty of hard space. Otherwise you can end up with a lot of "churning" and problems loading files.

Another challenge is when salespeople wish to leave hard copy of a sales agree-



ActionNote 500C from Epson

ment behind. You can carry a portable printer or some drivers to accommodate your client's printers. But here's a tip, one that can take advantage of all your graphics programs: With the built-in fax modem, just fax it to the client's fax machine!

Also, using a BBS shell back at the studio, it should be easy for a salesperson to dial in and upload a new order immediately, so the traffic department can get the schedule going, or identify problems even before you leave the client's office.

□ □ □

For more information on the Epson notebook products call 800-289-3776.

Barry Mishkind can be reached at 602-296-3797, or on FidoNet at 1:300/11.3 or "barry@coyote.datalog.com" on the Internet.

MOVING?...

Don't leave us behind!

Mail or fax
your current label
and new address
(with effective date) to:

Circulation, RW,
PO Box 1214
Falls Church, VA
22041

or

FAX 703-998-2966.

Address changes
will be processed
within four weeks of receipt.

Thanks!



TRUE BLUE FOR THE VIEWS.



Talk radio pros expect the unexpected, but there's one thing they can always depend on—the reliability of true blue.

audiopak
BROADCAST CARTRIDGES

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



They say Unity 2000 sounds better.

We say the Optimod 8200 sounds better.

They claim it sounds musical and natural.

We swear it sounds like water over the bridge.

Who's right?

Who's wrong?

You decide.



Sound is personal. 100% digital is the future. Optimod-EM 8200.

orban[®]

H A Harman International Company

© 1994 AKG Acoustics, Inc. Orban and OPTIMOD are registered trademarks of AKG Acoustics, Inc. Unity 2000 is a trademark of Cutting Edge. All other trademarks are property of their respective companies.
1525 Alvarado St., San Leandro, CA 94577 USA Phone 1-510-351-3500 Fax 1-510-351-0500.

Circle (219) On Reader Service Card
World Radio History

MORE POWER TO THE NEW AM RADIO

Broadcast Electronics Solid State AM Transmitters.

Saving Power In Hawaii

"Last month, my AM transmitter power bill was over \$1500. This month with our new BE AMS... (it's \$880) I can just about pay off the lease with the power savings alone. In over 20 years of owning radio stations, I've never had a piece of equipment deliver so dramatically."

Phillip L. Brewer - KHLO (AM) Hilo, HI
Brewer Broadcasting Hawaii

SAVE Electricity:

BE patented Class E power modules and switching supply technology saves substantial electricity.

SAVE Air Time:

Redundant power amps and redundant power supplies keep you on the air. Brown outs? High or low AC line voltage? Weather disturbances? No problem. Exclusive foldback and protection circuits, as well as broad input power supplies, will handle it all.

SAVE on Extra Transmitters:

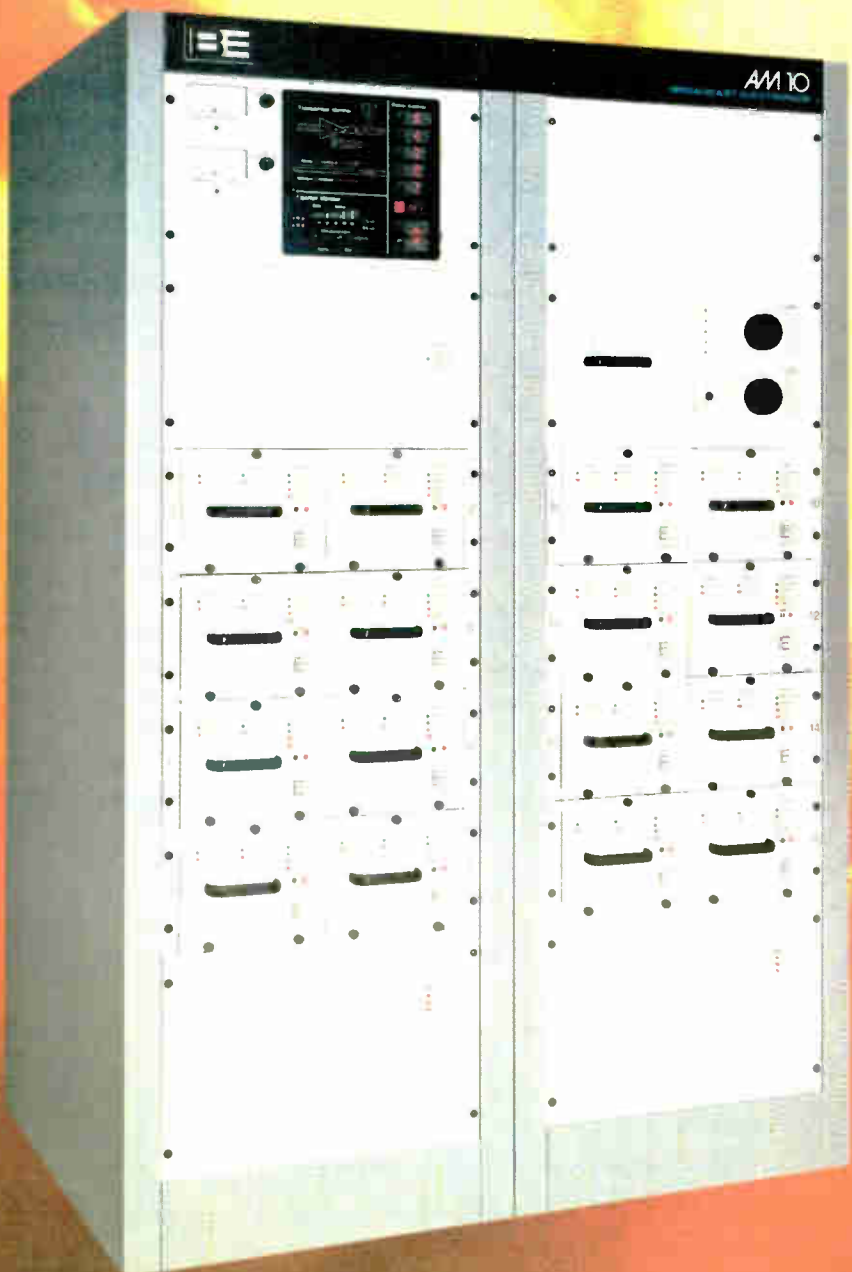
Our transmitters operate at up to five separate power levels. Whatever your license requires, you only need one BE AM transmitter for the entire broadcast day. And BE Solid State AM transmitters provide unequalled audio performance and C-QUAM™ stereo built in.

Call your BE Representative

**now, or
 (217) 224-9600**



THE POWER THAT SAVES



The Broadcast Electronics AM10-10KW powerhouse. Just one in a series of quality engineered solid state transmitters. Coming soon...the new BE AM500 - 500W transmitter.



BROADCAST ELECTRONICS, INC.

WORLD LEADER IN RADIO BROADCAST TECHNOLOGY

4100 N. 24th Street/P.O. Box 3606

Quincy, IL 62305-3606

(217)224-9600/Fax: (217)224-9607

USER REPORT

Harris HT-30s Power Chicago FM

by Gordon S. Carter
Chief Engineer
WFMT(FM)

CHICAGO When WFMT(FM) decided to replace its 22-year-old RCA transmitters in spring 1993, we faced some hard decisions.

FM broadcasters on the John Hancock Center master antenna system, including WFMT, were considering a change to a new antenna system. The new antenna would require a higher transmitter power to maintain our current radiation contours.

We felt that we could not delay buying a new transmitter until that decision was made. Therefore, we determined that our new transmitters needed to be capable of providing the increased power as long as it also could be used at the current power level until that time.

Prolong the life

We also decided to replace both the full-power main and low-power auxiliary transmitters with two new full power ones. This would reduce the need for rushed repairs and prolong the life of both transmitters.

After researching the possible transmitter vendors, we opted to purchase two Harris HT-30 FM transmitters. The plan was to replace our old auxiliary transmitter first, get the new transmitter on-air and then replace the old main transmitter. This would minimize any downtime and eliminate prolonged low-power operation.

In planning the project, we discovered that we needed to double the AC power capacity coming into our transmitter room to accommodate the higher power transmitters. We felt that adding a second service was the most reasonable approach as we could thereby avoid interrupting our existing service. Schedules and timetables were drawn up and the project begun.

When the first transmitter arrived, we installed it with only one minor incident—we pulled the cable from the power supply to the main cabinet through the conduit backwards. This was easily corrected and the transmitter went on air. After a two-week burn-in period, we proceeded with installing the second transmitter.

Second transmitter

When the second transmitter arrived, we expected to install it without any problems. However, we soon found that one of the stand-off insulators in the main cabinet had been cracked in shipping, and it broke when we attempted to connect to it.

We placed a quick phone call to Harris, and the next day we had another insulator. When we began testing the transmitter, we

had problems keeping it on. All the indicators showed an AC current fault, but we could find no evidence of a problem.

Some phone calls to Harris gave us a number of things to try, but everything checked out OK. By the second day of these problems, Harris sent a technician to look at the transmitter. After running through a number of items, he discovered that one of the magnetic overload

relays was stuck, apparently the result of excessive jarring during shipment. He corrected the problem, and the remainder of the installation went without a hitch.

We operate each transmitter for about three months and then switch off so that both transmitters receive equal usage. The only outage we had was due to an AC power glitch in the building, which effected several other stations as well.

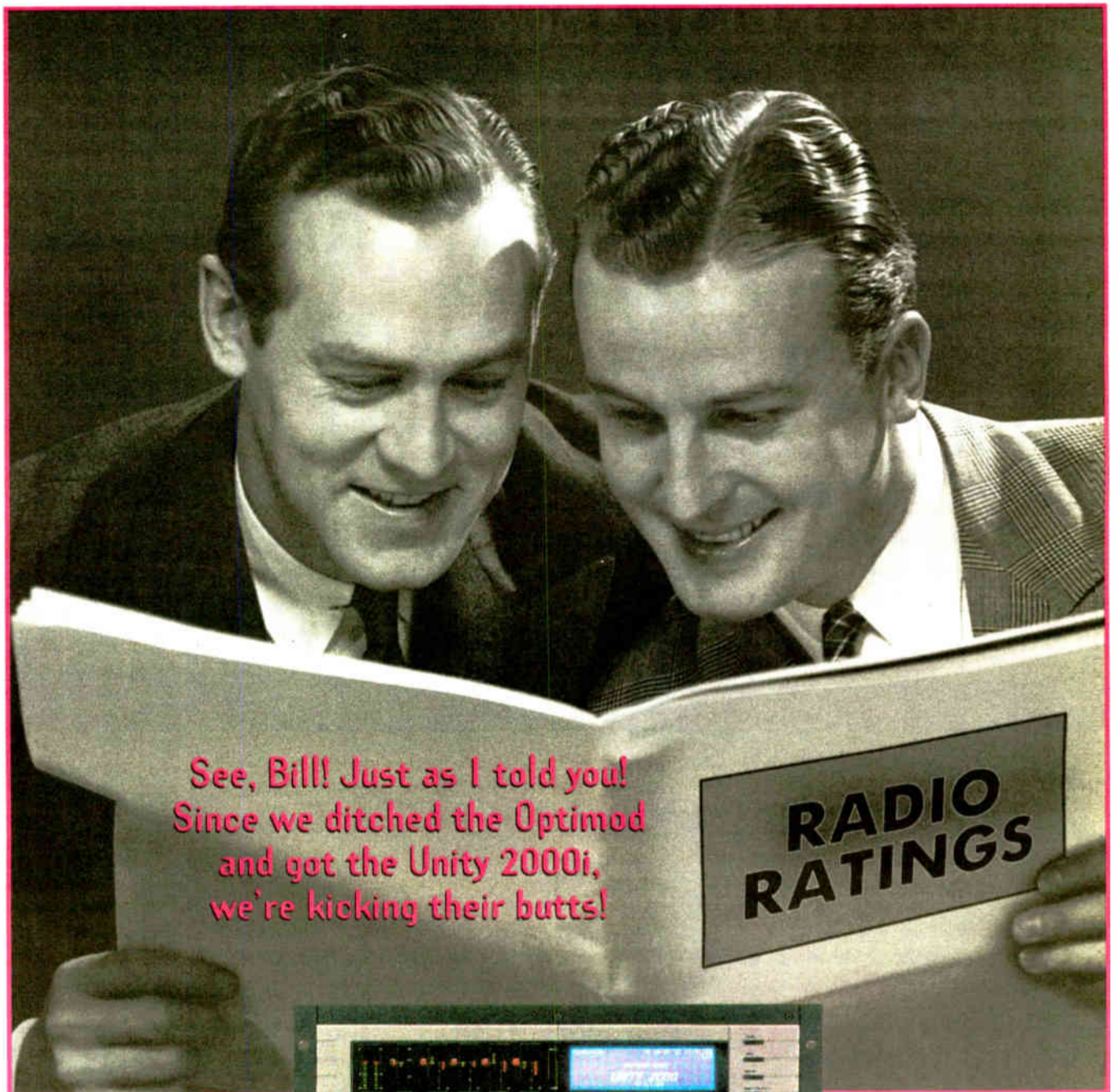
After using the Harris HT-30 for a year, we have had no problems with these transmitters. They continue to operate with the same parameters as set at the factory and verified upon installation. A number of listeners have reported cleaner audio as well. We look forward to many more years of reliable service from these transmitters.

□□□

For information from Harris Allied, contact Daryl Buechting, FM product manager, in Illinois at 217-222-8200, ext. 3405; fax: 217-224-1439; or circle Reader Service 152.



Harris HT-30



the unity 2000i the world's best sounding FM processor.
Better sound, more listeners, bigger profits. That's what it's all about.



CUTTINGEDGE

2101 SUPERIOR AVENUE, CLEVELAND, OHIO 44114 • TEL: (216) 241-3343 • FAX: (216) 241-4103
Circle (173) On Reader Service Card

USER REPORT

Compact BE Transmitter Breaks the Rules

by Richard Furr
Chief Engineer
WPCD(FM)

CHAMPAIGN, Ill. For those used to seeing transmitters the size of large freezers, think again.

The **Broadcast Electronics (BE) FM-3C** shatters that paradigm by packing 3 kW of power into a single equipment rack with room to spare.

After introducing its new transmitter at the 1994 spring NAB, BE chose WPCD(FM) as the alpha field test site.

We installed the solid-state FM-3C in June.

At 42 inches tall and 22 inches deep, plus 6 inches for the lowpass filter, the FM-3C can stand alone or mount into a standard rack.

When I first saw the new transmitter, I was amazed by its small size and weight—two engineers can easily move it. Installation went smoothly. A BE FM-100C exciter was connected to the composite input of the transmitter.

After all connections were made, a dummy load and wattmeter were connected and the transmitter was turned on. We were kept waiting for the sound of a relay kicking in, but the FM-3C does not have an AC contactor. The silence sur-

prised me at first, but according to BE, later models will include a contactor.

Power was slowly increased to rated output without incident, so we connected the antenna. Power was raised to our legal limit of 2.5 kW. Reflected power was measured at 3 W. Thanks to its broadband design, no tuning is required with the FM-3C.

The only problem we encountered was a poor signal-to-noise ratio (SNR), which turned out to be a power line grounding problem unrelated to the transmitter.

The design and manufacture of the FM-3C are impressive, especially its redun-

dancy and soft failure modes.

The swinging front door houses function controls, status indications and an LCD multimeter with two functions: a system function that measures forward and reflected power, power supply voltage and exhaust temperature; and a module function that measures each RF power amplifier (PA) module's voltage, current, power and temperature. A module select switch steps to each PA module.

Simple controls

The controls are simple: transmitter on/off, power raise/lower, fault reset, an interlock status indicator and a switch for remote control enable/disable.

Three power supply fault LEDs correspond to the three hot-pluggable switching power supplies that are installed behind the door. The CMOS-based control printed circuit board is just below the power supplies. The integrated circuits are socketed and the test points well labeled.

The cabinet also holds six plug-in PA modules. Each PA module has a drive and status LED indicator and weighs about 10 pounds. The power combiner is connected to the lowpass filter, which terminates in a standard 1.625-inch female flange.

At the bottom of the transmitter are two ground studs and a reusable air filter. Remote control connections are made to a 30-connection terminal block at the back of the transmitter.

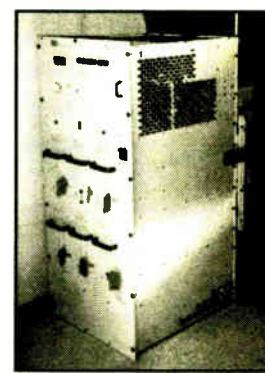
The remote control interface has positive or negative logic and +4 V or +2 V full-scale meter indications. All front panel function controls can be remote controlled, and remote metering also is extensive. Forward power/reflected power, PA power supply bus voltage and exhaust temperature all can be monitored. In addition, the forward power, voltage, current and temperature of each PA module can be monitored via the remote control step function.

Built-in redundancy

After three weeks of operation, one of the three switching power supplies in the transmitter failed. Thanks to its built-in redundancy, however, the only result was lower output power.

When we tried to isolate the bad power supply, the other two supplies failed. A loose mechanical connection in the power supply bus resulted in an extremely high current flow, burning the bus board. BE replaced the transmitter cabinet so they could evaluate the damage to the original bus board. We have experienced no other problems since then.

We have had little lightning damage since installation, and we cannot address the transmitter's survivability. It does automatically restart after a power failure, but the step function does not reset to module one. To get PA module readings, the operator must select a module via the step function. BE says this can be changed so that the controller automatically resets to module one.



BE FM-3C

The Dolby DSTL® has always been known for great specs.

Here's another.



If you shop for equipment by the numbers, there's one more you can't ignore: the new, competitive price of the Dolby Digital Studio Transmitter Link. You already know the DSTL can't be beat when it comes to performance. But the latest developments in its RF design let us lower prices without compromising its robust, interference-free operation and high quality audio.

Call us today to find out more at **800-DOLBY-RF (365-2973)**. Our numbers will make both you and your bottom line happy.

*Suggested list price of the two channel system. Suggested list price of the four channel system including the optional digital stereo generator is \$14,900. Contact your local distributor for actual prices. For those of you who read the fine print, you'll be glad to know that you can order the two channel DSTL with our new AES/EBU digital input at no additional charge. It's also available to retrofit to existing 2-channel DSTL systems. We're doing our part to make the all-digital signal path a reality!



Dolby Laboratories Inc. • 100 Potrero Avenue, San Francisco, CA 94103-4813 • Telephone 415-558-0200 • Facsimile 415-863-1373
Dolby Laboratories Inc. • Wootton Bassett • Wiltshire SN4 8QJ • England • Telephone 0793-842100 • Facsimile 0793-842101 • Telex 44849
Dolby, DSTL and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation ©1994 Dolby Laboratories Inc. 594/10339

Circle (68) On Reader Service Card

World Radio History

For information from BE, contact David White in Illinois at 217-224-9600; fax: 217-224-9607; or circle Reader Service 34.

“The thing is just impossible to screw up! The DM-80’s non-destructive editing is the only way to go, and revisions are extremely easy and very quick!”

–David Esch, Director of
Commercial Production
WPNT, Chicago

“We looked at DAWs for a year—no other product could even come close to the DM-80’s price/performance ratio.”

–Bill Robinson,
Production Director
WQCD N.Y., NY

“I love this machine! It’s reliable, and user friendly. I can edit in 1/3 the time, and I wasn’t familiar with disk recorders—the DM-80 is easy to learn and use.”

–Michael Cook,
Program Director
KSJJ/KPRB, Redmond, OR

Broadcast professionals speak out about the DM-80 Digital Audio Workstation!

“I’ve been editing on tape half my life, and was hesitant to give up “rocking the reels”—but I found this machine is incredibly easy to edit with. And its expandable storage put it way ahead of the competitors we compared.”

–George Zahn,
Operations Director
WVXU, Cincinnati

“The DM-80 does more than DAWs costing twice as much. It’s very rugged—you can set it up and forget about it. And it’s easy to use.”

–Tony Diggs,
Chief Engineer
WKHK Richmond, VA

“We originally chose the DM-80 because of its user friendliness. Then we discovered the real magic of this device: a promo announcement that normally would take 4 hours can be done in 30 minutes.”

–Tom Collins,
International College of
Broadcasting & Recording, Dayton

“We universally love our DM-80’s! They have revolutionized the way we work here and we have made it a point to spread this word to other public radio stations.”

–Richard Paul
Special Projects Engineer
WAMU-FM, Washington, DC

“It’s like a digital studio in your lap! The DM-80 is a very affordable, portable, high quality digital editing system.”

–Howard Silberberg,
Sound Engineer
United Nations Radio
N.Y., NY

“The DM-80 is easy to learn, and once learned...it’s fast, very fast! We also like its clean digital sound.”

–Barry Witherspoon
Program Director
WSTO-FM, Evansville, IN

“The DM-80 is a great production tool—it really changed our sound! I like its fast and easy editing capabilities.”

–Mike Britton,
Production Director
KODY/KXNP, North Platte, NE

We couldn't say it any better.

Call (213) 685-5141, Ext. 337, or FAX (213) 722-0911 for more information about the DM-80 Digital Audio Workstation for the magic of hard disk recording and random access editing at your fingertips.



Circle (47) On Reader Service Card

World Radio History

USER REPORT

Reliable, Problem-Free Nautel FM

by Lee Rust
Owner/Operator
WJZR(FM)

ROCHESTER, N.Y. In selecting a transmitter for our start-up Class A FM station, we kept one goal in mind: No problems.

With only a few people handling technical, programming, sales and administrative duties, there is not much time available for transmitter maintenance and trouble shooting.

We needed a 3 to 6 kW transmitter that was reliable, efficient and easy to maintain. As our proposed transmitter location was in an industrial building with lots of heavy electrical equipment, a stable RF output on variable single-phase AC input also was very important.

Our space limitations necessitated a small footprint for the transmitter and an internal harmonic filter. Of course, full remote control, complete alarm and metering outputs and automatic recycling in the event of an AC line failure were mandatory.

Conservative technology

Solid-state technology, commonplace in AM for years, was just emerging in FM transmitters when we began putting the station together in 1992. We sought a conservative but current technology that incorporated the solid-state advantages of no tubes or tuning, modular redundancy and a certain degree of on-air serviceability.

We considered designs by several manufacturers and while, for the most part, they all satisfied our basic requirements, the Nautel AMPFET FM transmitter offered several attributes we found especially attractive.

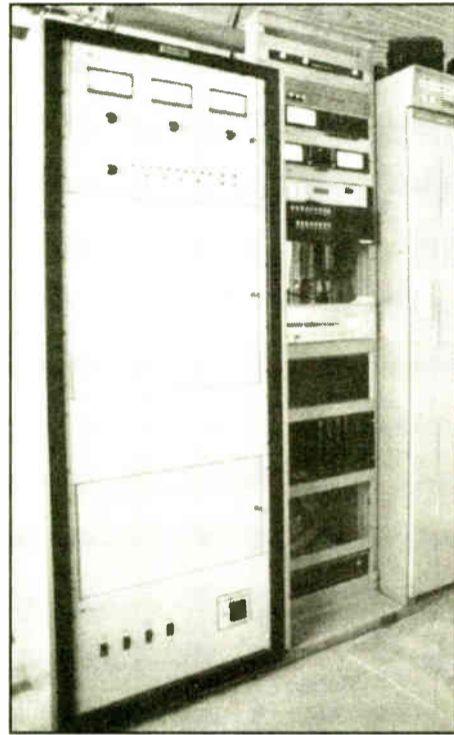
First and foremost, Nautel builds only solid-state transmitters. Their product line began with nautical navigation beacons in the early 1970s and progressed to solid-state AM transmitters.

Also, the Nautel FM design is uncomplicated and clean, with a minimum of RF

amplifier components; an RF combiner with no load resistors; simple control logic with no microprocessors; neat mechanical layout and meticulous construction. Each of the 250 W power amplifier cards somehow do their job with only 15 components while competing designs seem to need hundreds of parts.

Modular

Another advantage is that Nautel FM transmitters are modular with interchangeable 1 kW PA modules, each of which incorporates four 250 W PA cards.



Nautel AMPFET FM4

Each amplifier module has its own cooling fan. There is no forced air flow over the electronics, only over the large heat sinks, so dust and dirt build-up on the components is avoided.

The only major difference between the 4 kW and the 7 kW transmitters is three

additional PA modules in the 7 kW and a different combiner and power supply. In each transmitter, there is one intermediate power amplifier module, for which any of the PA modules can be substituted in an emergency. The 4 kW transmitter can operate at reduced power with one PA module shut down. Removal and replacement of that module can be performed with the transmitter on-air.

Its low-voltage power supply is a good feature for a station with only one technician who usually works alone. The only regular maintenance the transmitter needs is clean air filters every few months as well as a check of the 9 V battery, which maintains control settings during a power failure, and the various meter readings. These readings have been absolutely stable for our two years of operation.

Overall AC-in to RF-out efficiency for our frequency, 105.9 MHz, is reportedly about 63 percent. Lower frequencies would have higher efficiencies, but it is at least 10 percent better than most tube-type FM transmitters we looked at and 20 percent better than one of the other FM solid-state units we considered.

The regulation and protection systems in the Nautel FM transmitter are conservative and effective. Our output power rarely varies more than 1 percent, even in a building full of laminating presses, electroplating tanks and elevators. The output power cuts back automatically if a high VSWR condition in the antenna occurs or shuts off immediately in the event of a short.

Extensive protection

Lightning protection is extensive. A heavy copper cable bypasses the entire electronics chassis of the transmitter, from the antenna connector at the top of the cabinet to the ground terminal at the bottom. Detailed installation instructions help "lightning-proof" the transmitter and AC supply panel. An optional surge

protector is available for the AC supply. We ordered one.

Last September, a very close lightning strike blew out our audio switcher and AP printer but only gave the Nautel a few seconds pause before it automatically recycled back on the air. It is always nice to see the stereo light glowing on the car radio when you race to the transmitter to make repairs, even if the carrier is perfectly silent.

Finally, the Nautel AMPFET FM transmitters were ready when we needed one. Several Nautel 7 kW units were already in the field and the 4 kW transmitters were in production when we placed our order. The FM4 was shipped from the plant near Halifax, Nova Scotia, on time, beautifully crated, with complete installation and operation documentation. Ours was one of the first off the production line.

Each unit comes with an elaborate test set-up for adjusting the phasing of the PA modules, in the event that field repairs would ever have to be made. We ordered the optional spares kit, which includes replacements for most of the semiconductors and other components, as well as a spare fan and air filter.

Straightforward installation

Installation was straightforward and without major difficulties. The only field modification requested by the factory after we went on air was the addition of one diode to a control circuit board.

Of course, the Nautel AMPFET FM design is not perfect. Some of this we knew before purchase, and some we learned later. A necessary compromise in the design, in the interest of efficiency, was to make the transmitter frequency-specific, rather than broadband. Changing operating frequency, especially from one half of the FM band to the other, is no small matter. There is a different PA design for upper and lower FM band, as well as a different RF combiner design. However, this is a rare occurrence.

In addition, many cables are used to connect the IPA module, PA modules and combiner, which means lots of BNC connectors and other plugs and wires.

We also discovered that the acceptable range for exciter input level is very narrow. If you are even a little bit above it or below it, the transmitter will not come up. Additionally, the SCR-controlled transmitter power supply is capable of causing noise in nearby audio equipment, but an AC line filter on our stereo generator solved that problem for us.

These are all minor quibbles, however. The bottom line is that our Nautel AMPFET FM4 has worked perfectly since the first day we went on the air, requires only an occasional dusting, shrugs off lightning and AC power variations, and does not make a lot of heat or noise.

The whole process of selecting the transmitter was aided by the responsive and knowledgeable people at Nautel: Bob Perry, John Brennan, Chuck McLain, Mike Woods and Jorgen Jensen, as well as Ed Young of RF Specialties of Pennsylvania. Fronted by a Hnat-Hindes UM2000 stereo generator and BE FX30 exciter, our FM4 runs at 2.4 kW into a half-wave Shively 6813 four-bay antenna. It sounds great, with no problems.

□ □ □

For information from Nautel, contact Jorgen Jensen in Nova Scotia, Canada, at 902-823-2233; fax: 902-823-3183; or circle Reader Service 7.

NEW!
With digital option prepared for mixed signals

A2
Audio Test System

- Bit-Analyzer
- Jitter-Analyzer
- D/A Converter
- AES/EBU Generator

14 TO Instruments in one

- easy to operate
- storage capabilities
- highest performance
- large graphics display
- AS03 software-package for remote-control and automatic tests
- comprehensive two-channel system
- PC-and printer communication

The leading instrument

Neutrik AG Liechtenstein Tel 075/2329666 Fax 075/2325393
Neutrik Zürich AG Switzerland Tel 011/7340400 Fax 011/7343891
NCV GmbH Germany Tel 0941/98041 Fax 0941/999772
Neutrik Marketing Ltd United Kingdom Tel 071/7928188 Fax 071/7928187
Neutrik Division of Japan Japan Tel 03/54112551 Fax 03/54112827
Neutrik Instrumentation Canada/USA Tel 514/3445220 Fax 514/3445221



NEUTRIK
CONNECTING THE WORLD

Circle (90) On Reader Service Card

USER REPORT

Customized CCA Transmitters Key in Rebuild

by Chris Hicks
Technical Director
Amaturo Group Ltd.

WEST PALM BEACH, Fla. In 1992, WKGR(FM) purchased a CCA FM35,000G 35 kW FM transmitter to replace an old standby. That transmitter served us so well that we purchased two more CCA transmitters in 1994. The second purchase included custom equipment and installation for our new duopoly station WPBZ(FM).

WKGR used a 1978 CSI 25 kW transmitter as a backup, operating at 24.5 kW TPO as a full-power auxiliary, and it was tired. After scouring the used transmitter market, we decided that the best bang for the buck would be a new transmitter.

We selected a CCA FM35,000G and installed it as a main transmitter alongside a relatively new transmitter in an alternate-main configuration. During a year-and-a-half on air, the CCA proved so reliable that we bought a CCA unit for WPBZ.

Easy to buy

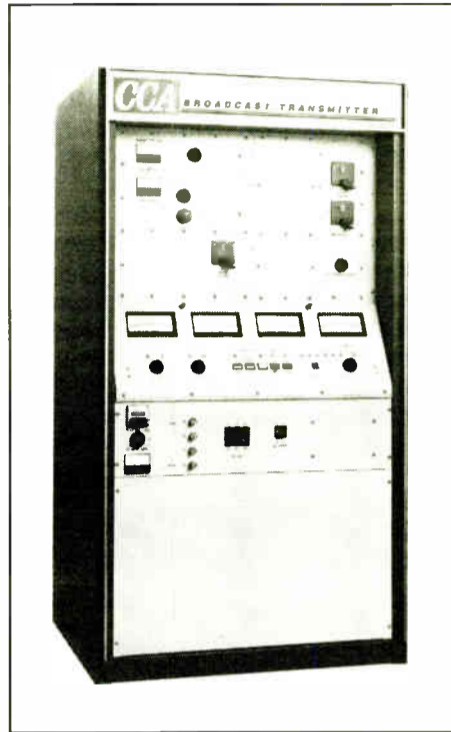
We talked seriously with three transmitter manufacturers, but for our particular application, CCA came out ahead. Steve McElroy, CCA vice president of sales, made it easy for us to buy two transmitters with turnkey factory assembly and testing of all the transmitter room equipment.

At the CCA factory near Atlanta, everything for the transmitter room was assembled and tested exactly as it would be installed at our site. Three of the CCA people responsible for the factory assembly and testing came to southeastern Florida and installed the equipment for us.

The size of the transmitters makes them easy to install in small rooms. CCA FM transmitters, up to and including their 35 kW model, are built into a standard 38-inch by 34-inch by 71-inch cabinet, including the high-voltage power supply.

Our garage-size transmitter room is only

15 feet wide and 22 feet deep with an eight-foot ceiling. It contains all our transmission and electrical equipment, but there is still room to walk around freely and to back in the bed of a pickup truck through the garage door. From in front of



CCA FM35,000G

the control rack, every indicator and meter on every piece of equipment in the room is visible without taking a single step.

CCA Service Manager Gerry Meier supervised the factory assembly and test as well as the on-site installation of the system. Thanks to Gerry's years of experience, our complicated interlocking system worked the first time we tested it. The CCA transmitters have two interlock contacts available to the user: one is driven by the plate mode, the other by the presence of IPA screen voltage, which in turn is driven by the presence of plate voltage.

Both at the factory and on-site, the new transmitters were rigorously tested. After installation, we operated both transmitters simultaneously through the Dielectric switch at 36 kW TPO, one to the dummy load and the other to the antenna.

To identify any weak components in the system, we hard-switched the power source from our electric utility to the standby generator and back several times. After replacing a couple of meters and a bleeder resistor, we tested the system with five additional quick and hard power transfers. Everything worked fine with no failures.

Customer service

After about 700 hours of operation, CCA had the chance to prove its customer service. One of the transmitters began showing signs of an intermittent plate-to-grid PA tube short. When this happened, a large airwound, two-section choke in the DC plate supply atop the PA box collapsed as an electromagnetic shock absorber/fuse. The tube and choke are easy to replace. CCA is located very close to the Atlanta airport and sent the parts by Delta Dash. Getting warranty parts in a few hours from a company in another state is the way it should be.

At the same time we installed the transmitters for WPBZ, Gerry Meier modified WKGR's FM35,000G to provide better cooling to the PA box, at no cost to us. Two months after we installed WPBZ's new transmitter room, Gerry returned to install an improved IPA input circuit in all three transmitters, again at no cost to us. That is factory support at its best.

All three CCA transmitters provide excellent service. The incidental AM noise (synchronous AM), calculated PA efficiency and AC-input-to-RF-output

efficiency are comparable to other designs. The grounded-grid triode PA is very stable and cannot self-oscillate and

After scouring the used transmitter market, we decided that the best bang for the buck would be a new transmitter.

run away or create spurious emissions. Our transmitters exhibit a 66 percent AC-input-to-RF-output efficiency, which helps keep operating costs down.

Everyone at our stations is pleased with the performance of all three CCA transmitters. What really surprised us, however, was how good the CCA FM60G high-performance exciter sounds. Our initial plans were to replace the CCA exciters at WPBZ. But after hearing them we decided to leave them on line.

Very accommodating

The people at CCA are very accommodating. I oversaw our project at the CCA factory and I found a lot of friendly, capable people who enjoy their work. They have a good time building transmitters as well as doing research and development.

CCA President Ron Baker first saw the terms of our deal during my visit to the factory. I casually mentioned that another company had proposed to do the turnkey assembly and system testing for about 10 percent less than CCA. Ron said, "I don't ever want to charge more than they do for anything. Change the invoice." This was after the contract was awarded. You have to respect a guy like that.

□ □ □

For information from CCA, contact Steve McElroy in Georgia at 404-964-3530; fax: 404-964-2222; or circle Reader Service 6.

TFT RECITER - THE BETTER STL SOLUTION

MORE PERFORMANCE



ZERO COMPRESSION

TFT Reciter - STL Receiver & FM Exciter in one unit gives you digital advantages with absolutely no digital compression plus these other features -

- True Digital Quality Audio
- Digital Audio Interface at Studio
- No Cascading Compression Algorithms
- No Baseband Demodulation at Transmitter

Call for more information 800-347-3383 or 408-727-7272, fax 408-727-5942

TFT
INC

Sound Quality for over 20 years

3090 OAKMEAD VILLAGE DR. SANTA CLARA CA 95051-0862

This is what you get.

You asked BEXT to build the best high-performance FM exciter, put it in a no-frills package, and bring it to you at the most competitive possible price. To guarantee that you get everything you deserve, we bring you the new LEX 25, backed by our two year warranty and 24-hour engineering hotline.

LEX 25
25 Watt FM Exciter
S/N: >80dB
THD: <0.03%
\$1,995



1045 10th Ave.
San Diego, CA 92101
619-239-8462
FAX: 619-239-8474

BEXT

Circle (73) On Reader Service Card

Circle (166) On Reader Service Card

USER REPORT

New QEI Quantum Shows Its Mettle

by Tom Andrews
General Manager
Lake Cities Broadcasting Corp.

ANGOLA, Ind. If you ask a hundred radio station managers and engineers which piece of equipment cannot fail, it is a sure bet they would all vote for the transmitter.

Without a transmitter, no one will hear you, no matter how wonderful your studio is.

Lake Cities Broadcasting Corp. operates three radio stations. WLKI(FM) in Angola is our flagship station, running a hot AC format. Our second station, WLZZ(FM), which went on-air in September 1991 in Montpelier, Ohio, 25 miles to the east, programs a very successful country format from Jones Satellite Network. Our newest station, WTHD(FM) in LaGrange, Ind., 20 miles to the west, also takes a Jones Satellite country format.

Relied on experience

In building WTHD, we relied on the experience we gained building our other stations. The choice of transmitter manufacturer was an easy one for us, as both WLKI and WLZZ use QEI FMQ 5000 models. Because of the reliability of our two existing QEI transmitters, we did not consult any other manufacturer.

In talking with Jeff Detweiler at QEI, we learned that a new all solid-state transmitter was about to be released, and that we could choose between another tube-type unit or the new QEI Quantum solid-state transmitter.

Normally, we are reluctant to purchase serial number 1 of anything, even from an established manufacturer like QEI. But our positive experiences with the QEI boxes that reliably churn out power for our other two stations persuaded us to select the Quantum.

On paper, the QEI Quantum has a lot going for it. Thanks to its tubeless design, the Quantum typically draws 400 W less than a comparable tube-type transmitter. The internal efficiency of the Quantum also is excellent, with a power factor of 72.5 percent.

One indication of the overall electrical efficiency of the Quantum is its extremely low operating temperature. Even on hot summer days, the Quantum produces so little heat

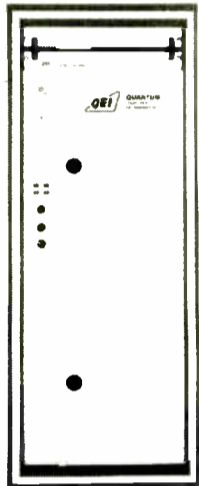
that you can place your hand in front of the exhaust stack without any discomfort. A thermocouple placed in the transmitter's exhaust plenum registered an air temperature of only 118 degrees Fahrenheit.

On air instantly

The Quantum is a strange-looking transmitter. There are no tuning or loading controls on it. Simply hook it up to an antenna, plug it in and press the big green On button. Presto, it is on-air instantly.

The natural bandwidth on this transmitter is so wide that tuning is never necessary. Stereo is wonderful and you can forget about occasional tuning and loading adjustments. You also can skip the funerals for dying tubes.

Construction of the Quantum is also interesting. The exciter is actually a massive driver, producing 300 W. Output from this exciter/driver is routed to a stack of as many as six amplifier modules, each of which produces 600 W.



QEI Quantum

Depending on the number of modules stacked into the transmitter, it is possible to configure maximum power output at anywhere from 1.2 kW to 6 kW. A 10 kW version is also in the offing.

For WTHD, we decided on six modules, giving us a maximum power of 3.6 kW, easily exceeding our 2.8 kW nominal power.

The reason for this overkill is another clever Quantum feature. If a single amplifier module fails, the remaining modules automatically act to keep power within 90 percent of nominal.

Repairs, when needed, are easy. The ailing module can be removed for service without lost air time.

One thing that gave us pause in selecting a solid-state design was the possibility of lightning damage. Our fears were laid to rest only two weeks after we went on-air.

A violent thunderstorm rolled through our area, and as we watched in horror, a huge bolt of lightning struck our tower. But listening to the radio, you would have thought it was a clear and sunny day. Not only did the transmitter emerge unscathed, but there was not a sound on the air to indicate that the tower had been hit.

We think the QEI Quantum is a natural choice for remote control operations. Interfacing it with our Gentner remote control was a cinch and, as there are no tubes to replace, unexpected midnight runs to the transmitter site are reduced.

We also feel that, from an engineering standpoint, the Quantum is an excellent choice. And, from a cost standpoint, it is priced at about the same level as previous tube-type models.

□ □ □

For information from QEI, contact Jeff Detweiler in New Jersey at 800-334-9154; fax: 609-629-1751; or circle Reader Service 75.

USER REPORT

RDS Debut

by Woody Tanger
President
Marlin Broadcasting

BOSTON Classical stations frequently lead the way in exploring new broadcast technologies, and RDS is no exception.

At Marlin Broadcasting we decided to be at the forefront and begin broadcasting RDS on our commercial classical stations.

During the first quarter of this year, we commenced RDS transmissions at WFLN-FM in Philadelphia, WTMI(FM) in Miami and WQRS(FM) in Detroit. For each station we bought the RDS-1 encoder from Modulation Sciences Inc. (MSI) and were quickly transmitting RDS data.

Full-function RDS

The RDS-1 comes complete with a plug-in board that converts any PC into a full-function RDS generator. MSI also supplies software to operate the RDS-1 and a remote control program, which affords access to the RDS-1 computer from anywhere.

The list of possibilities for RDS makes us feel like kids in a candy store.

Basically, all a station need do is plug in the card. MSI designed the RDS-1 to start running as soon as it is connected to the transmitter.

The computer is used to customize the RDS signal, sending and changing the messages we want to appear on RDS receivers along with the usual call letter and program identification (PI) codes.

Operating the RDS-1 is as easy as operating a PC. A dedicated computer is at each station, and we run sequenced radio text messages throughout the day. For example, we might enter information about upcoming concerts to be broadcast from the Metropolitan Opera. It is also easy to provide detailed information about selections we play.

The RDS-1 lets us store and use up to 255 radio text messages. While the maximum length of an RDS message is 64 characters on other coders, MSI designed the RDS-1 to send complete messages—no matter what their length.

Revenue potential

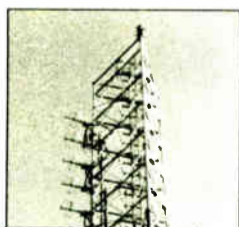
The most exciting thing about RDS is its potential for our advertisers. At our Miami and Philadelphia stations, we conducted educational sessions with our sales staff. MSI representatives talked with us about the capabilities of RDS, its profit-making potential and future product introductions.

Our advertisers generally run the gamut from skeptical to interested to amazed when they see the new technology. But we have sold promotional messages over RDS, establishing its revenue potential.

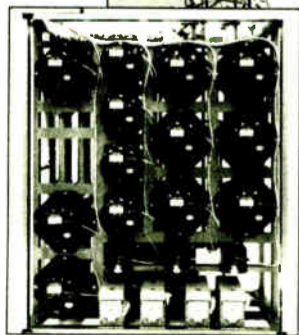
We began showing RDS on sales calls to local car dealers, some of whom are offering RDS receivers in their newer,

DIELECTRIC

FM Antennas



Switches, Loads Custom Systems



The Dielectric name is recognized worldwide for quality and workmanship in RF communications.

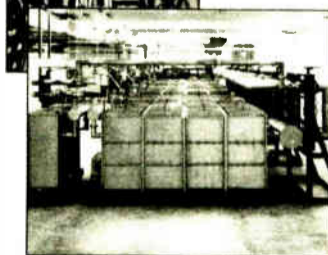
Our products include FM antennas, transmission line, switches, loads, filters, combiners and dehydrator pressurization equipment, everything from transmitter output through the antenna.

Dielectric also designs and manufactures RF equipment for custom applications in addition to our standard television products. Call us with your requirements...

Coaxial Transmission Line



Multistation Combiners



Serving the Radio Broadcaster for Over 45 Years!

Dielectric Communications * P.O. Box 949 * Raymond, Maine USA 04071 * 207-655-4555 * FAX 207-655-7120

Circle (192) On Reader Service Card

World Radio History

Smooth Thanks to MSI

high-end cars. We mounted receivers in their showrooms and programmed in their names. The response was enthusiastic.

In addition to car dealers, high-end stereo stores have shown a great deal of interest in RDS. They like to demonstrate the latest features of new receivers—

an interface to our music library so that we can display artist and title information while the music is on air.

Untapped potential

The RDS-1 can connect to a modem to transmit other data, such as traffic advi-



The MSI DS-X data receiver helps WFLN-FM explore RBDS.

including RDS capabilities—to their customers. And it has really been fun watching potential clients react when, during a sales call, the station sends a special greeting to them that scrolls across the RDS receiver's display.

RDS messages usually air about once an hour. They can run manually, but we plan to automate them, which is easy with the RDS-1. We also are working on

sories from a variety of services. These messages too can be sent out automatically.

The RDS-1 also can send simultaneously multiple data streams in addition to its program-related functions, which means it can be used for a multitude of services at the same time.

For data uses, MSI offers an RDS data receiver—the RDS-X. Unlike receivers on the consumer market, the RDS-X

picks up additional data streams and can use them to activate billboards, synchronize traffic lights and anything else that might bring in additional revenue. The list of possibilities for RDS makes us feel like kids in a candy store.

We have had no technical problems since we began transmitting RDS. Both our Miami and Detroit stations have other subcarriers in use, and there has been no interference.

Jim Perry, Marlin's director of engineering, kept the injection level of the RDS-1 at around 3 percent. But we have run lower than that and still had a robust RDS signal. The PRD-3000, another new RDS product from MSI, monitors and measures the injection level as well as decoding and displaying RDS data.

It is true that, for the time being, there

are not enough receivers in the market to make full use of RDS. It is as if there is a tiny speck of light on the horizon approaching, and when it gets here, it will be a 50-car train coming at 110 mph.

Even though we are pioneers, we have already begun to reap the benefits of RDS. Its simplicity of set up and operation, our success in generating advertiser interest and the performance of the RDS-1 has made us glad to be on the cutting edge.

□□□

For information from Modulation Sciences, contact Art Constantine in New Jersey at 800-826-2603; fax 908-302-0206; or circle Reader Service 70.

Woody Tanger is president and founder of Marlin Broadcasting and an author whose latest book is entitled *The Dead Cure*. He can be reached at 617-267-0515.

Quantum FM

Solid
State

Solid
Reliability

from

QEI



- Proven reliability
- Maintenance-free FET technology
- Self-contained modules with own power supply regulator
- Compact size reduces shipping costs, allows affordable air shipment
- Power levels between 300 Watts and 6 kW
- Modular design offers buy-only-what-you-need affordability and convenience

For the same price you pay for a tube transmitter, you can now have a superior solid state FM transmitter with high-power, advanced technology exciter and cableless combiner. The modular design of QEI's QUANTUM-Series FM transmitters offers the advantage of buying only the amount of power you need...and means that you can upgrade to higher power levels whenever you're ready.

QUANTUM from QEI—the people who have been designing and building solid state transmitters longer than anyone else in the industry.

You need to know more! Call Jeff Detweiler today toll free (800) 334-9154.

QEI Corporation
One Airport Drive • P.O. Box 805
Williamstown, NJ 08094

Tel (800) 334-9154
Fax (609) 629-1751

24-Hour Service Hotline
(609) 728-2020

A Special Commitment



Since 1965, COMET has been committed to one objective — keeping our customers satisfied with the highest quality vacuum capacitors available.

Our experienced technical staff is dedicated to the advancement of capacitor technology, and will meet your custom requests with a design proposal in a matter of days. And, while we do specialize in made-to-order designs, we also stock a number of popular capacitor types for your off-the-shelf needs.

Call COMET when you have a special design request, want expert technical service, or need a replacement capacitor now.



COMET NORTH AMERICA, INC.

11 Belden Ave. • Norwalk, CT 06850 (203) 852-1231 • FAX (203) 838-3827

Circle (125) On Reader Service Card

World Radio History

Circle (215) On Reader Service Card



The Only Digital Created For Multi



" My advice: if you're gonna buy one, buy two. Or you'll never keep the peace ."

*John Buffaloe...Chief Engineer
KSON, San Diego*

" As quickly as you can conceptualize it, the DSE can do it. Or undo it. "

*Bill Schultz...Production Director
103.5 WYNY-FM, New York*

" Radio lives by critical deadlines. With the DSE 7000, time is on my side."

*Barbara Sherry...Production Director
KQQL FM, Minneapolis*

Production Directors. Engineers. Even newsroom people swear by the DSE. Maybe because it's the only digital editing system that lets your creativity keep pace with radio production. There are no complex computer commands to learn. No tedious waveform editing. You work on a console with the same buttons and controls you already know. So you can edit, copy and slide tracks instantly. Listen and cue at high speeds. Mix in crisp, 8-track digital.

And put together spots in minutes that would normally take hours. So it's no wonder these stations with one DSE soon wind up with two. Or even three. Learning is faster. Editing is easier. Everyone is more productive. After all, not only do your station's multiple personalities get up to speed faster, they stay up there. To see it in action yourself call 1-800-622-0022 for a demo. The DSE 7000. The New Speed Of Sound.

Editing System Multiple Personalities.



"You install it, it runs, the production department is happy. Next problem."

*Dan Mettler...Chief Engineer
WNDE/WFBQ, Indianapolis*

"It's the only digital system in radio that lets you edit by ear. What a concept."

*Ross Wilson...Production Director
K101, San Francisco*

"It gives our air talent so much creative freedom, they won't use anything else."

*Byron Swanson...Chief Engineer
KKRZ, Portland*

orban

H A Harman International Company

For a demo in the U.S. call Harris Allied Broadcast Center: 1•800•622•0022
Or contact Orban: Phone 1•510•351•3500 Fax 1•510•351•0500

USER REPORT

Bext Fits the Bill Following Power Increase

by Bill Glenn
Station Manager
KGDN(FM)

RICHLAND, Wash. Following a power increase, KGDN(FM) needed a new transmitter. We turned immediately to Bext Corp.

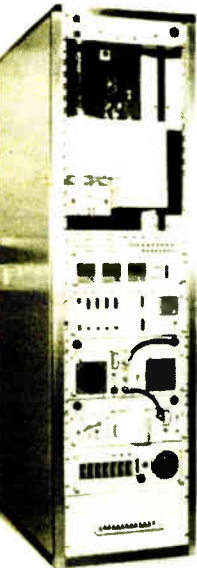
For the past two years we have operated as a 3 kW Class A station using a Bext T-1800 amplifier with a Bext exciter and solid-state driver. For the past year, our sister station, KSPO(FM) in Spokane, Wash., has run using a hybrid combination of two Bext T-1500 amplifiers.

We needed a transmitter output power of 3,450 W. A 5 kW unit would have been overkill, but we would push the capabilities of a 3 kW transmitter. Bext suggested its L Series of FM transmitters.

The L Series consists of five Italian-manufactured transmitters ranging from 4 kW to 30 kW. The L4 and L7 use a single YU148 triode output tube and the L10, L20 and

L30 use a 4CX20000C. All are built in a standard 19-inch cabinet with simple straightforward amplifier designs.

KGDN ordered an L4. When it arrived, I was impressed at once by its construction. All components are mounted in a welded stainless-steel framework. The back door and both side panels are easily removed as is the front upper panel, giving access to the cavity and the tuning controls.



Bext L4

The cooling chimney and the 1.625-inch

waveguides all are chromed, making the L4 almost too attractive to cover. The quarter-wave stub and harmonic filter mount inside the box, facilitating placement of the transmitter.

In lieu of electrically interlocked access doors, the L series uses a key-locked model.

A rotary line AC on-off control, lever-operated shorting system and key lock are mechanically interlocked so that the key cannot be removed unless the AC is off and the shorting bar down.

The back door is key locked as is the cooling chimney. The cooling chimney is in

two telescoping pieces that slide upward, allowing access to the tube within the cavity assembly.

Each transmitter comes with only one key. Theoretically you cannot operate it with the covers off and the key removed from the safety module.

The power supply assembly is complete, comes mounted on wheels and is shipped separately. With the back and side covers removed from the L4, the lower brace bar is removed and the power supply wheels into place.

All electrical connections to the transmitter are made with either plug-in connectors

or clearly marked screw terminal barrier strips. Reinstall the brace bar and hook up the RF output and the back of the unit is ready to go.

Three-phase AC is connected at an isolation transformer just above the safety module in the lower front of the transmitter. I routed the AC through a metal conduit into the top of the unit.

The L4 at KGDN uses a Bext PJ-200 solid-state driver and a Bext TEX-20 exciter. Both of these units fit in the rack space provided in the lower front half of the L4.

continued on page 31 ►

USER REPORT

RE Makes RBDS Easy to Implement

by Ron Bartlebaugh
Director of Engineering
The Kent State University Radio Network

KENT, Ohio As part of the Denon Electronics RBDS introductory promotion, WKSU-FM recently received an RE533 RBDS encoder from RE America.

A 50,000 W NPR affiliate owned and operated by Kent State University, WKSU-FM serves the Cleveland, Akron and Canton metropolitan areas of Ohio with in-depth news and classical music 24 hours per day.

Its coverage area is extended via repeater stations WKRW(FM) in Wooster and WKRJ(FM) in New Philadelphia. And plans to add two additional repeater stations are in the works. WKSU-FM is the most listened to public radio station in Ohio and ranks among the top 10 public radio stations nationally.

Flexibility

The RE533 encoder can either sum the RBDS subcarrier with the base and signal internally or operate as a standalone SCA source. This provides us with a lot of flexibility in deciding where to insert the RBDS signal into our composite signal chain.

We put the encoder at the transmitter site along with a separate 57 kHz SCA source. Installation proved very easy, requiring only a phase adjustment between the pilot and the 57 kHz RBDS subcarrier and the setting the RBDS output level to provide 2 to 3 percent of injection.

After installation, we performed an extensive series of tests on RBDS reception in our fringe areas and found the RBDS signal to be very robust even at the relatively low 3 percent injection level. We also tested our main channel audio quality and found no degradation as a result of adding the RBDS subcarrier.

RBDS data is created on a PC housed at our studio. The computer connects to the encoder at our transmitter site via our dedicated fiber STL link. The RBDS data is formatted in records and groups, the structure of which is very complex. But the creation of them was a very easy process thanks to the RE533 PC control program supplied with the coder.

The control program gives broadcasters a high-level Windows interface for use in creating data records. The Windows interface allows you to edit the data records in terms of their RBDS functions without getting buried in the details of the data protocol. The most unique and beneficial feature of the control program, however, is its live mode. In live mode, you can change and monitor records as they are broadcast.

Promote the station

We currently use the RE533 to transmit radio text messages to promote the station. Using live mode lets us change our radio text on the fly.

This feature demonstrated its value recently during a one-day RBDS seminar conducted WKSU-FM and Denon Electronics for Denon retailers in Cleveland. Denon spent the day educating the

continued on page 31 ►

Do You Want A Better Sounding Station?

CRL CAN HELP YOU. No matter the size of your station or the size of your budget, we have an engineered solution for you.



Call Today!

Give your station that distinctive sound you need to build bigger audiences.

Amigo FM.
Feature by feature the Amigo offers the best value in today's market. The Amigo has the ability to give any station a "big station" sound at half the cost of typical FM processors.



Circuit Research Labs, Inc.
(602) 438-0888
FAX (602) 438-8227

Circle (118) On Reader Service Card

SINE SYSTEMS

Walkaway Specialist: Innovative Solutions

- EBS Compliance Tools
- Remote Transmitter Control & Monitoring
- Dial-up Remote Broadcast
- Program Automation
- Accessories & Studio Aids

(615) 228-3500
FAX 227-2367
1020 Maxwell Avenue, Nashville, TN 37206-3554

24 Hour FAX
ON-DEMAND
(615) 227-2393

Circle (206) On Reader Service Card

We can't tell you the price...



...but we can tell you that we are offering an unbelievable deal on the industry standard Symetrix 528 voice processor that features five separate functions (mic preamp, de-esser, compressor/limiter, downward expander and parametric equalizer) in a single rack space. We could probably think of at least 399 reasons why you should purchase this highly flexible unit to custom tune your vocals, spice up your on-air presence and remove unwanted audio artifacts. Call BSW today and mention special #399 to find out the incredible price on the Symetrix 528. Sale price is limited to stock on hand.

To Order Your 528 Call or Fax
Phone: 800-426-8434 Fax : 800-231-7055
While Supplies Last

Equipment Solutions To Keep You Number One

BSW[®]

BROADCAST SUPPLY WORLDWIDE

7012 27th Street West Tacoma, Washington 98466

Products & Services Showcase

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

Uh-Oh...  ...We Should Have Called **CORTANA**

STATI-CAT for **Affordable Lightning Prevention.**

Let Us Design a System for You

Stati-Cat provides a continuous, low-resistance discharge path for the static electric charge on tall structures. Dissipation points are 1/8", type 304 stainless steel rods ground to needle sharpness. They won't bend, not even from ice and severe weather.

Coran Corporation


Write to us today for a **FREE** brochure!
P.O. Box 2548, Farmington, N.M. 87499
Call (505) 325-5336 FAX (505) 326-2337

READER SERVICE NO. 29

Cellcast
REMOTE BROADCAST STUDIO

THE CELLULAR DIFFERENCE

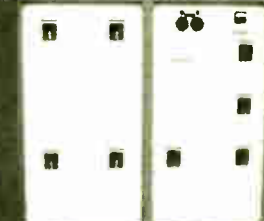
- Easy to Use
- Reliable
- Cost Efficient
- Portable
- Flexible



Technology & convenience combine to bring you on-the-spot remote broadcast capabilities with excellent sound quality. Cellular transceiver, frequency extender, and mixer all in one! Powered by Ni-cad rechargeable batteries or AC power supply — utilizes cellular technology or land lines.

For more information call
1-800-852-1333

READER SERVICE NO. 45




- CUSTOM ANTENNA PHASING SYSTEMS
- ANTENNA CONTROL SYSTEMS
- AM/MF ANTENNA TUNING UNITS
- DIPLEXERS & MULTIPLEXERS
- TRANSMITTER COMBINERS
- DUMMYLOADS (WITH MATCHING NETWORK)
- ASSOCIATED RF COMPONENTS
- CALL OR FAX FOR MORE INFORMATION

PHASETEK INC.

550 CALIFORNIA RD. UNIT 11
QUAKERTOWN, PA 18951
PHONE: 215-536-6648
FAX: 215-536-7180

READER SERVICE NO. 201

CONSOLE UPGRADE WITHOUT THE BIG EXPENSE



Approach digital quality with your yesteryear audio console by using BDI plug-in retrofit electronics. If the cost of a new console is depriving you of a competitive air sound then BDI electronics are the answer. Better headroom, lower noise, lower distortion, dynamic range approaching 90dB and improved reliability are just some of the advantages of our easy to install upgrades. Call us today direct for a competitive air sound tomorrow!

Our retrofit electronics currently support most:

- Gates/Harris Consoles
- RCA Consoles
- McMartin Consoles
- McCurdy Consoles

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

READER SERVICE NO. 72

"I have long recommended Rules Service Company... to client stations. It has proved to be reliable and reasonably priced."

Barry Mishkind, Radio World Magazine

FCC Rules on Disc

- Featured in & endorsed by **Radio World**
- Acclaimed **Pick Hit** at '94 NAB by **Broadcast Engineering**
- Uses **Folio VIEWS 3.01**
- Redlining** indicates new & obsolete material
- Effective dates** indicated in "Pop-Up" notes
- "Jumps"** link different Sections & Parts of rules
- Convenient **search & backtracking** capabilities
- Bi-monthly revisions for a year included in subscription price
- Parts sold individually
- Available in windows & DOS versions

Rules Service Co.
Legal Publishers Since 1950
301-421-9102 (Tel), 301-762-7853 (Fax)
7615 Standish Place, Rockville, MD 20855 8:00-3:30 EST


READER SERVICE NO. 161

EZ RAZE Portable **Antenna Mast**

Transport the EZ Raze Antenna Mast in any size vehicle. Its five foot mast section easily fits into the trunk of most cars and this portable 25 foot free standing, self-supporting (no vehicle support or guy wires needed) antenna mast can be easily assembled by one man in five minutes.

Convenient tote bags make it a breeze for carrying the entire 25 foot mast into any building, elevator, up stairs or onto roof tops. A must for remote sporting events or on location live newscasts.

The EZ Raze Antenna Mast is omnidirectional. In just minutes, one person can erect a stable 25 foot antenna and you're ready to start broadcasting.



OLD STONE CORPORATION
249 North Pierce St.
Eden, NC 27288

Phone: 1-800-538-4977

READER SERVICE NO. 27

AUDIO BROADCAST GROUP, INC. introduces the dramatically redesigned for 1994/95 Data Stream Series of our exclusive "Digital Ready" Studio Furniture. Created specifically for the efficient housing and operation of today's digital hard drive storage/studio automation systems and workstations. Our designers have combined the ultimate in functional work space and eye pleasing appearance.



AUDIO BROADCAST GROUP, INC. Supplying broadcast equipment and studio systems with integrity to the broadcasting community for over 33 years.

AUDIO BROADCAST GROUP, INC. Your single source supplier of AM/FM studio packages, AM/FM transmitter installations, as well as all major lines of on air and production studio equipment.

For additional information on how we can serve you, please call today

MAIN SALES OFFICE 2342 S. Division Avenue Grand Rapids, Michigan 49507 Phone: 800-999-9281 Fax: 616-452-1652	SOUTHEASTERN SALES OFFICE 200 Fareway Drive, Suite 2 Smithfield, North Carolina 27577 Phone: 800-369-7623 Fax: 919-934-8120	WESTERN SALES OFFICE P.O. Box 1638 Palmdale, California 93550 Phone: 800-858-9008 Fax: 800-273-3321	 AUDIO BROADCAST GROUP For over 33 years
---	--	--	--

READER SERVICE NO. 11

Attention Advertisers

Reach 22,000+ broadcast equipment buying prospects at AM, FM and AM/FM radio stations, networks and groups, recording studios, engineering and consulting firms every month.

Products & Services Showcase appears in every issue of Radio World. To advertise your product or service, contact Simone Mullins at

RADIO WORLD
P.O. Box 1214
Falls Church, Va 22041 USA
Tel: 1-800-336-3045
FAX: 703-998-2966

USER REPORT

Continental Unit Proves Reliable

by **Ted Townsend**
Director of Engineering
CHML(AM)-CJXY(FM)

HAMILTON, Ontario Last year, we decided to replace our FM transmitter. We initially compiled a list of technical, operational and budgetary objectives that had to be met. We then considered some less critical items. In the long run, however, these items made for a simple and efficient installation.

All the transmitters we considered met modern operating standards, but we dropped some manufacturers off the list because they could not supply the power output we required. We then considered operational factors.

Easy to tune

We needed a transmitter that was both easy to operate and to tune. Our transmitter site is unmanned, and we do not have the luxury of time to refresh our memories each time we visit.

We looked for a transmitter with a logically arranged metering and control panel. And because of the way our station is set up, we needed the remote control to allow us to wire out all the functions we used. We also considered the safety standards of the transmitter and, of course, its cost.

We weighed a number of smaller questions that made our installation go smoothly without losing air time.

Some of the obvious questions were: Will it fit through all of the doors? Does the transmitter come in one piece or is there a significant amount of assembly required? Are the input and output connections readily accessible? How will the unit be tested, voltage, power, etc., before it is shipped? What is the technical support and warranty period? Can the supplier meet the delivery date?

In the end, we selected a **Continental Electronics Model 816R-2C**. The cost was quite competitive and the unit met

all of our criteria. It has been on-air for a year, and the transmitter performs well.

Whenever things go well, however, you find yourself preparing for a big problem. But with the 816R-2C, it never came.

Advance planning

Our advance planning and research, plus a reliable supplier and product, resulted in a hassle-free installation and a year of trouble-free operation.

We initially budgeted for a new transmitter and installation but were forced to perform major antenna work too. We had to replace the antenna line and install the new transmitter concurrently. Limiting our time off air also was critical because the work was scheduled just before a rating period.

We placed a lot of faith in our suppliers, and all of them came through. Continental Electronics promised us a short delivery date and met it.

From previous endeavors and word of mouth, we knew that the technical support would be there when we needed it. Continental assisted us in every area that they could.

Because the transmitter arrived assembled in a single package, this saved us considerable time in assembly and testing. We only had to connect the AC lines, the output line, the composite input and to insert the final tube. After minimal testing, the remote control and air handling were connected.

Professional movers arrived on-site to unload and place the transmitter in its location. They arrived with the proper equipment to do the job safely.

Simplified wiring

We recently had completed some building modifications and electrical additions to prepare for the installation. The remote control wiring was simplified thanks to good transmitter design and drawings. A good portion of the remote control was

pre-wired and then connected once the transmitter was in place.

While the transmitter was on the test bay at Continental Electronics, it was set

We needed a transmitter that was both easy to operate and to tune.

to our operating voltages and power output. When we powered up the unit, it came up to the factory test data. We did not adjust any tape on transformers or have to make any major changes. After a simple tuning, the transmitter was ready to go on the air.

The timetable we worked under was very tight. It would have been nice to test the transmitter for a little while longer. When the transmitter went to air, the elapsed time meter registered 12 hours of operation.

The Model 816R-2C transmitter has a solid state driver section. We are in a fairly high lightning area, and our antenna is on a 1,000-foot HAT tower. During every thunderstorm, we receive numerous lightning hits and have lost different pieces of equipment. But we have never had a problem with the solid state driver stage.

□□□

For information from Continental, contact Steve Claterbaugh in Texas at 800-733-5011 or 214-381-7161; fax: 214-381-4949; or circle Reader Service 78.



Who needs the

Dividend

Composite Filter?

every
FM station
that

- Has subcarriers for RBDS, data services, or other applications, especially when those subcarriers generate revenue
- Uses a microwave STL
- Includes composite clipping in their processing
- Wants to regain lost modulation
- Seeks to reduce multipath related distortion

The Dividend Composite Filter reduces noise often generated by audio processing and STLs in the upper composite spectrum from 53kHz to 99kHz. Now you can protect your subcarrier signals, regain lost modulation, reduce multipath related distortion, and maintain signal integrity for only \$1195.

the dividend
 composite filter



CUTTINGEDGE

2101 SUPERIOR AVENUE, CLEVELAND, OHIO 44114 • TEL: (216) 241-3343 • FAX: (216) 241-4103

GEPCO INTERNATIONAL

Audio, Video & Broadcast Cables

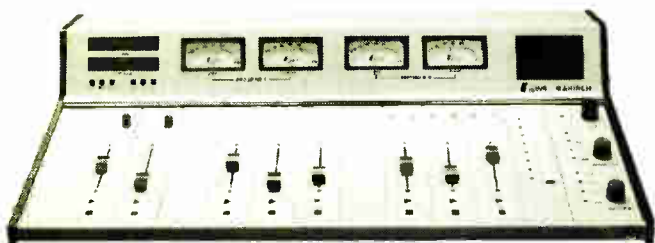
GEPCO
 2225 W. HUBBARD ST., CHICAGO IL 60612-1613
 (312)733-9555 FAX (312)733-6416 (800)966-0069

Circle (212) On Reader Service Card

Circle (218) On Reader Service Card

Products & Services Showcase

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



Why Compromise?

Get affordable features for any format!

Do you faint at the cost of a full featured console but find that budget consoles can't support the complexity of your station's tight format?

The Mariner console's software based channel mixers can easily supply a simple machine control to the most complex automatic sequencing and gain control scheme, all at a modest price.

And our digitally controlled analog signal path has a full, clean sound that is second to none while ensuring trouble free service for years to come.

Starting at \$3900, the Mariner series consoles give you today's technology at yesterday's prices.

Logitek

Call: 800-231-5870 or 713-782-4592 for your nearest Logitek dealer

READER SERVICE NO. 13

Measure Up With Coaxial Dynamics Model 81070 WATTCHMAN Transmitter Protection System.



NEW!
4-1/16 and 6-1/8 series line sections and elements to add to our exciting line-up

WATTCHMAN—protects your transmitter and transmission line system. A permanent 19 inch rack installation used with any dual socket line section 7/8", 1-5/8", 3-1/8" and elements (additional) to monitor CW, TV, and FM power. Model 81070 features two easily read meters to monitor both forward and reflected power. The reflected meter provides a front panel adjustable set point which controls the trip level for fast transmitter shut down and alarm. Abnormal load conditions quickly cause transmitter shut down in less than 15 milliseconds including control relay. Both visual and audible alarms indicate system malfunction. Contacts provided for remote alarm and reset switching. Contact us for your nearest authorized Coaxial Dynamics Representative or Distributor in our World Wide Sales Network.



COAXIAL DYNAMICS, INC.

15210 Industrial Parkway • Cleveland, Ohio 44135
(216) 267-2233 or 1-800-COAXIAL • Fax: (216) 267-3142
Service and Dependability... A Part of Every Product

READER SERVICE NO. 23

EVEN THE BEST CAN BE MADE BETTER

Introducing the new

MINI-MIX 12A

THE COMPACT MIXER WITH A COMPACT PRICE FROM THE QUALITY LEADER



\$3499

12 Channels
25 Stereo Inputs

Service & Affordable Quality for Over 23 Years

AUTOGRAM CORPORATION

1500 Capital Avenue (214) 424-8585
Plano Texas 75074-8118 1-800-327-6901
FAX (214) 423-6334

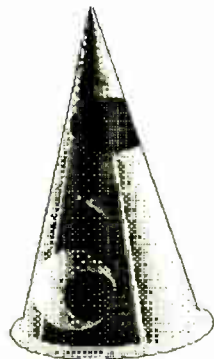
READER SERVICE NO. 120

Wizard For Windows™

by Prophet Systems, Inc.

The Flexible Digital Automation System

Designed by Broadcasters



- Windows & Novell Network
- Hard Drive Automation
- Digital Real-Time Editor
- Integrated Copy System
- Block Stretch/Squeeze
- Runs Multiple Stations
- Simultaneous Record & Play
- Voice Tracking Module
- Expand up to 20 Terminals
- Digital Reel to Reel with Program Length Recording

Prophet Systems

1-800-658-4403

READER SERVICE NO. 128

Shively

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

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

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

call or write for more information

Shively Labs

A Division of Howell Laboratories, Inc.

19 Harrison Road, Bridgton, ME 04009
207-647-3327 FAX 207-647-8273

READER SERVICE NO. 213

With *this* box



You have everything to Gain

Zercom's Gain Box has 2 independent channels of AC or DC "clean" gain, in a rack-mountable RFI protected metal case. That's why this is the box specified by engineers to solve a myriad of problems at the studio and the transmitter.

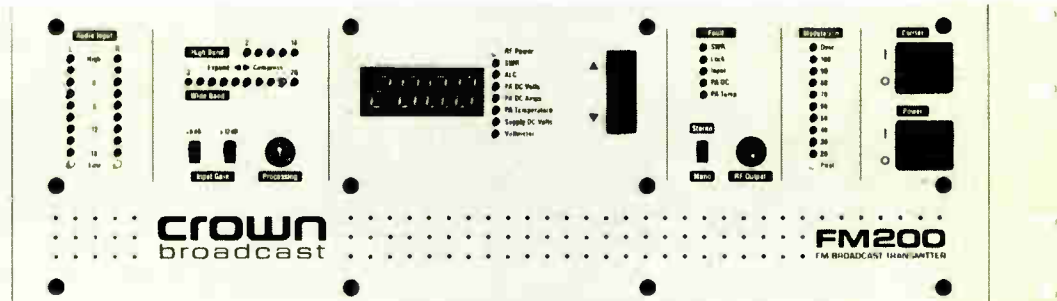
The engineer's choice
Available at all Major Dealers

ZERCOM

Box 84, Merrifield, MN 56465 • 218-765-3151

READER SERVICE NO. 77

Never Go Off the Air Again.



When the power fails, your signal won't. Crown's FM200 transmitter, with optional automatic back-up power, will keep your station on the air. Available in 30, 100 and 200 watt models.

Each FM200 includes:

- FM Exciter
- Audio Processor
- Stereo Generator
- RF Amplifier

All of which operates from your AC or DC power source.

Crown broadcast

A Division of Crown International, Inc.
1718 West Mishawaka Road
Elkhart, Indiana 46515-1000
Fax 219-294-8302
Broadcast Sales 219-294-8050

READER SERVICE NO. 162

INDUSTRY ROUNDUP

RBDS on Verge of Breakthrough

by T. Carter Ross

WASHINGTON In Seattle, giant RBDS receivers will peer down over rush hour from billboards. In Miami, radio "coupons" will help stations sell RBDS to advertisers. Along the Jersey Turnpike, RBDS will make sure emergency weather bulletins are heard.

The utility of Radio Broadcast Data Service (RBDS)—the second generation of what Europeans have known for nearly a decade as RDS—runs the gamut from station image and profile enhancement to Emergency Broadcast System redux.

And broadcasters and listeners alike can expect to see widespread use of the technology within the next few years.

Critical mass

"In the U.S., RBDS is beginning to meet critical mass. About 200 stations are on-air and about 200 more are prepped to go," said Jerry Lebow, president of Sage Alerting. "By next year, about 10 percent of the FM stations should be on-air, and that is the signal the receiver manufacturers are looking for."

With the exception of Denon, stateside receiver manufacturers have been skittish about offering RDS/RBDS receivers. Their hesitation is frequently linked to the low number of stations transmitting the 57 kHz subcarrier signal. But until more receivers become available, broadcasters will remain hesitant to adopt the technology.

"It's a little chicken or the egg," Lebow said. "The receiver manufacturers won't jump until 500 stations are up. Until then it will have to happen by itself."

But companies are hardly standing by, just waiting for receiver manufacturers to

gear up production. Projects like Sage's EBS modernization programs in New Jersey and California are helping to raise the profile of RBDS technology with regulators, broadcasters and the public.

Specialized Communications, for example, is working with Denon and several stations in Washington and Oregon to increase the visibility of RBDS. Using billboards that picture a Denon RBDS receiver, the stations broadcast radio text messages that scroll across the receiver's "display."

Wonderful advertisement

"The billboards are a wonderful advertisement for smart radio," said Allen Hartle, president of Specialized Communications. "By combining an outdoor campaign with RBDS the station wins, the receiver manufacturer wins and advertisers win."

Not only can stations self promote themselves with musicboards, Denon is promoted by having its receiver on the board and advertisers—for example, local stereo stores that sell RBDS tuners—can buy advertisements that run either in conjunction with radio text or on radio text alone.

"Since radio is driven by money and marketing, stations need to make a dollar by installing RBDS," Hartle said. Broadcasters may find that the billboards are a good means to make money with RBDS before more tuners enter the market.

According to David Alwadish, president of CouponRadio, the lack of means to make money with RBDS is the prime reason the technology's growth has been slow in the U.S.

"I think the radios have no dollar value, that's one of the reasons why RBDS has not taken off," Alwadish said. "Manufacturers are trying to woo broadcasters into data transmission with no mention of how to make money."

With CouponRadio, listeners can capture RBDS information about advertisers, music, station events and whatever else the broadcaster wants to transmit. The saved information can be placed on a removable

media card and printed out later at home or at a retailer.

"That is of tremendous value to a broadcaster who's being wooed into data transmission.... Broadcasters are very sophisticated; they can smell out a good idea in a heartbeat," Alwadish said.

Other media outlets are using similar systems to provide viewers instant coupons for products advertised on cable TV. Acu-Trac Services and the Cox cable system are beginning tests of such a system in San Diego early next year.

CouponRadio is establishing "technology launch sites" in Miami and Fort Lauderdale, Fla. Seven radio stations are looking to offer manufacturers on-air exposure in exchange for offering CouponRadio-enabled receivers in the market.

Encoders are available from a variety of manufacturers, including Modulation Sciences, Circuit Research Labs (CRL),

RE America, BE, Harris Allied, Tectan, Rhode & Schwarz and Inovonics, all of whom are working to convince broadcasters of the utility of their gear. And broadcasters are following through, albeit slowly. In the end, RBDS could prove to be the edge that helps broadcasters compete against an ever increasing array of information services.

"I am hoping that we see an awaking on the part of broadcasters. That with all of the interest in the [information] superhighway, that they'd realize that they could put a little pizzazz into FM," Hartle said.

□ □ □

For information from CouponRadio, contact David Alwadish in New York at 212-595-1313; fax: 212-956-7959; or circle Reader Service 16.

For information from Sage Alerting, contact Jerry Lebow in Connecticut at 203-357-1464; fax: 203-357-1531; or circle Reader Service 190.

For information from Specialized Communications, contact Allen Hartle in Washington state at 206-641-9043; or circle Reader Service 131.

Bext Unit Fits the Bill

► continued from page 26

Room was even left over to install the audio processor as well, which made a complete one-piece transmitting package.

Once assembly was complete and all connections made, I put the covers back on, inserted the key in the safety module, raised the shorting bar and turned the AC on for the first time. The L4 came up on filaments and the quiet blower started.

A start up delay of about five seconds is indicated by a flashing green LED on the control panel. After time delay is complete a white "Ready" light shines.

I allowed about a 10 minute warm-up period. A small momentary contact button applies plate voltage.

I advanced the exciter power and started the tune up process. The input tune/match control to the final amplifier is not readily obvious as it is hidden behind a screw just above the input coax connection.

Once located, it was easy to get a perfect impedance match with no VSWR to the driver amplifier. The unit was running at its maximum output within five minutes.

The L4 is technically a 4 kW transmitter, but at KGDN, with 20 W from the exciter and 200 W from the driver it emits 6.4 kW.

Everyone at Bext has been very knowledgeable and helpful. They take great pride in their product and are constantly working to make it even better.

□ □ □

For information from Bext, contact the company in California at 619-239-8462; fax: 619-239-8474; or circle Reader Service 5.

RE Makes RBDS Easy

► continued from page 26

dealers on the value of RBDS, and WKSU-FM spent the day constantly changing data records to demonstrate the value of the different RBDS functions.

We will install RBDS encoders at our repeater stations soon, so that our listeners can take full advantage of the Alternative Frequency (AF) switching feature on their RBDS radios. AF switching is a very beneficial enhancement for us and our listeners. It allows listeners with RBDS receivers in their cars to automatically track our program as they travel through our various repeater and main channel coverage areas. As listeners enter the fringe of one of our transmitter coverage areas, their radios automatically scan a list of our other transmitter frequencies and lock on to the strongest signal.

We also plan to use our RBDS capacity to air emergency traffic information, along with song, title and artist information, and are actively looking into various methods of revenue generation through RBDS.

□ □ □

For information from RE America, contact Bill Daniels in Ohio at 216-871-7617; fax: 216-871-4303; or circle Reader Service 58.

Ron Bartlebaugh can be reached in Ohio at 216-672-3114.

If You Think We Only Supply Cable Harnesses ...



Think Again.


You should see the quality and pricing on Clark Wire & Cable bulk cable and connectors.

Clark Wire & Cable has industry standard audio and video cables available in as many as ten jacket colors. Our customized A/V cables are designed with your needs (and pocketbook!) in mind.

CLARK WIRE & CABLE

1-800-CABLE-IT!
151 S. Pfingsten Road #B
Deerfield, IL 60015

If You Think We Only Supply Bulk A/V Cables ...



Think Again.

Clark Wire & Cable provides custom high quality cables, cut to length and terminated to your specifications.

- Patch Cords
- ADAT Harnesses
- DA 88 Harnesses
- DT 12 Audio Snakes/Harnesses
- RGB Cables
- Remote Camera Cables
- Digital A/V Assemblies
- Complete Facilities
- And More!

CLARK WIRE & CABLE

1-800-CABLE-IT!
151 S. Pfingsten Road #B
Deerfield, IL 60015

TECHNOLOGY UPDATES

LARCAN-TTC

Wide Variety of Solid-State FM Transmitters, Exciters Comprise Larcant-TTC Line

LOUISVILLE, Colo. Larcant-TTC manufactures a variety of solid-state FM transmitters and translators from 1 W to 16 kW, as well as line surge protectors. Following the introduction of the FMS Series in 1989, Larcant-TTC focused on solid-state FM transmitters at power levels above 1 kW.

The FMS-4000 is a compact 1 to 4 kW transmitter featuring four plug-in 1 kW modules, internal lowpass filters and

combiner, ferroresonant regulated power supply, extensive metering, and "Fail On" CMOS controller.

At the heart of all FMS units is the Model X FM exciter. The Model X is the "secret weapon" of high-fidelity FM broadcasters around the world. Broadband amplifiers in the FMS transmitters are virtually transparent to the acoustical clarity of the Model X.

Solid-state FM transmitters offer a host

of advantages over vacuum tube counterparts. The higher acquisition cost is quickly offset by maintenance savings—no tube replacement, no tuning, no high voltage components. The redundancy inherent in parallel amplifier architecture keeps the transmitters on the air. They are safe; there are no lethal DC voltages.

FMS Series transmitters are frequency agile: to change frequency change or to create an N+1 standby configuration, just

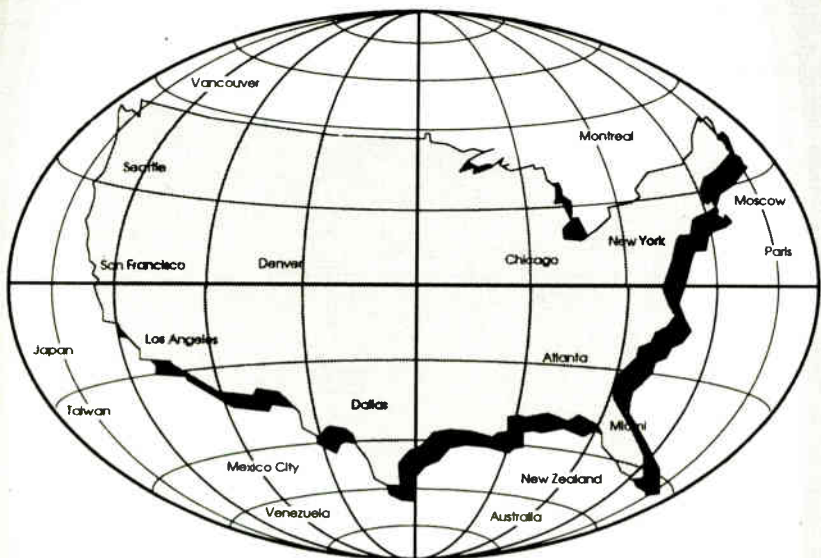
change the DIP switches.

The XLFM Series of FM translators, which have been on the market since 1980, include standard features such as low phase-noise crystal oscillators, PLL upconverter, automatic power control and VSWR foldback. Options such as local modulation capability, code identifier and high selectivity are available.

For information, contact John Binsfeld in Colorado at 303-665-8000; fax: 303-673-9900; or circle Reader Service 3.

WELCOME TO THE DIGITAL WORLD OF DIGILINK

- Replace cart machines live On Air while adding walkaway CD, Satellite, or Tape automation
- On Air Base Price starts under \$8,000
- 8 Track Editor base price starts under \$5,500
- Smallest systems start at 10 hours stereo audio storage (20 hours mono)
- Network more than 15 Digilink workstations



With over 500 workstations sold worldwide in the last 18 months and more than 400 of those workstations sold in the U.S.A, it is little wonder that Digilink is the #1 choice for a digital audio hard disk workstation for professional radio broadcasting. Whether for On Air, Production, News, or Automation... Digilink does it ALL.

For more information about the #1 selling digital audio workstation for Radio, call or write...

303-224-2248

ARRAKIS

© 1993 Arrakis Systems inc. 2619 Midpoint Drive, Fort Collins, CO. 80525

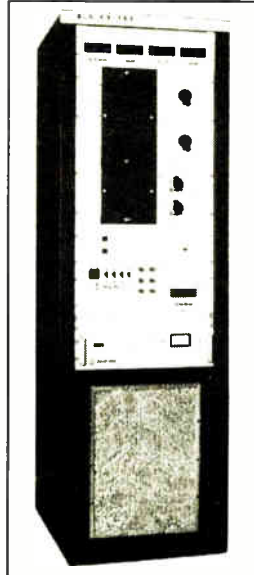
Circle (101) On Reader Service Card

ENERGY-ONIX

Eco Series of Transmitters from Energy-Onix Offers Economical, Reliable Alternative

HUDSON, N.Y. In recent years, FM broadcast transmitter design has emphasized sophisticated control systems, high-performance exciters and pictorial diagnostics.

These enhancements increase transmitter complexity, but often do little to improve performance. In many cases, the increased complexity decreases reliability and raises costs to the point that broadcasters seek out used transmitters for their stations.



Sensing the need for attractively priced transmitters that still incorporate important features, Energy-Onix repackaged its MK Series transmitters to create a series of economical, one-tube 4 to 10 kW transmitters. Eco transmitters cost approximately 25 percent less than the MK Series.

The reduced cost was accomplished by eliminating the "bells and whistles" and keeping only those features required by modern transmitters. The Eco line contains independent broadband solid-state IPAs, which require no tuning and can be used as a standby. It also contains a 3CX3000A7 or 3CX6000A7 PA tube, automatic power output controls, VSWR trip and foldback, and a simple control system.

Since its introduction at NAB '94, Eco transmitters have been selected by broadcasters attracted to their reasonable prices, simplicity and reliability. For example, KZKS(FM) in Colorado needed a reliable transmitter for a mountain-top site that is inaccessible during the harsh winter months. The

Eco-8—with its 12 kW PA tube, remote operation and maintenance capability and lack of sophisticated integrated circuits—was the obvious choice.

For information, contact Ernie Belanger in New York at 518-828-1690; fax: 518-828-8476; or circle Reader Service 164.

RBDS

EASILY
INSTANTLY
INEXPENSIVELY

... with these two, brand-new products, INOVONICS has you covered, coming and going!

710 ENCODER: Just \$995 and **no computer required!** The non-volatile memory holds 16 separate frames of program and format identifiers, alternate frequencies, radiotext messages and traffic or emergency flags. A built-in data interface lets you upgrade later to full dynamic operation for revenue-generating paging, GPS, coupons, contests, etc.

510 DECODER: Connects to your existing FM Mod-Monitor. The front-panel LCD display shows RBDS injection level and allows you to scroll through and read all the data groups. An RS-232 port gives unlimited access to raw RBDS data for telemetry and other in-house functions.

Inovonics, Inc.

1305 FAIR AVE., SANTA CRUZ, CA 95060 U.S.A.
TEL: (408) 458-0552 — FAX: (408) 458-0554



Circle (189) On Reader Service Card

LET'S TALK ABOUT
REDUCING THE PROBABILITY
OF HUMAN ERROR.

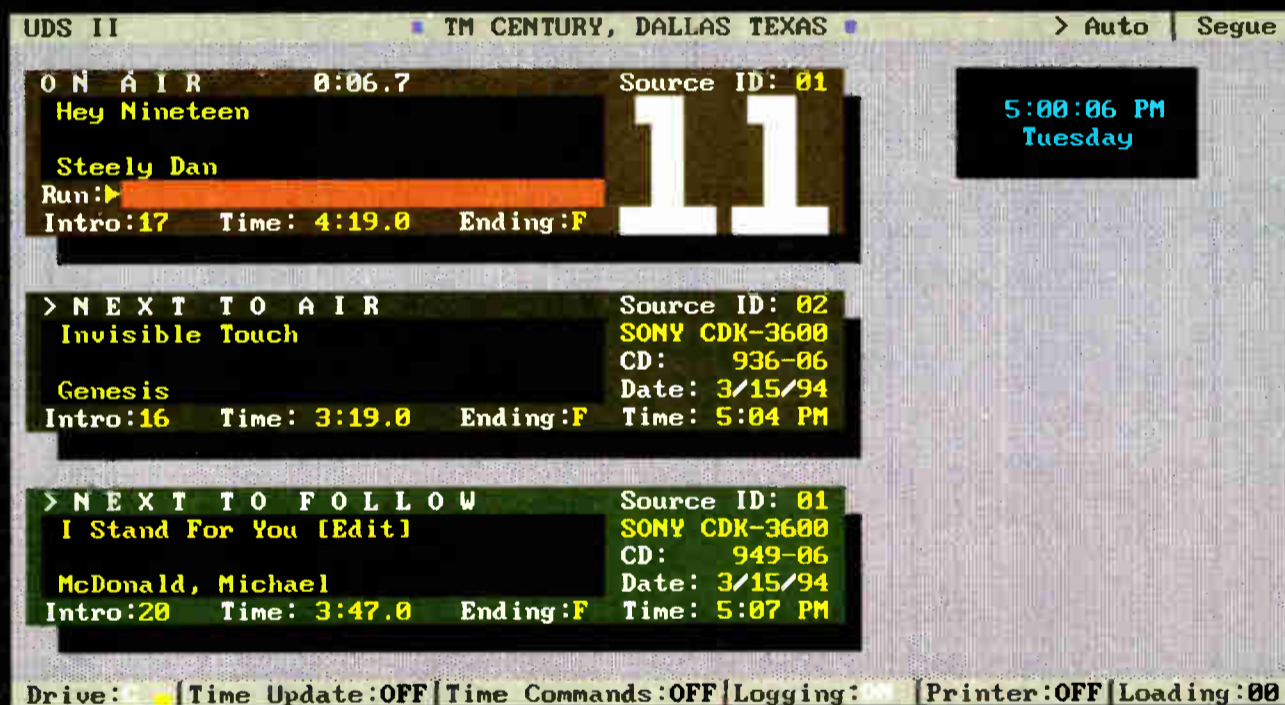
Perhaps the only thing simpler than operating a Pioneer® 300 CD Autochanger is breathing. That's because the Autochanger stores 300 CDs, which can then be played remotely with the push of a button. And when people can't touch discs, they can't miscue, scratch, smudge, steal, doodle on or misfile them, either. Call 800-421-6450 for literature and a list of our systems integrators. However, you may feel that your employees are flawless and impervious to error. In which case, we recommend, not our Autochanger, but a shrink.



TM CENTURY[®] InC.

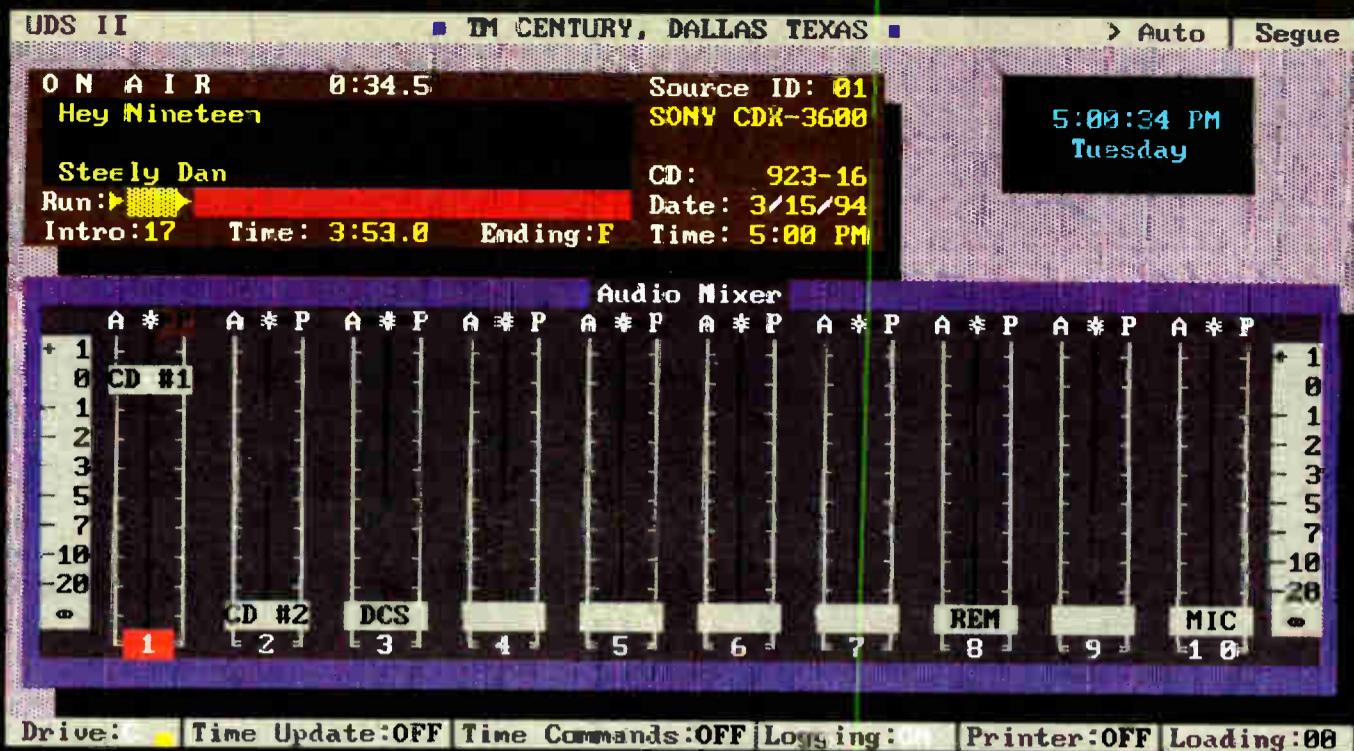
**PRESENTS OUR NEWEST
FULLY INTEGRATED SYSTEM
FOR FULL AUTOMATION OR LIVE-ASSIST**

ULTIMATE Digital Studio II

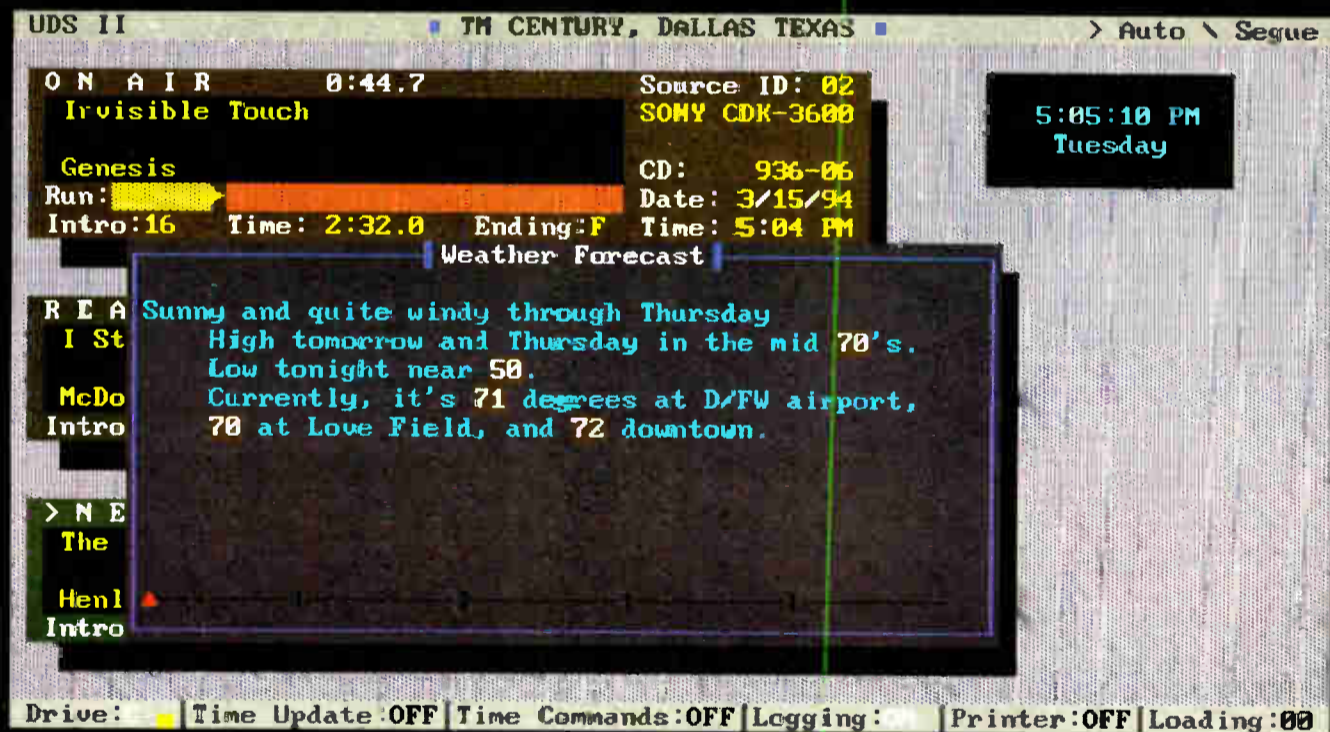


- **NEW COUNTDOWN** clock shows EXACT TIME before VOCAL STARTS and WARNS THAT END OF EVENT IS NEAR.
- **FULL WALK AWAY** OR LIVE CONTROL with just ONE KEYSTROKE.
- **TOTAL EVENT TIME, INTRO LENGTH, ELAPSED TIME, AND ALL IMPORTANT INFORMATION** IS ALWAYS CLEARLY SHOWN.

For more information call your personal sales representative:



- NEW AUDIO CONTROLLER USES DIGITAL TECHNOLOGY FOR SOFTWARE CONTROL OF AUDIO LEVELS AND CROSS FADES
- NEW BARGRAPH DISPLAY SHOWS AT A GLANCE HOW MUCH TIME IS LEFT IN YOUR SONG, COMMERCIAL, JINGLE, ETC.



- POP-UP WEATHER, CALENDAR, PSA, AND LINER WINDOWS
- ENHANCED REAL-TIME FUNCTIONS, INCLUDING REAL-TIME NETWORK JOINS
- ENHANCED SUPPORT FOR LOCAL-AREA NETWORKS
- INCLUDES ALL THE FEATURES THAT MADE THE ORIGINAL UDS FAMOUS INCLUDING SUPPORT FOR ALL INDUSTRY-STANDARD MUSIC SCHEDULING AND TRAFFIC SYSTEMS

(214) 406-6800 — (800) TM Century — FAX (214) 406-6890

Dynamic Deals on Dynamax



Dynamax DCR1000
Buy 3 players for \$8925
Get a FREE Record Module
worth \$2500

**Plus
FREE
Federal
Express**

Dynamax MX Series Consoles
IN STOCK NOW at Harris Allied
Call for Special Pricing



Whether you need digital cartridge machines or modular audio consoles, Fidelipac and Harris Allied have the best of the best available now at great prices, in stock and ready to ship Federal Express at no charge to you. Now, that's a deal.

It gets even better. You can reduce your operating costs by using the DCR1000 Series. Thanks to its durable, maintenance-free design and use of standard 3-1/2" floppy disks to store high quality digital audio. And, over five minutes of 15kHz stereo audio on each 13 MB floppy disk.

The DCR's simple cart-like operation requires little or no training. The player has only three front panel buttons — START, STOP and CUE. START and CUE are literally instantaneous.

There is nothing to clean or align and no adjustments to make. The disk drive provides over 30,000 hours of service, can be replaced in 15 minutes, and costs less than a set of tape heads.

The MX Series Console offers the quality you demand, all the features you need, and a price you can afford.

Make no compromises. The MX Series is truly modular. Each input module includes all

of the active circuitry necessary for its operation. Its motherboard has no active electronic components, so you'll never have to disassemble the entire console to replace a single component. Other consoles claim to be modular. The MX Series truly is.

You get the highest quality components and construction in the MX Series. Available in 6 to 18 channels.

Even the call is free.

1-800-622-0022

Fax 317-966-0623

Southern CA 1-800-690-2828

 **HARRIS
ALLIED**

INOVONICS

Inovonics Equipment Offers Entry-Level RBDS with Many Options to Upgrade

SANTA CRUZ, Calif.

Common-sense broadcasters are likely to think of RBDS first as an additional revenue source. Global positioning correction, paging services, merchant advertising and "coupon" specials—like an SCA—can translate to steady income with little or no effort on your part. But RBDS, like the RDS European counterpart, is an asset with hidden values.

Unless you have had first-hand experience with RDS, it is hard to imagine how handy this sluggish little data channel is. As listeners drive into your fringe, their radios retune to your nearby translator, without missing a beat. Or, if regular programming is interrupted for an emergency traffic announcement, radios on other stations will switch temporarily to your frequency.

And, of course, if an RBDS

"smart" radio is user-programmed to seek a favorite format, it will not stop on your station if it cannot find a PTY (Program Type) code. These are only a few of the many features that comprise the RBDS system.

Inovonics takes a conservative position with RBDS by introduc-

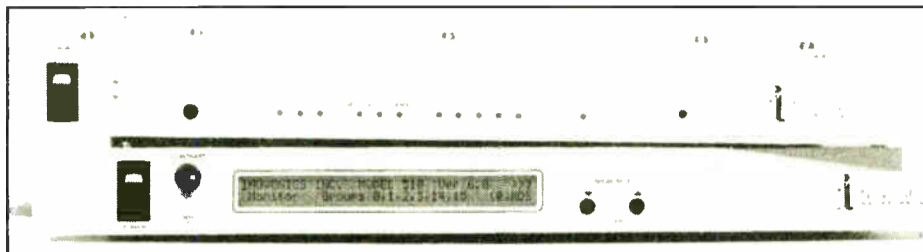
ing a simple, yet expandable, entry-level encoder. In its sim-

plest form, the unit requires no host computer or user program-

ming. User-supplied information is burned into an EPROM at the factory, and what goes out over the air is updated by the factory or via computer. When you are ready to expand, the encoder

A companion unit, an RBDS decoder/reader, completes the picture by qualifying, decoding and displaying RBDS data. Connected to any FM modulation monitor, the decoder shows RBDS subcarrier injection level and scrolls through all the data groups for front-panel LCD display of decoded information. An RS-232 bus allows computer analysis of raw data and helps support the RBDS in-house.

For information, contact Jim Wood in California at 408-458-0552; fax: 408-458-0554; or circle Reader Service 2.



easily interfaces with a computer for on-line operation.

Miles Above Your Competition!



As authorized distributors for multiple lines of satellite communications products, we'll make sure you have the right system for your needs. Then we'll handle the implementation details: from licensing & lease financing; satellite selection & space segment; to turnkey installation & training. But we don't stop there—NSN maintains a 24-hour Technical Support Center because your network doesn't stand still after five.

Experience and service is why NSN Network Services is the nation's leading distributor of SCPC digital VSAT audio and data networks.

Look to us for:

- ☑ Audio & Data VSAT Network Equipment
- ☑ VSAT Network Design
- ☑ Domestic & International Spacetime
- ☑ Integrated Operations Networks
- ☑ 24-Hour Technical Support
- ☑ Installation & Training
- ☑ Disaster Recovery
- ☑ Lease Financing

Put yourself above the rest with a satellite system from NSN Network Services. NSN's digital VSAT audio and data distribution systems have enabled broadcasters around the world to reach new heights in program and spot distribution, while keeping costs grounded.

If you want to program distant stations, centralize commercial production and billing, start your own programming network, or expand your existing operation, call us. NSN has established and supports over 60 digital satellite audio systems, with over 1,000 receive sites worldwide.

303♦949♦7774

800♦345♦VSAT
8728

**NSN NETWORK
SERVICES**
SM
Avon, Colorado USA

Fax 303♦949♦9620

NSN is an authorized distributor of ComStream, Gilat, Audisk, Crown, and other fine satellite and broadcast communications products.

CROWN

Crown Combines Processing, Transmitter, Exciter

ELKHART, Ind. With the introduction of the new FM30 transmitter, Crown Broadcast provides stations an affordable, low-power, integrated broadcast system.

Beyond being a user-adjustable 3 to 30 W transmitter, the 20-pound unit includes an on-board stereo generator and audio processor. All it needs is an audio



source, an antenna and an AC or DC power source.

The FM30 allows user-selectable pre-emphasis settings: flat, 25, 50 or 75 μ S. Without the internal audio processor and stereo generator, the audio response of the unit is 30 kHz to 15 kHz, ± 0.25 dB. With the stereo generator and audio processor, response is 30 Hz to 10 kHz, ± 0.3 dB, and 10 kHz to 15 kHz, ± 1 dB.

The FM30 offers frequency stability better than ± 250 Hz from 0 to 50 degrees Celsius. In addition, automatic control circuitry provides proportional foldback protection for over-VSWR, over-current, over-voltage and over-temperature conditions. The system automatically will restart after a power interruption.

For information, contact Mark Potterbaum in Indiana at 219-294-8050; fax: 219-294-8329; or circle Reader Service 1.

BE

Slimline Gear from BE Eases RBDS Introduction

QUINCY, Ill. With the 1076 Slimline RBDS encoder, Broadcast Electronics helps stations implement Radio Broadcast Data Service (RBDS).

The entry level 1076E provides basic tuning and switching information using an internal EPROM. Remote inputs trigger the Traffic Program (TP), Traffic Announcement (TA) and music/speech flags with simple contact closures.

The 1076D features a microprocessor controller. This provides data transmission with the option of selecting data from the default EPROM, battery-backed internal RAM or RS-232 inputs from an

external computer.

Clock data is supplied by an internal real-time clock. Software options support advanced RBDS features, including time and date, program item number, radio paging, radio text and transparent data channel options.

The single-rack unit package includes a front-panel terminal port for monitoring transmitted data and fault status.

The basic 1076E is upgraded to a 1076D by adding the microprocessor circuit card and a new front panel. This makes it possible for a broadcaster to progress easily from a basic entry-level service to a fully implemented information provider without a high initial expenditure and without making the original equipment redundant or obsolete.

For information, contact David White in

Illinois at 217-224-9600; fax: 217-224-9607; or circle Reader Service 119.

TECTAN

Expandable RBDS Gear

CONCORD, Calif. The RBDS E-1 and E-2 encoders from Tectan are easy to install, easy to use, fully functional and hold up to eight non-volatile data sets.

With three levels of software available, the level of software purchased determines the various data groups that can be programmed into the data sets.

Prices start at just less than \$1,000. With Tectan's software expandability feature, you can get started now and upgrade later.

For information, contact Judi Pendleton in California at 510-798-2222; fax: 510-798-2224; or circle Reader Service 4.

A cast of performers.

For more than 20 years, Inovonics has met the everyday needs of broadcasters the world over with sensible, top-quality broadcast products at down-to-earth prices.



222 Asymmetrical AM Low-pass Processor

Guarantees U.S. NRSC compliance, or is available in several versions for international shortwave service.



250 Programmable 5-band Stereo Processor

Gated AGC, 5-band Compression and EQ, split-spectrum Limiting—all with colorless PWM gain control. Manually pre-program 4 processing presets, or place entirely under computer/modem control via RS-232 bus.



255 "Spectral Loading" FM Processor

Triband-PWM Stereo Processor for contemporary music formats. Gated AGC, 3-band Compression and Limiting; unique "Spectral Loading" feature for a very aggressive sound.



260 Multifunction FM/TV Processor

Stereo AGC—Compressor—Limiter ideal for TV-aural and budget FM's. Split-spectrum dynamic control.

715 "DAVID" FM Processor / Stereo-Gen.

AGC—Compressor—Limiter, plus clean Digital Synthesis of the multiplex baseband signal. Internal RBDS/SCA combining; amazing performance at low cost!

705 & 706 Digital Synthesis Stereo Generators

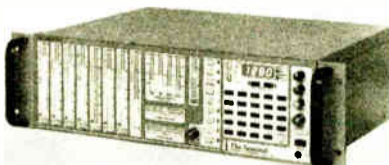
Choice of a no-frills, basic Stereo-Gen., or a full-featured unit with metering and remote control. Both have patented overshoot compensation and a clean sound.

530 Off-Air FM Modulation Monitor

Tunable Mod-Monitor gives accurate measurement of total mod., pilot injection, stereo separation, etc. The peak flasher, metering and alarms may be remoted.

550 The "Sentinel" Monitor Receiver

All-mode radio tunes AMAX-spec C-QUAM® Stereo, FM/FMX® Stereo and all analog and digital RBDS/SCA subcarriers. Comprehensive audio diagnostics permit off-air evaluation, comparison and analysis.



Coming soon: An easy-to-use RBDS Encoder, and a Monitor/Decoder for use with any FM Mod-Monitor.

Inovonics, Inc.

1305 Fair Ave., Santa Cruz, CA 95060 • TEL: (408)458-0552 • FAX: (408)458-0554



RESOURCE GUIDE: Transmitter Tubes

Comet North America Inc.
11 Belden Ave.
Norwalk, CT 06850
Contact: Lance A. Scott
tel: 203-852-1231
fax: 203-838-3827

Comet offers vacuum capacitors for broadcast transmitters, couplers and phasers. High voltage, high vacuum ceramic envelope capacitors available from 3 pF to 6,600 pF, current ratings to 1,000 amperes, peak test voltage to 100 kV. Wide variety of fixed and variable types available from stock. Interchangeable with competitive types. For information, circle Reader Service 123.

Econco Inc.
1318 Commerce Ave.
Woodland, CA 95776
Contact: Debbie Baker
tel: 800-532-6626
fax: 916-662-7553

Econco offers quality rebuilt electron tubes for transmitters. For information, circle Reader Service 20.

EEV Inc.
4 Westchester Plaza
Elmsford, NY 10523
Contact: Greg Morton
tel: 800-342-5338 or 914-592-6050
fax: 914-682-8922

EEV manufactures the following tube types for use in AM and FM transmitters: 4CX5000A, 4CX10000D, 4CX10000J, 4CX35000C, 4CW25000A, 4CV100000C, YC130 (use EEV 4CX15000A). EEV's mesh filament design offers high stability with no power or tuning drift, high performance with low noise and distortion and long life with a 10,000 hour warranty. For information, circle Reader Service 140.

Penta Laboratories
21113 Superior St.
Chatsworth, CA 91311
Contact: Steve Sanett
Barney Zelman
tel: 800-412-4219 or 818-882-3872
fax: 818-882-3968

Penta Labs offers a full spectrum of power grid tubes for the broadcast industry. Recent developments in improved manufacturing techniques provide up to 25 percent extended life expectancy. Penta offers new production tubes at near rebuilt prices with longer warranties. Tube types offered includes: 3CX2500F3, 3CX3000A7, 3CX10000A7, 3CX15000A7, 4CX250B, 4CX350A, 4CX15000A and 4-400CG. For information, circle Reader Service 60.

Svetlana Electron Devices
8200 S. Memorial Parkway
Huntsville, AL 35802
Contact: Stephannie Davis
tel: 800-239-6900
fax: 205-880-8077

Svetlana presents a quality line of drop-in replacement power tubes for FM broadcasters. The growing reputation for quality of these tubes is backed by the strongest warranty in the industry. The rapidly expanding Svetlana product line now includes: YC130/9019, 4CX15000A, 4CX10000D, 4CX5000A, 4CX3500A, 5CX1500B and 4CX250B tetrode FM transmitter tubes, as well as 3CX15000A7, 3CX10000A7 and 3CX3000A7 triode FM transmitter tubes. Produced in St. Petersburg, Russia, to the highest of standards. FM broadcasters benefit from low-cost quality manufacturing. For information, circle Reader Service 214.

Thomson Components and Tubes
40G Commerce Way
P.O. Box 540
Totowa, NJ 07511
Contact: Joseph S. Emsley
tel: 201-812-9000
fax: 201-812-9050

For information, circle Reader Service 99.

Varian Power Grid Tube Products
301 Industrial Way
San Carlos, CA 94070
Contact: Ken Peterson
tel: 415-592-1221
fax: 415-592-9988

Varian offers a comprehensive line of power grid tubes for all broadcasting requirements. Tubes available with anode dissipation from a few hundred watts to megawatts. New products are available for low-power UHF TV transmitters and for high-power shortwave. For information, circle Reader Service 203.

Products & Services Showcase

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

AUTO-ANSWER TELEPHONE COUPLER

Ideal for unattended situations such as listen lines, IFB feeds, dial-up networks, remote transmitter sites & satellite links.

- Clean connection to phone line
- Easy to install
- Send or receive program
- F.C.C. registered



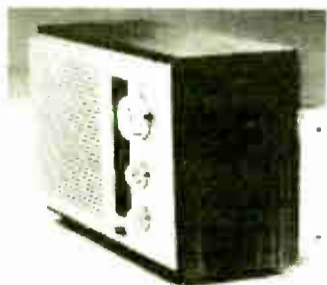
COMREX®

Comrex Corp., 65 Nonset Path, Acton, MA 01720
Tel: 1-800-237-1776 Fax: 508 635-0401

READER SERVICE NO. 24

PORTABLE OFF SITE EBS MONITOR \$350⁰⁰

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



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

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

Gorman Redlich Mfg. Co.
257 W. Union St. Athens, Ohio 45701
FAX 614-592-3898 • Phone 614-593-3150

READER SERVICE NO. 14

Broadcast Engineering



- ✓ Tools/Tool Kits
- ✓ Test Equipment
- ✓ Cases/Shipping Containers
- ✓ Cables/Connectors
- ... and more!

Make just one call for quality products from major manufacturers. Working on site? Need just-in-time delivery? Your satisfaction is guaranteed.

Request your free catalog today!
800-426-1194

JENSEN TOOLS INC.

7815 S. 46th St., Phoenix, AZ 85044
602-968-6231 FAX: 800-366-9662

READER SERVICE NO. 197



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

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

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

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

IFR SYSTEMS, INC.

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



READER SERVICE NO. 63



Econco REBUILT POWER TUBES



Approximately One Half the Cost of New

3,000 Hour Unconditional Guarantee

Call for Our Price List

Econco 1318 Commerce Ave. Woodland, CA 95695
Phone: 916-662-7553 Fax: 916-666-7760 Telex: 176756
Toll Free: 800-532-6626 From Canada: 900-848-8841

READER SERVICE NO. 168

Get the best MUSIC, the best QUALITY, the best PRICE!

WE'VE GOT IT ALL

- Oldies
- Seventies
- AC
- HOT AC
- CHR
- Country

ALL ready to make your format sizzle this year!

ALL in stock... ALL at terrific prices!

To get it ALL on CD just call our name!

1-800 HALLAND



tel: (818) 963-6300
fax: (818) 963-2070

1289 E. Alosta Ave, Glendora, CA 91740

READER SERVICE NO. 147



ETS

EAGLE TOWER COMMUNICATION SERVICE
Dunn & Bradstreet #808336994
(419) 424-0020

NATIONWIDE

- Lightning Deterrent Systems Sales & Install
- Slot Cover Replacement Decer Repair
- Strobe Sales & Service
- Custom Antenna Sales & Service FM-STL-2 way
- Camcorder/VHS Inspection & written reports
- Core tube rustproofing & guywire replacement
- Custom Ice Shield & Mounting Hardware Sales & Installation
- Red Light Sales & Service
- Tower Painting
- Earth Station Sales & Services
- Guywire Tensioning
- SS or Guyed Tower Sales, Installation & Service
- Contract ETS for your annual tower & lighting maintenance
- Nationwide Rates
A. \$490 a day + parts, travel included
B. \$155 mo. + parts, tension & plumb included
C. \$15 mo. per lighting unit includes parts, travel, labor, tension & plumb
- Feedline Sales & Service
- PRE-FAB Buildings
- Tower Plumb

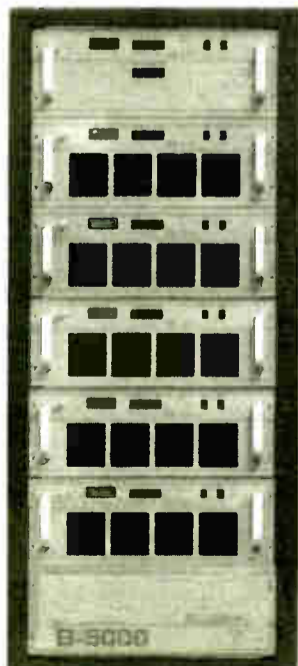
We offer a 15-40% reduction in list prices from 60 manufacturers

"OUR BUSINESS IS CLIMBING TO NEW HEIGHTS"

READER SERVICE NO. 211

SOLID STATE 2, 4 & 5 kW FM BROADCAST POWER AMPLIFIERS

CALL 800-986-9700



1KW INTERCHANGEABLE MODULES

2 YEAR WARRANTY

HARMONIC FILTER

5' RACK

MODEL	POWER
B-2000	1000 - 2200
B-3000	1500 - 3300
B-4000	2000 - 4400
B-5000	3000 - 5500



Silicon Valley POWER AMPLIFIERS

The RF People

800-986-9700 FAX 408-986-1438
529 FORMAN DRIVE, CAMPBELL, CA 95008

READER SERVICE NO. 177

For More on The
AES Show See
pages 47 & 57

AES Preview



Show Offers Role to Radio in '94

by John Gatski

SAN FRANCISCO The Audio Engineering Society (AES) returns to San Francisco in 1994, and the latest audio production equipment will be showcased—much of it tailor-made for radio.

Scheduled for Nov. 10-13, the show will

be held at the Moscone Center here. More than 14,000 audio professionals have registered to attend, and nearly 350 companies will exhibit their latest products.

The agenda includes 78 technical papers relating to audio, video, broadcast and multimedia, as well as 13 workshops and a number of tours of studios and companies. The tour schedule includes

Digidesign, Dolby, Meyer Sound, Louise M Davies Symphony Hall, Silicon Graphics, CCRMA, San Jose area and KQED. The keynote speaker will be legendary Beatles producer George Martin.

The following papers are likely to be of interest to radio production engineers and independent studio engineers who are involved in radio production. The papers include topics on test and measurement, air studio acoustics, digital microphones, 96 kHz sampling DAT, analog signal processing, high performance jitter reduction, psychoacoustics and hearing, grounding interconnection and electromagnetic compatibility of digital/analog equipment, transducers, DSP and audio encoding.

The workshops also will cover a variety of audio subjects. The workshop titles and times are as follows:

Thursday, Nov. 10, 9 a.m.

• "Alternative Digital Media"

Joe Martinez, DIC Digital

• "Video for Audio: Technology and Timing for Audio Professionals," Don McCroskey

• "Recording Console Signal Flow," Laurel Cash-Jones, CJ Technologies and Van Webster, Webster Communications

Friday, Nov. 11, 9 a.m.

• "Fundamentals of Grounding, Shielding and Interconnection," Ken Fause, Smith Fause & Associates; Neil Muncy, Neil Muncy Associates

• "Cable Fiber Optic Transmission,"

Michael Karagosian; "Audio and Multimedia," Ken Rose, Artists for Multimedia; Larry Boden, Denon; Wiley Statemen, Sound Deluxe; Mary Sauer, Sonic Solutions; Peter Coucher, Digidesign; Dr. Mark Waltrop, Chris Cornell, Audio Cybernetics; and Ric Wilson, Digisonics

• "3-D Stereo Sound," Emil Torik, Steve Desper, SRS Labs; Bo Gehring, Focal Point 3D Audio; Alan Howarth, Electric Melody Studios; Allastair Sibbald, Thorn EMI Central Research Laboratory; Eric Small, Modulation Sciences; and Robert Todrak, Roland

Saturday, Nov. 12, 9 a.m.

• "Audio Processing for Radio and Television," Robert Orban, Orban; William Ammons, CRL; Frank Foti, Cutting Edge Technologies; Greg Ogonowski, Modulation Index; Skip Pizzi, Broadcast Engineering; and Don Werrbach, Aphex Systems

• "Audio Education," Prof. Roy Pritts, University of Colorado

• "Developments in Data Compression," Han Tendedoo, ADV Applications

• "Music Recording Approaches Based on Musical Style," Van Webster, Webster Communications

• "Touring With Computer Controlled Systems," David Scirman, Lone Wolf Corp.; David Andrews, Andrews Audio; Artie Congero, Audio Art; Mark Frink, MIX; Mark McLean, Live Sound Magazine; Rob Mailmen, Sound Image; Dave Stevens, Proshow USA; and Jim van Bergen, TCI & Lighting Dimensions

JOIN THE HUNDREDS WHO HAVE USED DIGILINK TO ACHIEVE ECONOMIC RECOVERY

- ❑ 10 hours of stereo digital audio storage for \$7,995* complete
- ❑ Satellite, CD, Tape, and Hard Disk Automation
- ❑ Simultaneous Play, Record, & Network transfer
- ❑ Digital Editor with Waveform Editing for tight production
- ❑ Crossfade CD's, sources, and hard disk audio
- ❑ Music Scheduling system built in for basic CD automation
- ❑ Digital Networking for transfer of audio and schedules

Digilink is the #1 selling digital audio hard disk system in radio today. You can replace your cart machines for live On Air and have an automation system for walk away at the same time! Link over 15 workstations & scheduling computers on our digital network and transfer audio and schedules between your studios.

For more information, call or write
ARRAKIS,

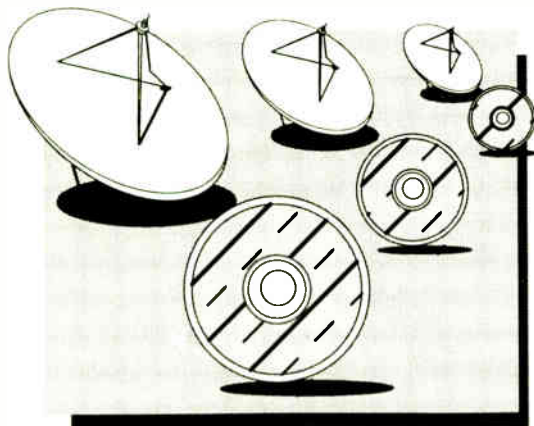
(303) 224-2248

the premier broadcast manufacturer of
consoles, furniture, Digilink and Trak*Star digital audio products.

Consoles
Modulux
Trak*Star
Digilink
Modulink

ARRAKIS

* Suggested retail price. Complete system



SESSIONS SCHEDULE

Following are selected sessions
that will be held during the AES show. See the official
program guide for a complete schedule.

MUSIC

Thursday, Nov. 10, 9-11 a.m.

• "Differential Head-Worm Microphones for Music," Bruce Bartlett, Crown International, Elkhart, Ind.

• "A Framework for the Design, Development and Delivery of Real-Time Software-Based Sound Synthesis and Processing Algorithms," Kurt J. Hebel and Carla Scaletti, Symbolic Sound Corp., Champaign, Ill.

• "Real Time Audio Signal Processing on RISC Workstations via Short Time Fourier Transforms," Alan Peeters

MULTIMEDIA

Thursday, Nov. 10, 9-10:30 a.m.

• "An Overview of Audio Technology for the Multimedia Personal Computer," Jim Heckroth, Crystal Semiconductor Corp., Austin, Texas

• "Custom Audio-Video Control Systems," Harold Clark, Media Systems, Keene, N.H.

MULTI CHANNEL PLAYBACK ENVIRONMENTS

Thursday, Nov. 10, 9 a.m.-11 a.m.

• "The History of Multichannel Sound," Ted Uzzle, FAES

• "The Architectural Impact of Surround Sound on the Playback Environment," Russ Berger

• "Perceptual Issues in Multichannel Environments," Robert Stuart

• "Quantifying the Multichannel Environment," Kurt Graffey

• "Multichannel Perception/Localization," Diana Deutsche

TEST AND MEASUREMENT

Thursday, Nov. 10, 2-5 p.m.

• "Removing Distortion Artifacts from Maximum Length Sequence Impulse Response Measurements," Paul S. Kovitz, Consultant, Arlington, Va.

• "Real-Time Loudspeaker/Environment Performance Management Considerations in the Application of Automatic Spectrum Analyzer," Bob Reams, Audiocontrol

• "Room Impulse Response Calculation by Using Elliptic Contours for Determining Equal Delay Reflection Locations," Dr. George L. Sackman, R. Schwartz and Peter J. Dugan, Binghamton University, Binghamton, N.Y.

► continued from previous page

• "Characteristics of Musical Signals," *Eric Benjamin, Dolby Laboratories Inc., San Francisco*

ACOUSTICS

Thursday, Nov. 10, 2-4 p.m.

- "The Relocation and Reconstruction of Air Studios," *M. Hollier, British Telecom Research Laboratories, Ipswich, U.K.; David Harries, Air Studios, Hampstead, U.K.*
- "Design and Construction of an 'AM' and 'FM' Broadcast Center," *Sergio Beristain, Mexico City, Mexico*

RECORDING

Friday, Nov. 11, 9-12 p.m.

- "Two-Dimensional Directional Control Digital Microphone," *Hiroyuki Naono, Takeo Kanamori, Satoru Ibaraki and Hiroyuki Furukawa, Matsushita Electric Industrial Co. Ltd., Kadoma City, Osaka, Japan.*
- "Checking Tempo Stability of MIDI Sequencers," *Marius Perron, Russian Dragon, San Antonio, Texas*
- "A Stand Alone SCSI AES/EBU Converter," *Edward Fried and Mark Kahrs, Rutgers University, Piscataway, N.J.*
- "96 kHz Sampling DAT," *Takeo Yamamoto, Masami Tsuchida, Kiichiro Koguchi, Fumihiko Miyamoto, Kiyoshi Iwai and Kuniharu Nishi, Pioneer Electronic Corp., Tokyo*

ANALOG SIGNAL PROCESSING

Friday, Nov. 11, 9-12 p.m.

- "Theory and Practice of Wide Bandwidth Toroidal Output Transformers," *Ir. Menno J. van der Veen, Vordensebeek, Netherlands*
- "A Digitally Controlled Audio Attenuator," *Damon Lee, National Semiconductor, Santa Clara, Calif.*
- "The Characteristics of Conventional and Switching Power Supplies in Audio Applications," *Jay Gordon, Factor One Co., Keyport, N.J.*
- "An Investigation of Proper Shield Connection Practices for a Variety of Input/Output Topologies," *Stephen R. Macatee, Rane Corp.*

PSYCHOACOUSTICS AND HEARING

Friday, Nov. 11, 9-12 p.m.

- "A Time-Frequency Auditory Model Using Wavelet Packets," *Finn T. Agerkvist, Technical University of Denmark, Lyngby, Denmark*
- "An Uncoupled Model of Basilar Membrane Vibration," *R. Linggard, University of East Anglia, Norwich, U.K.*
- "An Object Oriented Programming Approach to Tonal Audiometry," *Costa Pasiadis, Aristotle Univ. of Thessaloniki, Greece*
- "A Method for Training Listeners and Selecting Program Material for Listening Tests," *Sean E. Olive, Harman International Industries Inc., Northridge, Calif.*
- "Hearing is Believing vs. Believing is Hearing: Blind vs. Sighted Listening Tests, and other Interesting Things," *Floyd E. Toole and Sean Olive, Harman International Industries Inc., Northridge, Calif.*

GROUNDING, INTERCONNECTIONS, AND ELECTROMAGNETIC COMPATIBILITY IN ANALOG AND DIGITAL SYSTEMS

Friday, Nov. 11, 2-5 p.m.

- "Noise Susceptibility in Analog and Digital Signal-Processing Systems," *Neil A. Muncy, Neil Muncy Associates, Toronto, Canada*
- "Considerations in Grounding and Shielding (in) Audio Devices," *Stephen R. Macabee, Rane Corporation, Mukilteo, Wash.*
- "Balanced Lines in Audio Systems—Fact, Fiction and Transformers," *Bill Whitlock, Jensen Transformers, Van Nuys, Calif.*
- "Automated Test and Measurement of Common Impedance Coupling in Audio Systems Shield Terminations," *Cal Perkins, JBL Professional, Northridge, Calif.*

TRANSDUCERS, PART 1

Saturday, Nov. 12, 9-12 p.m.

- "Four-Way, Multienclosure, Digitally Processed Loudspeaker System," *Brock Adamson, Adamson Systems Engineering, Ajax, Ontario, Canada*
- "Maximum SPL from Direct Radiators," *Douglas Button, JBL Professional, Northridge, Calif.*
- "Horn Driver-Different Approach to Moving Assembly Topology," *Dr. Alexander Voishvillo, St. Petersburg, Russia*

DSP—DIGITAL DOMAIN, PART 1

Saturday, Nov. 12, 9-12:00 p.m.

- "Log Sampling in Time and Frequency: Preliminary Theory and Application," *D.B. Keele, DBK Associates, Elkhart, Ind.*
- "Efficient Convolution Without Input/Output Delay," *William G. Gardner, Perceptual Computing Section, MIT Media Lab, Cambridge, Mass.*
- "The Equivalence of Various Methods of Computing Biquad Coefficients for Audio Parametric Equalizers," *Robert Bristow-Johnson, Enfield, N.H.*
- "A New Approach to Digital Audio Equalization," *David McGrath, Lake DSP Pty Ltd., Maroubra, Australia*

TRANSDUCERS, PART 2

Saturday, Nov. 12, 2-5 p.m.

- "The Voice Coil and Eddy Currents," *Fancher M. Murray, Harman/JBL, Northridge, Calif.*
- "Past and Present of Monitoring Loudspeakers in Japan," *Takeo Yamamoto, Pioneer Electronic Corp., Tokyo*
- "A New Method of Calculating the Directivity Patterns of Loudspeaker Arrays in the Cross Over Region," *David J. Murphy, Regency Institute of Vocational Education, Regency Park, SA, Australia*
- "Dynamic Safe Operating Area Protection Circuitry Safeguards Monolithic Audio Power ICs," *John DeCelles, National Semiconductor Corp., Santa Clara, Calif.*

DSP—DIGITAL DOMAIN, PART 2

Saturday, Nov. 12, 2-3:30 p.m.

- "A Proposal for Increasing the Robustness of the AES 3 Interface," *James B. MacArthur, Lexicon Inc., Waltham, Mass.*
- "Optimal Multirate Filters for Minimum and Linear Phase Equalization," *Robert L.M. Heylen and M.O. Hawksford, University of Essex, Centre for Audio Research and Engineering, Colchester, Essex, U.K.*

DSP A-TO-D, D-TO-A

Sunday, Nov. 13, 9-11:30 a.m.

- "Principals and Concepts of the Digital Controller Syrincs DCL-1," *Gottfried Behler and Swen Muller, Syrincs Large Signal Technology, Aachen, Germany*
- "An 18-Bit, 8-Pin, Stereo Digital to Analog Converter," *J.J. Paulos, S.T. Dupuis, A.W. Krone and G.D. Kamath, Crystal Semiconductor Corp., Austin, Texas*
- "A Simulated Comparison of Dithered and Chaotic Sigma-Delta Modulators," *Chris Dunn and Mark Sandler, Signals, Circuits and Systems Group, Kings College, London, U.K.*

AUDIO ENCODING

Sunday, Nov. 13, 9-12:30 p.m.

- "Parametric Bit Allocation in a Perceptual Audio Coder," *Grant A. Davidson, Louis D. Fielder and Brian D. Link, Dolby Laboratories Inc., San Francisco*
- "An Efficient Scheme for Lossy Real-Time Audio Data Coding," *Robert C. Maher, University of Nebraska-Lincoln, Lincoln, Neb.*
- "AC-3 Operation, Bitstream Syntax and Features," *Mark Davis and Craig Todd, Dolby Laboratories Inc., San Francisco*
- "Analytical Design of Filter Banks for Audio Coding Applications," *C. Bruscianni, F. D'Alvano, R. Banchi and F. Mujico, BAMCO CCS 144.00, Miami, Fla.*

Products & Services Showcase

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

The Audio World™ Interface from BENCHMARK

\$225



The Audio World™ Interface is a two-way recorder interface that is switchable to a line amp or a mono mix amp.

The balanced inputs and electronic transformer outputs both have front panel recessed gain controls. The rack mountable chassis includes LEDs to indicate signal presence, the onset of peak overload, switch position, and power presence.

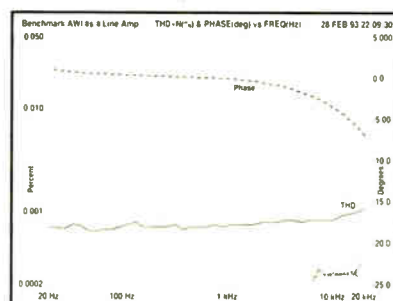
Use it to mate R-DAT and analog recorders, to generate Mono from Stereo, or as a balanced line amplifier to compensate for level mismatches.

With its superlative performance and very, very low price, you'll find numerous applications for this versatile device.

Benchmark
...the measure of excellence!

BENCHMARK MEDIA SYSTEMS, INC.
Phone 800-262-4675, FAX 315-437-8119

READER SERVICE NO. 160



MAGNETIC HEADS

CART REEL-TO-REEL

- HWRA cores: 3-5 times the life of mumetal/hyumu
- Balanced windings: for optimum S/N and hum rejection properties.
- Filled epoxy: more stability and wear resistance.
- Proprietary lamination design: exceptionally smooth response curve, typically ± 1 dB, 35-16,000 Hz
- SPC-based manufacturing: consistent products, excellent yields, minimum variations.
- Design flexibility: specifications adjustable to customer requirements.

MEC cart heads are always as good as the originals...and often better.

1-800-433-8522

MEC

Mag-Head Engineering Co.
686 Mendelssohn Avenue
Golden Valley, MN 55427

READER SERVICE NO. 41



Where can you get a feel for digital audio production?

Now's the time to get your hands on SoundLink —the first Random Access Digital Audio Multi-Track system with all the critical functions you need at a price you can live with.

An all-in-one system, SoundLink provides hard disk recording, mixing, non-destructive editing, signal processing and MIDI recording in one comprehensive and affordable package.

If you want a whole new feeling about digital audio production, please call Korg Professional Audio at 800-645-3188 Ext: 280.
In NY, call 516-333-9100.

SoundLink™
KORG™
Professional Audio

PRODUCT EVALUATION

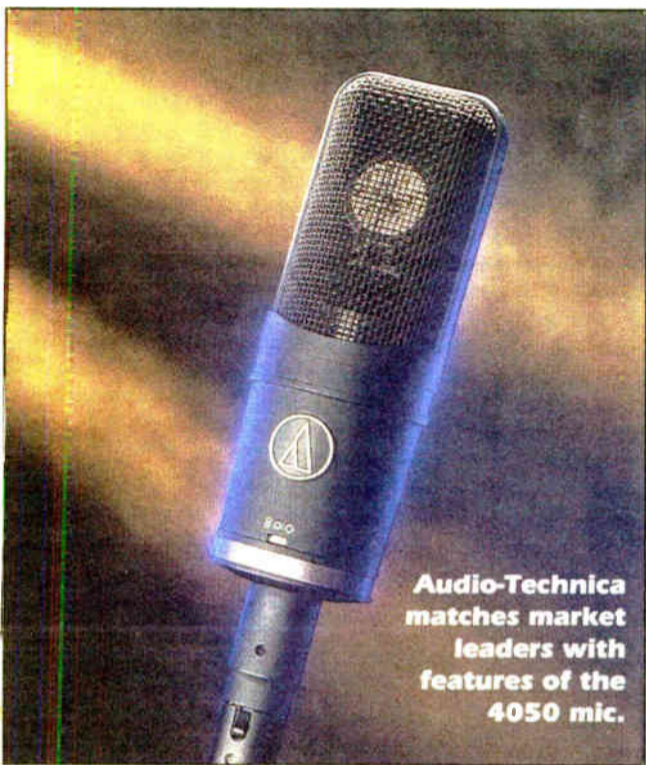
Discover Zen with Audio-Technica

by Ty Ford

BALTIMORE I don't think I've talked to any audio person who has ever found the perfect microphone. This is not a condemnation of microphony.

Instead, it's a commentary on the audio person's endless journey. It's a Zen thing. The journey is more important than the destination.

In the sometimes parallel universes that are dominated by expectation and insecurity, we gravitate to those microphones that have served us well, or those that are used by others whom we respect or envy. In the process, we develop a body of experience about our favorite mics.



Audio-Technica matches market leaders with features of the 4050 mic.

The anecdotes we relate to others about our triumphs (and defeats) become mythology. So, basically, a mic gets high marks if it has been around a long time and lots of people have good stories to tell about it.

In order to take its place among the "chosen," a mic must develop its own mythology over time, job by job. That's the long road. The short road is to hit the market with an attractive price, use the reputation of a professional you think the market will believe and buy as much advertising as you can. That's what Audio-Technica did a few years ago with the single-pattern AT4033 (\$699).

The AT4050/CM5

However, you can't build an empire on just one mic, and Audio-Technica now has several "professional" microphones—ranging from ENG to the top-of-the-line AT4050/CM5 condenser.

It is no coincidence that the AT4050 (\$995.00 including AT8441 shock-mount and carrying case) has the features of the most recognized market leaders: large diaphragm (1-inch diameter), transformer-

less output, dual gold-plated elements, three-patterns, 10 dB pad and bass roll-off switch.

It also is probably no coincidence that the basic EQ curve that determines the overall sound of the mic falls somewhere between the sizzle and thump of an AKG 414 and the more midrange-dominant Neumann U87.

In comparison with the Gefell UM70, the AT4050 was just a little brighter. It was a lot brighter until I removed the wind-screens. My Gefell's foam windscreen is now three years old. (It's good to remember that, as foam windscreens age, their cells can close up, thus blocking the passage of high frequencies. If you've had yours for a while, compare the sound of the mic with and without the foam to make sure the windscreen is not making the mic sound unduly dull.)

Wide hot spot

The AT4050's cardioid pattern has a fairly wide hot spot, about 45 degrees either side of the center line for a total of 90 degrees. There is what some would call a "brightness" or an "edge" due to the 2 dB hump at between 2 kHz and 3 kHz and the almost 4 dB peak that centers at 10 kHz and declines to 5 kHz on the low side and 15 kHz on the high side.

The latter peak is similar to, but not as rounded as, the peak in the Neumann U87Ai that sounds smoother and less edgy. Since the AT4050 drops 2 dB between 15 kHz and 20 kHz, it also lacks the "sizzle" of an AKG 414.

Because I work a mic fairly close (two to five inches), I had to roll off some of the bass to reduce the "boominess" that usually occurs with large diaphragm condenser microphones in that situation. I decided to go with the "edge," so I left the small amount of mid- and high-frequency boost and the moderate amount of compression and limiting I normally use. The "edge" did give my voice more cutting power against music tracks. For voice-only tracks, however, I opted for backing off the mid- and high-frequency EQ.

After refreshing my ears with a good night's sleep, I set the Gefell and the Audio-Technica side by side for some close listening. While noting the differences, I took the opportunity to switch mic cords and preamps to eliminate any contribution they might make. The results of my male-voice, cardioid pattern test:

The AT was a few dB hotter than the Gefell. Increasing the Gefell's input trim to match levels brought up a small amount of

HF preamp and/or mic noise. The Gefell was slightly more noisy than the AT, but it had a more open and smoother top end.

The AT's tone is slightly darker and more

peaky. At equal distances, the Gefell has slightly more low end response, but moving in on the AT by as little as one to two inches compensates for the difference.

In the omni position, the AT4050 loses HF response at about 40 degrees either side of the centerpoint until about 80 degrees off axis. At that point the HF

continued on page 48 ►

Nothing could compete with the wildly popular EV 635A—until now.



Introducing the 635N/D—the same "nail-hammering" durability—infused with the power of N/DYM®

THE ELECTRO-VOICE 635N/D AND 635N/D-B (CAMERA BLACK) MICS MAY LOOK AND SOUND LIKE THE LEGENDARY 635A, BUT THERE ARE SOME VERY POWERFUL DIFFERENCES. WE'VE ADDED A NEW, ULTRAHIGH-OUTPUT NEODYMIUM IRON BORON MAGNET ASSEMBLY (N/DYM®). THEN CRADLED IT IN AN EVEN MORE PROTECTIVE STRUCTURE—FOR QUALITY AUDIO UNDER EVEN THE MOST DEMANDING NEWS/FIELD CONDITIONS.

WHEN THERE'S ONE CHANCE TO GET IT RIGHT CALL 800/234-6831.



Electro-Voice, Inc. a MARK IV company 600 Cecil St. Buchanan, MI 49107 616/695-6831 In Canada: 613/382-1141

DIGITAL DOMAIN

Audio Compression's Effects Can Vary

by Mel Lambert

LOS ANGELES Responding to comments I received from industry colleagues following my July column on digital audio data compression, during the past several weeks I have been auditioning a new Denon MiniDisc unit and its use in conjunction with one type of processing algorithm. The results, to date, have proved extremely useful and point to effects that might be of equal interest.

In the past, I have expressed a warning about the potential sonic effects of multiple and sequential coding. Applied once,

twice or possibly three times to audio material, these algorithms produce few discernible affects. Performed process several times between formats, I predicted that even the most tin-eared individual would soon realize that something odd might be occurring.

The problem, of course, is securing access to material that can be used to test such hypotheses—which, to a limited extent, I think I have achieved.

A couple of years ago, Audio Processing Technology, makers of the apt-X100 sub-band ADPCM system, released a CD that contained several, carefully-prepared test

recordings. The really useful feature was that each recording was repeated four times on the CD; a table within the accompanying liner notes indicates which of the versions had been subjected to a complete apt-X 100 encode-decode cycle and which were unprocessed.

Using MD

So, now that I had access to a selection of material that I knew was processed and unprocessed, I contacted Denon and borrowed a DN-990R MiniDisc recorder/player. Since the DN-990R features both analog and AES/EBU digital I/Os, I could

now perform transfers within the digital domain of apt-X100 processed information. (I used the digital transfers simply to reduce the number of D-to-A stages involved in multiple generations.) And to examine the effects of multiple ATRAC compression utilized with the MiniDisc format, I used a DAT machine with error-rate readout as a temporary data-storage device—again to reduce the number of A-to-D and D-to-A stages to the absolute minimum.

So the process was relatively simple. I could now compare results of unprocessed material with the same data that had been subjected to:

- A single stage of apt-X100 4:1 digital audio data compression.
- A single stage of MiniDisc ATRAC digital audio data compression.
- A single stage of apt-X100 followed by a single stage of ATRAC.
- Multiple stages of ATRAC processing, with intermediate data storage to uncompressed DAT.

First, let me state that the Denon DN-990R is one of the best-sounding MiniDisc systems that I have auditioned.

Undetectable

As with previous test I have made on apt-X100-encoded material, a single stage of processing is virtually undetectable. On one of the APT test tracks, Bach's Sonata No. 1, played delightfully by Itzhak Perlman, I can sometimes hear the occasional touch of harshness on some high-frequency passages. But this is highly dependent upon the monitoring system and the freshness of my hearing.

Dubbing the material via Denon AES/EBU ports from a Technics CD-player equipped with consumer-grade SP/DIF outputs required a Lexicon LFI-10 Digital Format Converter to both raise the output level and convert the unbalanced signal to a balanced format.

Given the amount of data compression that ATRAC produces, the results were impressive. I began to hear the data-compression effects on only the more demanding material recorded onto the APT Test CD. During A/B tests I also could spot very little difference on the pop-music tracks (including "I'm Not Scared," by the Pet Shop Boys, and Robert Palmer's "She Makes my Day.")

Offloading the material from MiniDisc to DAT via the AES/EBU ports allowed me to listen for artifacts produced by multiple ATRAC stages. (Incidentally, like several units I have come across during recent years, the DN-990's digital output is not strictly to AES-3 standards. According to the LFI-10 measurement section, byte #0, bit #0 of Channel Status data is set to "0," which indicates a consumer format I/O.)

I prepared DAT tapes that contained a maximum of six ATRAC generations, a parameter that served two purposes. It became pretty apparent after two or three stages that the signal degradations were audible. I did not push the process too hard, since each stage of DAT recording/replay might be introducing additional error correction and/or concealment, which could further cloud the subjective comparisons. (I did make sure that the SV-3900 had clean heads and that error rates remained well below 25 during each playback session.

continued on page 49 ►

Owning a Real Neumann Just Got a Lot Easier

You've put a lot of money into your studio... expensive consoles, recorders, processing, etc. But your recordings just don't measure up to your expectations. Chances are, the problem is with the most important (and most often overlooked) part of your signal chain... the microphones.

Virtually every major recording produced during the last 50 years has utilized Neumann microphones on vocals and critical tracks. And with good reason. Neumann microphones sound better. The warmth. The texture. The velvety smooth richness that cannot be duplicated. It's called the "Neumann Sound."

The TLM 193 is a large diaphragm cardioid condenser microphone with state-of-the-art specifications. Frequency response of 20Hz to 20kHz, dynamic range of 130dB, self noise of 10dB-A, and maximum SPL of 140dB.

Mics like the U 47, U 67, U 87, and the TLM 170 are legends in the industry. Now, with the TLM 193, you can have Neumann performance in the classic tradition for less than \$1300 us!

Make your next recording a classic. Use Neumann... the choice of those who can hear the difference.

Introducing the TLM 193
Large-Diaphragm Condenser Microphone



Neumann|USA

6 Vista Drive, PO Box 987 • Old Lyme, CT 06371
Tel: 203.434.5220 • FAX: 203.434.3148
West Coast Tel: 818.845.8815 • FAX: 818.845.7140

Neumann|Canada

221 LaBrosse Ave., Pointe-Claire, Quebec H9R 1A3
Tel: 514.426.3013 • FAX: 514.426.2979



THE CART MACHINE GOES DIGITAL! INTRODUCING THE DENON MD CART.

As the company that first employed digital technology to record music, it's not surprising that Denon has become the broadcast standard for on-air CD playback with its CD Cart[™] Players. Now, Denon is about to repeat its ground-breaking tradition with the introduction of Denon MD Cart[™] Recorders and Players.

Based upon digitally recorded, removeable MD technology, Denon has created the DN-990R MD Cart Recorder and DN-980F MD Cart Player... and in the process has effectively replaced the 25 year-old NAB Cart.

Erase and re-record for commercial/spot production and playback using widely available blank MDs. Record and re-record with CD-like sound quality, durability and reliability.

Audition Denon MD Cart machines today. And remember, whenever digital broadcast equipment is made better, it will be made by Denon.



DENON
The First Name in Digital Audio

DCL-220: Best of Both Worlds

by John Diamantis

WASHINGTON Hello from the land of Orange Glow! I am continually amazed at the amount of interest there is in tube gear these days. Even a die-hard valve fan like myself is taken aback at all of the recent pro equipment entries, especially from mainstream companies.

For example, Aphex has introduced a stereo vacuum tube,

albeit hybrid, microphone pre-amp for around half a kilobuck (\$500).

Does this mean we may yet see a triode-laden Optimod? Will Cutting Edge round its corners with a brace of 12AX7s? Well, maybe not, but I know we'll be seeing more fascinating tube goodies soon, some of which we are currently evaluating in our secret "Tube Talk" testing laboratories.

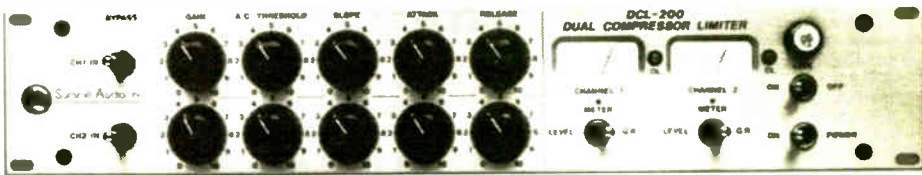
I've had the opportunity to test several tube audio processors so far this past year, and each one has had its own distinct personality.

I recently had the chance to live with and evaluate the Summit Audio Dual Compressor-Limiter, Model DCL-200. This product is unique from the others tested so far in that the audio path is a vacuum tube solid state hybrid. Sacrilege, you wail? Well, maybe at first look, but the DCL-200 and its mono

predecessor are popular items in recording studios. After playing

around with it a bit, it seemed like an interesting device.

The Summit Audio DCL-200 utilizes 12AX7A dual triodes for gain, and Jensen 990 discrete transistor op amps for the



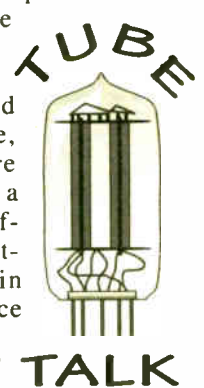
The audio path in the Summit DCL-200 uses vacuum tubes.

OUR DIGITAL AUDIO WORKSTATION IS NOW PERFORMING WITH THE FOLLOWING GROUPS

ADAT is a registered trademark of Alesis Corp.

balanced input and output stages, allowing a transformerless audio signal path. The tubes are arranged in a classic three-stage gain block, the first two stages providing voltage gain with common cathode topology, the third stage is a follower, providing a low impedance output.

Global feedback is utilized around the gain block from the follower output, to first gain stage cathode resistor. According to the sketchy block diagram (no schematic was provided), one 990 op amp is used for the balanced input stage, and two are used to create a balanced differential output. The gain control device is a "proprietary circuit," designed to emulate photo resistor/light source devices, similar to those used in older designs. Given.



Front panel controls include gain, compression threshold, slope and continuously variable attack and release times. There are two VU meters that can be switch selected to read "level" or gain reduction. Peak indicator LEDs warn of clipping.

The two channels can run either independently or linked for stereo, and there are bypass controls for both channels. The front panel is thick polished aluminum with nice beveled edges around the VU meters, large toggle switches and seven-sided retro-type adjustment knobs.

The compressor/limiter slope is of the "soft-knee" variety, which means the DCL-200 goes from non-compressed audio, through the threshold point, to compressed audio, in a gradual rather than abrupt manner. This characteristic helps reduce processing artifacts.

Additionally, while the slope is adjustable, it varies from 1:1 or no compression, to a maximum of 7:1 or one dB of output level change for every 7 dB of input. This maximum setting is greater than the slope used in situations requiring compression, but some users may balk at not being able to limit at 20:1, 50:1 or even 10:1 ratios.

continued on page 49 ►



Vermont Public Radio

Sam Sanders, a happy Foundation 2000 user since January, estimates that he has cut his production time in half.

Our unique Edit Controller looks and feels just like the recorders you work with every day —no keyboards, front-end computers or mice to slow you down. The built-in touch screen shows you a wave form picture of your sound for instant visual reference. There's even an ASRC option so that you can convert one sample rate to another.



Audio Mixers, New York

Fred Venitsky (pictured) and Jimmy Regan have the distinction of owning and operating the most used Foundation 2000 on the planet.

Foundation 2000 is fast and easy to use. Audio scrubbing is so clean, you'll swear you're rocking reels. Edits are seamless. Fades are smooth and glitch-free. Plus, you can specify the "Light Pipe" for direct interface with the popular ADAT™ and RD-8™ digital recorders.

FOUNDATION 2000LS

Designed specifically for broadcast production, this random access recorder/editor features the speed, the ease of use, and uncompromising audio quality of Foundation 2000—for less than \$15,000! It's the same dedicated user interface with touch screen display, real time operation, event based editing, wave form display, and expandability to a full Foundation 2000 at any time—the only workstation of its kind to offer this important feature. Test drive the high performance Foundation 2000LS in your studio. Call 1-800-7-FOSTEX or 212-529-2069 today to schedule a demo.



Fostex

AES PRODUCT GUIDE



Following is a sampling of products that will be exhibited at the AES show in San Francisco. For additional details, see the official directory at the exhibition.



Akai DD1500 Multitrack Disk System

At AES, Akai is premiering its DD1500, a modular direct-to-disk recording and editing system. The unit will support multitrack recording to hard disk and magneto optical (MO) disk.

The expandable system includes control unit, CPU, disk drive housing and A/D-D/A.

Each drive can utilize up to 1.3Gb MO drives. Connections include MIDI, SMPTE and VTC.

For more information, contact Akai at 817-336-5114; or circle **Reader Service 94**.

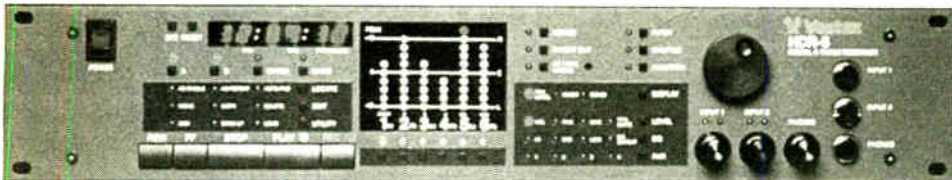


dbx 115 Utility Light Module

The 115 light module from dbx is a rack-mount utility light/AC patchbay that can brighten up dim studios or remote work areas.

The unit has two rack lights in all-metal retractable tubes, eight rear panel AC outlets, dimmer, on/off switch, 10 ft. AC cable and 15 amp circuit breaker.

For more information, contact dbx at 510-351-0555; or circle **Reader Service 186**



Vestax Digital Multitrack Recorders

Vestax offers the HDR-6 and HDR-4 hard drive-based digital recorders. The two models include digital mixer auto location, edit capability and computer compatibility. The HDR-6 offers 10.5 minutes of digital stereo audio per track in the 6-track mode, 31.5 minutes in the 2-track mode.

For more information, contact Vestax Musical Instruments at 707-427-1920; or circle **Reader Service 127**.

STATION/STUDIO SERVICES

BUY-OUT MUSIC — \$99

Sixty 60-second music beds for .. \$99
198 :30 & :60 music beds for ... \$198
2200 Hanna-Barbera (C)

Sound Effects for \$495
110 Lasers & Sweepers for \$99

For FREE DETAILS on production music, sound effects, call

.....
Ghostwriters (612) 522-6256

READER SERVICE 80

427 SOUND EFFECTS \$89.00

For a 5-CD set with a 30-day money-back guarantee.

Take an extra \$10 off if you mention this ad!

Send \$79 to Ghostwriters
2412 Unity Ave. N., Dept. RW
Minneapolis, MN 55422

For credit card orders call
(612) 522-6256

READER SERVICE 80

ATTENTION PROVIDERS!

Promote your services to **Radio World's** 22,000+ readers. Reach Radio Station and Recording Studio owners/managers and engineers with your message. For information on affordable advertising call **Simone** at **1-800-336-3045**.

Neumann KM 184

Neumann has introduced the KM 184 microphone, a small diaphragm cardioid condenser designed for recording and sound reinforcement.

The KM 184 combines the capsule of the KM 84 with the electronics of the TLM 170.

Specifications include 138 dB maximum SPL and 20 Hz to 20 kHz frequency response. Price is less than \$600.

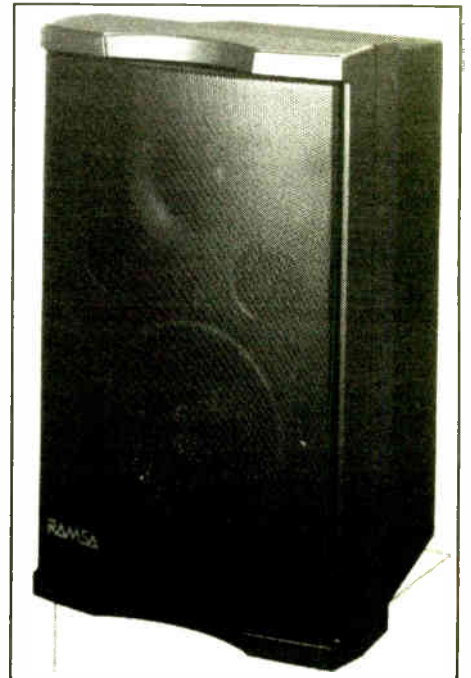
For more information, contact Neumann USA at 203-434-5220; or circle **Reader Service 116**.



Ramsa WS-A35 Nearfield Monitor

Panasonic's Ramsa WS-35 monitor is a two-way compact monitor offering magnetic shielding and optional wall mounting.

For more information, contact Panasonic Pro Audio at 714-373-7277; or circle **Reader Service 199**.



continued on page 48 ▶

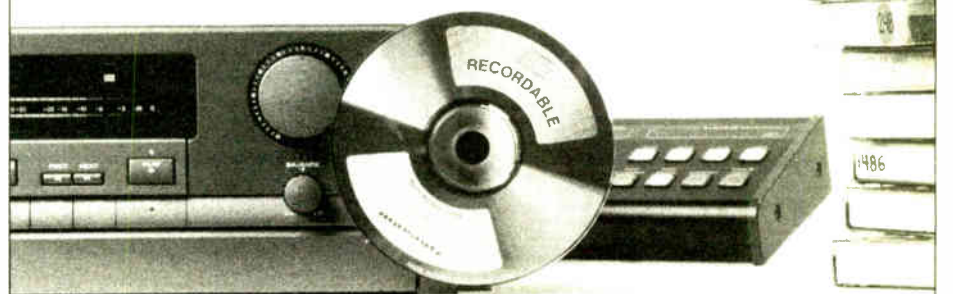
All CD, All the Time.

Marantz has put recordable CD technology and blank CDs within reach of your

budget. End the confusion and clutter of endless carts, cassettes and the occasional record by transfer to CD. Gain the advantage of rapid random access and unparalleled digital audio performance for everything you put on the air.

Today most music goes on air from CD; why not consider transferring your IDs, commercials, and sweepers to CD as well. You can also create custom CDs from music libraries, and your sales staff will love to present new spots to clients on CD.

marantz®
The affordable recordable

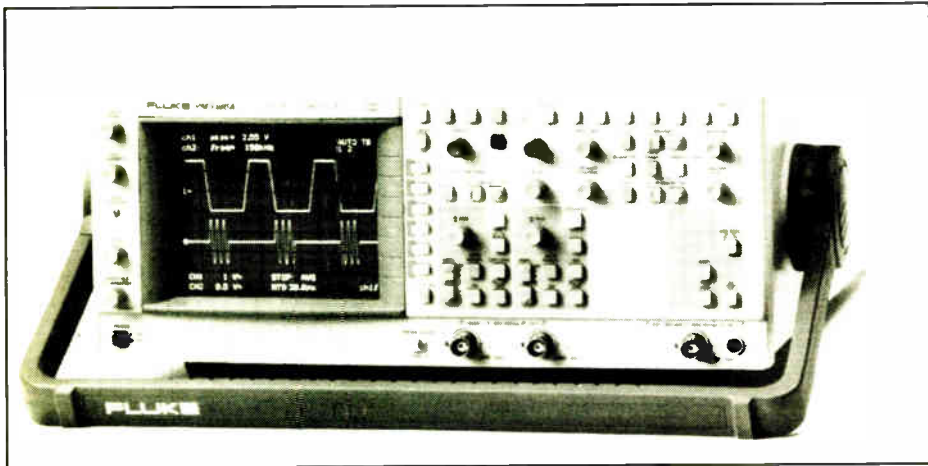


Marantz Professional Products • 1000 Corporate Blvd., Aurora, IL 60504
phone: 708.820.4800, fax: 708.820.8103

Circle (148) On Reader Service Card

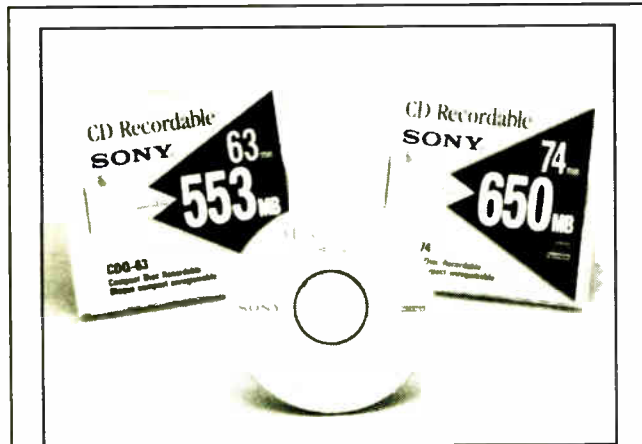
PRODUCT GUIDE

► continued from page 47



Fluke PM 3380 A Combiscope

The Fluke PM 3380 A combines a digital store oscilloscope with an analog scope in an affordable package, according to the company. Features include 100 MHz bandwidth, autoranging, on-probe switch, trigger view and oversampling peak detector. For more information, contact Fluke at 206-347-6100; or circle **Reader Service 183**



Sony Recordable CDs

Sony now manufactures two write-once recordable CDs, the CDQ-74 and CDQ-63. Designed for use in professional CD recorders, the CDQ-74 holds 74 minutes of 16-bit stereo audio and the CDQ-64 holds 64 minutes. For more information, contact Sony at 201-930-6981; or circle **Reader Service 59**.

SoftSplice Digital Audio Editor

Manufactured by Digital Expressions, the SoftSplice Digital Audio Editor is a professional 4-track portable editing system that can run on any Macintosh computer, including Powerbooks.

With its cut/paste editing platform, the SoftSplice offers automated mixing, cross-fades, parametric EQ and backup to DAT. Connection is via SCSI cable. Hardware includes Motorola DSP-56001, AES/EBU and S/PDIF I/O and SMPTE time code interface. Options include 18-bit A/D-D/A converter.

For more information, contact Digital Expressions at 206-389-9895; or circle **Reader Service 159**.



AT4050 Builds Reputation as Condenser Mic

► continued from page 43

returns but with a different coloration than the hot spots.

The figure-eight pattern reveals that the back capsule does not have the openness of the front capsule and that the back capsule also exhibits a reduced low frequency response. More expensive multi-pattern mics I have auditioned have had more uniform response in both these patterns.

Product Capsule: Audio-Technica AT4050/CM5 Microphone

Thumbs Up	Thumbs Down
<ul style="list-style-type: none"> ✓ brings out voice in music mix ✓ great feature package ✓ moderate cost 	<ul style="list-style-type: none"> ✓ irregular frequency response in figure-8, circular patterns

For more information, circle **Reader Service 25**; or contact Audio-Technica at 216-686-2600.



Spirit Folio Lite Line/Mic Mixer

The Spirit Folio Lite is a 16-input mixer with four mono, four stereo input channels, two effect sends with stereo return and two-track tape input. Other features include 48 V phantom power, two-band EQ and LED meters.

For more information, contact Jesse Walsh Communications at 616-695-5948; or circle **Reader Service 79**.

FM MONITOR & RDS OPTION

MORE PERFORMANCE



FOR LESS EXPENSE

Choose from two competitively priced models: 844A \$5,150 • 884 \$3,765. For just \$330 add the RDS level option for complete FM Stereo and RDS injection measurements plus these built-in features —

- 1% Modulation Calibrator
- Frequency-synthesized RF pre-selector
- Peak Modulation Duration Differentiator

Or retrofit your TFT monitor with RDS for only \$500. Call us, or fax your order, today.

800-347-3383 or 408-727-7272, fax 408-727-5942



Sound Quality for over 20 years
3090 OAKMEAD VILLAGE DR. SANTA CLARA CA 95051-0862

Circle (121) On Reader Service Card

So, is this the studio condenser mic you've been searching for? It depends. In doing voice work over music, the mic sounded very good with spots I cut. Also, it offers a nice features package with the multiple patterns and 10 dB pad. However, if you're only doing voice work, you probably don't need the other two patterns, although they might come in handy. The 10 dB pad is a small but valuable plus.

Summary

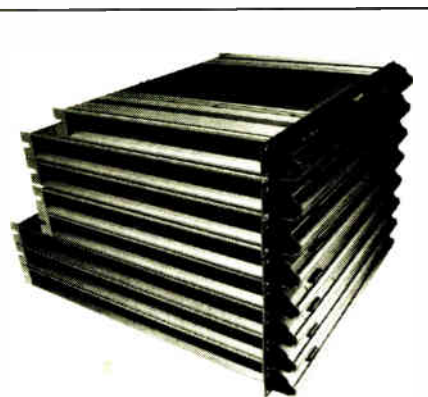
In summary, if you've tried the the Neumanns and the AKGs and they are not exactly right, and if the thought that the sound of the AT4050 lies somewhere in between those two brands, try the mic in your own rig.

Of course, if you like the sound of it, you'll have to take a certain amount of heat from "the old school." They'll say, "Tsk, tsk. Too bad you couldn't afford the real thing."

To which you can respond, "Please munch my ADAT sir (or madam), and...have a nice day."

□ □ □

Ty Ford is currently compiling a list of socially acceptable studio invectives and malisons that can be hurled at knavish miscreants without causing permanent damage. Submissions will be dissected.



Chameleon Amplifiers

British-made Chameleon power amplifiers are now available in the U.S. The high-current professional amps come in stereo and mono versions. The stereo units range in power from 225 watts RMS (8 ohm) to 900 watts (4 ohm).

For more information, contact Klay Anderson Audio at 801-272-1814; or circle **Reader Service 50**.

DCL-220 Combines Tubes, Solid State

► continued from page 46

My only complaint is that if you try to use the Summit Audio DCL-200 as a true limiter, you have to drive it several dB into gain reduction in order to get past the "soft knee" rotation point and find the point where the unit truly "limits."

My advice is to use the DCL-200 either as a dynamic range compressor or a leveler—a gain reduction device that "levels out" varying audio levels. It's in these modes that the unit really shows its strengths.

In the production studio the DCL-200 does a nice job as the final mix proces-

sor. Set up for a moderate slope (I can't be precise, as the knob legend doesn't show ratio; just an arbitrary scale) with average attack and release times, and with 7-10 dB of compression, the unit evened out a fully produced commercial without drawing attention to itself.

Tough to tell

Other than watching the metering, it was tough to tell if there was processing occurring. On voice, the DCL-200 does well with narration, but if you speed up the attack and release too much, the sound becomes a little uneven with some voices becoming harsh. A bit of knob twiddlin' will help find the sweet spot.

I next inserted The Summit Audio DCL-200 in the airchain of WBIG-FM, our oldies station, and set it up as the pre-processor to our main air chain. Adjusted for medium attack and release and a moderate slope, the DCL-200 kept levels under control and didn't fight dynamically with our other gear. Its sound was smooth and steady, without any pumping or overshoot.

The DCL-200 then was inserted in the airchain of WGMS, our classical music station, and while it took longer to find the right combination of controls, the resulting audio was handled very smoothly.

The overall audio quality of the DCL-200 was very good, and although it is a hybrid of vacuum tube and solid state devices, it seemed to lean more in the tube direction, sounding clear and clean in the midband and not harsh in the high frequencies. The low frequencies were leaner sounding than some vintage tube gear and was tight into the lower registers.

Distortion measurements were carried out with a Potomac Instruments test set, models AG-51 and AA-51. At nominal +4 dBm input/output, with no gain reduction, any frequency from 20 Hz-20 kHz, THD was less than 0.04 percent. With 0 dBm in and +20 dBm out, THD was less than 0.5 percent. The DCL-200 clipped at +24 dBm output. These measurements are within spec. Frequency response was 20 Hz-60 kHz +/-1 dB. Spec is to 70 kHz, although no range is given. The unit tested was -4dB at that frequency. Not a big deal.

SMPTE IMD was 0.06 percent at +4 dBm, and 0.4 percent at +20 dBm and surprisingly did not increase with 10 dB of gain reduction, attack and release on fast with maximum slope.

Most audio processors would generate several percent IMD under these circumstances. In fact, I didn't believe my measurements at first and went back more than once to verify my findings. Low frequency THD did increase with fast release times, and although these numbers seem inordinately high (around 8.0 percent maximum), they can be misleading.

Dynamic distortion of the signal at that fast of a release rate would swamp out the high THD or cause you to slow down the release time, thereby reducing low frequency distortion to around 1.0 percent.

Noise measured -78 dBm, settings at unity gain, reference +4dBm. Spec is -80 dBm. Close enough.

The 12AX7s were sourced from both Russia and China under the National

brand. Summit Audio makes a case in its manual for using tubes selected by them to insure lowest noise, distortion and gain matching, and also selected to run on 5 V DC heaters.

Summit Audio claims longer life and lower noise running the filaments this low (nominal is 12.6 V in series, 6.3 V paralleled), but research I've seen from General Electric and other former tube manufacturers state that you run the risk of cathode contamination if you run the filaments too low, and actual life expectancy could be less than running them on the high side.

I suppose Summit Audio has its own

research to back up its claims of proper operation and long life at low heater voltage.

Summary

The Summit Audio DCL-200 is a very good compressor/limiter, especially if you are looking for a clean device that doesn't intrude dynamically while operating. It combines the virtues of vacuum tube amplification, with the benefits of solid state input circuitry and output drive capability.

□□□

Cost for the DCL-200 is \$2,950. For more information, contact Summit Audio at 408-395-2448; or circle Reader Service 86.

John Diamantis is director of technical operations at WTEM(AM), WBIG-FM and WGMS-FM in Washington, D.C.

The Role of Compression In Recording

► continued from page 44

During any subsequent tests, I plan to use a hard-disk recorder rather than DAT.)

As I expected, the results were particularly program dependent. On some of the more subtle classical material—specifically the Scarlatti Harpsichord Sonata and Mendelssohn Violin Concerto—it was pretty easy to detect a certain "roughness" in the midrange, a general clouding of high-frequency transients and a general veiling of the overall stereo soundstage.

On some of the more strident material, which lacks a wide dynamic range or which contained a large amount of midrange material, the results of up to five or six stages of ATRAC were detectable but not obtrusive. (My definition of "obtrusive" is, by necessity, reasonably flexible.)

All in all, I was extremely impressed with the results. Of course, these were tests made on material that had been transferred digitally. Real-world applications might involve additional stages of A-to-D and D-to-A conversion, which would further degrade the signal content. And I have yet had the opportunity to repeat the test sets with other systems.

Beware multiple compression

Without exception, the majority of the currently available algorithms from APT, Dolby, Scientific Atlanta, MUSICAM licensees, etc., do an excellent job of removing redundant data from digital bit-streams and allow digitized audio to be stored on smaller hard drives or sent via cost-effective data links. But multiple and sequential compression stages now have become commonplace, often with discernible artifacts.

By their very nature, all data compression systems are going to degrade, however slightly, the quality of our audio material. Some algorithms produce noticeable—and harsh—artifacts on previously compressed material. While I concede that such tests as I have described here are only preliminary, I would welcome input from chief engineers around the country who have hands-on experience and are willing to share their findings.

□□□

Mel Lambert is principal of Media&Marketing, a Los Angeles-based consulting service for the professional audio industry. He can be reached at 818-753-9510.

I COULD HAVE BOUGHT A DIGILINK!

Are you thinking about replacing your old cart machines with 'Digital Carts' such as floppies, flopticals, Bernoullis, or Opticals??? Well, think about it a little more! Add up the list price for a digital cartridge recorder, just a single player, AND the floppy disks--- and you will find that you could have bought a Digilink workstation for \$7,995 that gave you 'Live' -AND- 'Automation' capabilities!!!

A Digilink workstation stores audio on an internal hard disk and comes out of the box with a capacity of 547 one minute, stereo carts for only \$7,995. Even better, the Digilink hard disk has an average 15 year life. Imagine how many floppies you will break, wear out, lose, and replace over 15 years. That doesn't count all of the floppy disk mechanisms that will jam, break, and simply fail...

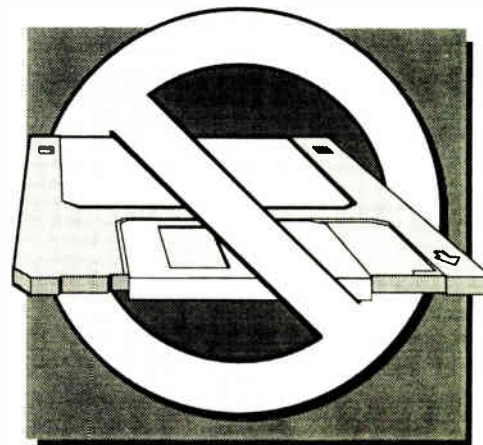
Also with a Digilink, you get much more! You can stack up hundreds of 'carts' in the play list and just walk away. You get satellite automation in the Digilink workstation and can optionally add CD players. A digital audio cut and splice editor even comes standard with Digilink. Because Digilink will play and record at the same time, you can play a spot to air while it starts a scheduled network autorecord. You can even network delay with Digilink.

With all of these features, it is easy to see why there are more than 500 Digilink workstations around the world from Paris to Moscow to Taiwan to Jamaica and in your own backyard. Don't suddenly come to the realization that you could have bought a Digilink!

Call Arrakis now...

(303) 224-2248

ARRAKIS



© 1993 Arrakis Systems Inc. 2619 Midpoint Drive, Fort Collins, CO. 80525

Circle (158) On Reader Service Card

PRODUCT EVALUATION

Audix PH-15 Clear in Tight Spots

by Bruce Bartlett
with Jenny Bartlett

ELKHART, Ind. Let me say right up front that I am impressed by the sound and convenience of the Audix PH-15 powered, two-way mini monitors. They're meant for digital audio workstations, studio monitoring and multimedia setups, and—by my standards—they can work well in all three applications

Priced at just \$429/pair list, the PH-15 is easily affordable. Although the speaker is very compact, it includes a built-in, stereo power amplifier of 25 watts per channel.

The amp circuit uses surface-mount devices and discrete components to keep the size down and increase reliability. (You can't bypass the power amp in order to use your own.)

Looking good

The high-density wood housing looks great with its rough-coat black finish and fabric grille. Behind the removable grille is a ported 5-inch woofer with a fabric cone and foam-rubber surround. The woofer uses a high-temperature aluminum voice coil. Directly above the woofer is a 3/4-inch cone dome tweeter made of super polymer.

On the back of one speaker is a heatsink and an aluminum panel housing the power amp. The panel holds all the connectors and a single volume control for both speak-

mounted well away from any nearby surfaces. I placed the pair at ear height, toed in, 2 feet from the wall behind them, about 3.5 feet apart and 3.5 feet from me. Wall mounting made the sound less clear and too boomy for my taste.

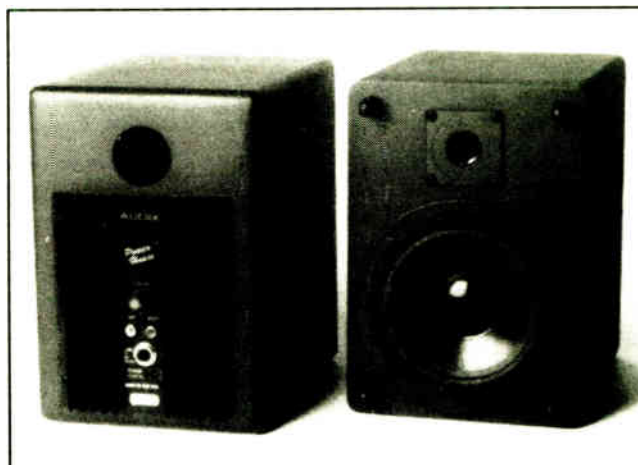
I listened to the Audix PH-15 with a variety of CDs and mix tapes. Here are my impressions of four representative CDs.

These are my own opinions, not necessarily those of RW.

•**Kamakiriad**, Donald Fagen, Reprise Records 9 45230-2 (pop)

A warm, smooth sound, never harsh, yet, with good presence. Bass is tight and transient attacks have good impact. Smooth percussion, sweet extended highs on cymbals. Easy to listen to. Although the bass rolls off in such a small speaker, there's an illusion of deep bass.

•**Reckless**, Bryan Adams,



Audix PH-15 two-way mini monitors

ers. Since the volume knob is on the back, it's a pain to adjust, but many users will set it and forget it. (Audix Sales VP Cliff Castle said a newer version will have the volume on the front).

A&M CD 5013(rock)

A rich sound with good drum impact and

Product Capsule: Audix PH-15 Loudspeaker

Thumbs Up	Thumbs Down
<ul style="list-style-type: none"> ✓ very good sound for its size ✓ compact and rugged ✓ quality built-in power amp ✓ easy to connect 	<ul style="list-style-type: none"> ✓ pleasant midbass rise reduces accuracy ✓ volume control on back (volume will be moved to front in newer models)

For more information, circle **Reader Service 136**, or call Audix Corp. at 503-682-6933.

Specs reviewed

As for specs, the power amp provides a healthy 25 watts per channel (peak) at 0.2% THD with a frequency response of 7 Hz to 100 kHz. The speaker's response is rated at 55 Hz to 22 kHz with no tolerance given. Line-input impedance is 10 kilohms, and DC powering is 8 to 18 volts.

Setup is easy and intuitive.

I like the design of the vertical wall-wart power supply. It has a short AC cord attached to the transformer, so the transformer doesn't cover up two outlets when you plug it in.

The PH-15 sounded best to me when

pleasing bite on the electric guitars. Plenty of dynamic range. Plays loud at full volume. Sharp imaging. Easy to pick out what each instrument is playing.

•**Firebird**, Stravinsky, Telarc CD-80039 (classical)

continued on page 55 ▶

8 TRACK DIGITAL EDITING BREAKS PRICE BARRIER \$5,495*

- ❑ A digital audio editor designed for *Radio* production
- ❑ Learn to use in minutes, *much faster than tape*
- ❑ Cut, splice, move, and fade up to 4 stereo tracks
- ❑ Use Scrubbing to edit with your ears
- ❑ Use visual waveform editing to edit with your eyes
- ❑ An UNDO button enables you to go back and fix mistakes
- ❑ Digital Networking to transfer audio to your On Air machine
- ❑ Add Trak*Star-8 software to a Digilink for only \$2,000

Trak*Star-8 is the first cost effective multitrack digital audio editor designed for the radio broadcast professional. Fast and easy to use, produce your commercials on Trak*Star and then transfer them in digital straight to the Digilink in your On Air studio. Dramatically reduce production time and save money !!!

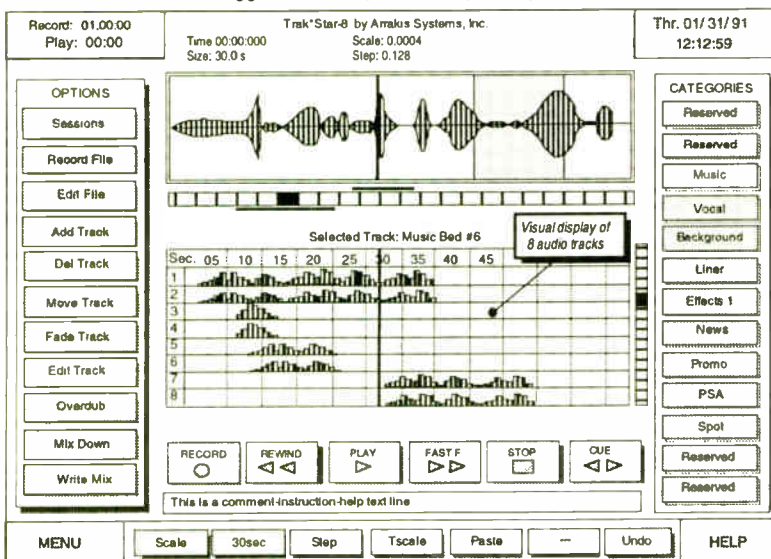
For more information, call or write
ARRAKIS,
(303) 224-2248

Consoles
Modulux
Trak*Star
Digilink
Modulink

the premier broadcast manufacturer of consoles, furniture, Digilink and Trak*Star digital audio products.

ARRAKIS

* Suggested retail price. Complete system



© 1993 Arrakis Systems inc. 2619 Midpoint Drive, Fort Collins, CO. 80525

Circle (87) On Reader Service Card

Belar STEREO MONITOR

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.
LANCASTER AVENUE AT DORSET, DEVON, PENNSYLVANIA 19333
Call or write for more information on Belar AM, FM, Stereo, SCA and TV monitors.

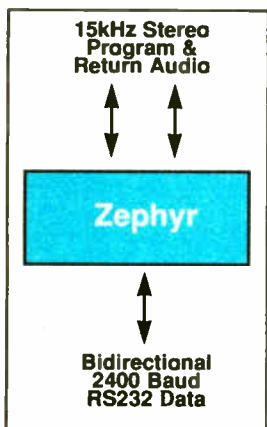
(610) 687-5550

Circle (174) On Reader Service Card

Finally, a Reason to Love Ma Bell



For years you've had to rely on satellites, and their sky-high prices. Now, Zephyr™ brings great sounding remotes back down to earth.



Integrated Services Digital Network (ISDN) dial-up phone lines are now available in most of the US and over a dozen other countries.

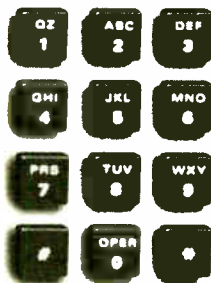
Using just one ISDN circuit, Zephyr transmits broadcast quality stereo for little more than the price of an ordinary voice call. And operation is as easy as sending a fax.

Zephyr uses Layer III to code and decode the audio for transmission. International listening tests, and the daily experiences

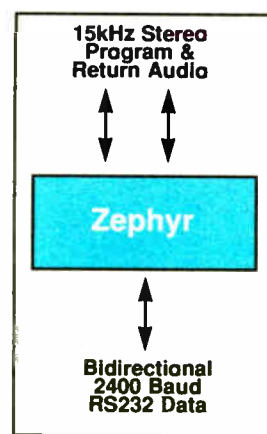


of hundreds of users, clearly demonstrate Layer III's superior performance when using ISDN.

Zephyr includes an ISDN terminal adapter, so no expensive external boxes are needed. For areas where only Switched 56 is available, Zephyr is totally compatible when using an external CSU/DSU.



You can even set up a remote with ISDN at one site and Switched 56 at the other! Our ISDN Telephone feature allows you to place



a standard voice-grade call to a Plain Old Telephone Service (POTS) phone.

only from



2101 Superior Avenue
Cleveland, Ohio 44114
216.241.7225
FAX: 216.241.4103

- Full duplex 15kHz stereo operation on one ISDN line or two Switched 56 lines using ISO/MPEG Layer III coding.
- Compatibility with older 7kHz codecs that use G.722.
- 2400 baud RS-232 bi-directional data for communications and control.
- Four end-to-end "contact closures" for summary alarm and control of recorders and other devices.
- Split channel mode allows individual mono signals to be transmitted to separate sites.
- The ISDN terminal adapter is built-in.
- V.35/X.21 port for connection to Switched 56, fractional T1, and other data paths.
- Simple operation with full metering, analog audio limiting, and straightforward controls.
- Each unit serves as both a transmitter or receiver.

The Best Way to Hear from There

Telos **Zephyr** DIGITAL NETWORK AUDIO TRANSCEIVER

Trials of Capturing Live Music

Editor's Note: This is the first in a three-part series on recording live music for syndicated radio broadcast.

by Mike Joseph

LENEXA, Kan. There's more to capturing live music for air than a couple of mics and a board feed.

If you've been keeping track of recent music programming trends, you've noticed that more and more so-called "live music" programs are hitting the syndicated airwaves.

Demographics tell the story: cocooning boomers, erstwhile concert goers scared

off by the thought of their foreign cars being ripped off while they're inside the smokey club they (used to) love; limited "quality time" with the family translated to mean fewer opportunities to get out (think: babysitters); and tighter budget limits on those "big nights out."

But the desire to be there, musically, still exists. Live music radio programs fill that need, whether produced to air as "happening right now" or captured live in the can.

Popularity increasing

No matter the music styles—jazz, country, alternative or polka—dependent

stations and small production companies everywhere are finding that the events being promoted locally, often in their own backyard (which is to say, by promoters advertising on the station, or events being co-promoted by the station and a corporate sponsor) represent a unique programming opportunity, if not an actual profit center.

For the next several issues, this series of articles will take a look at what's



Recording live music requires extensive planning.

involved in getting a musical event on the air, whether performance stage to transmitter or captured on tape for later post production, edit assembly and subsequent broadcast. We'll cover the organizational aspects, technical considerations and hopefully tag a few "dos and don'ts" along the way.

Determine the size

First and foremost, it's important to determine the project's size and scope. If it's too big to handle or beyond in-house capabilities get a pro involved, even if as a consultant. I am often hired, for tiny dollars that justify themselves quickly, to educate otherwise competent engineers on the details and aspects of live music production for broadcast. It's not uncommon.

If choosing an outsider, just make sure that his or her experience parallels your needs. Studio music recording or live sound reinforcement experience is not the same thing as live music broadcasting capabilities.

Ask if he is able to step in and do the whole job, if required. Is he happy merely assembling the special equipment you might need at a fair rental rate? Can he communicate and hand-hold patiently? Has he ever ordered up and balanced phone lines? Does he understand the amount of processing your signal sees on the way to the stick? Can he artistically mix to the musical style in question under the (typically) adverse monitoring conditions involved?

These are good questions to answer up front.

Is it live?

On the project itself, what's the goal? Is it background for a live ENG actuarial on a special news segment? Stick a mic in front of the PA speaker and grab two minutes for wild fly-in at editing. If it's a complete music show, featuring a large act's three-set evening, event-related history, pre-produced lead-ins and -outs, and a hosted artist interview, then that's a little more involved.

The big choice you have to make here is whether you really want to grab the music live and stick it in the ether—flaws, delays and all—or tape it, leaving yourself the opportunity to fix it in the mix, via post production and later assembly.

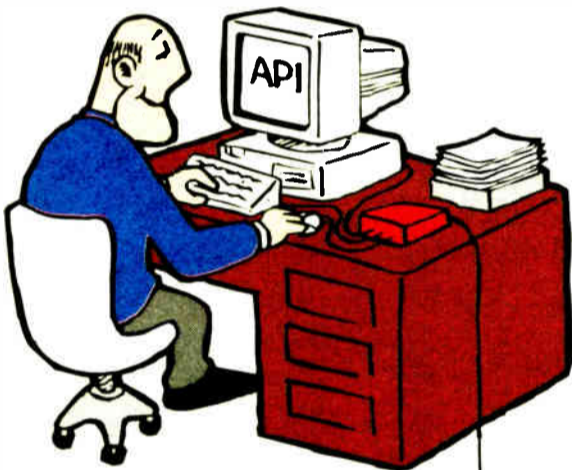
A higher quality final production implies that there is more time spent getting it ultimately right, which typically means a live recording to tape.

Listeners today are used to well-balanced, CD-quality sound with no dead air or technical "gotchas." That requires a "capture, not a cover" in the vernacular, which is to say you'll be capturing the event for later post production, as opposed to covering it while it's going down.

"We Need It in the Office ... He Needs It in the Booth..."

With **PC-Companion Plus™**, the same computer can be in either place!

- **Easier Information Distribution**
Now, you can have remote access to your wires and other important data.
- **Better Physical Security**
Locate your computer in a secure area and still have round the clock access to your information.
- **User Friendly**
No complicated software to install. Just plug it in and go.

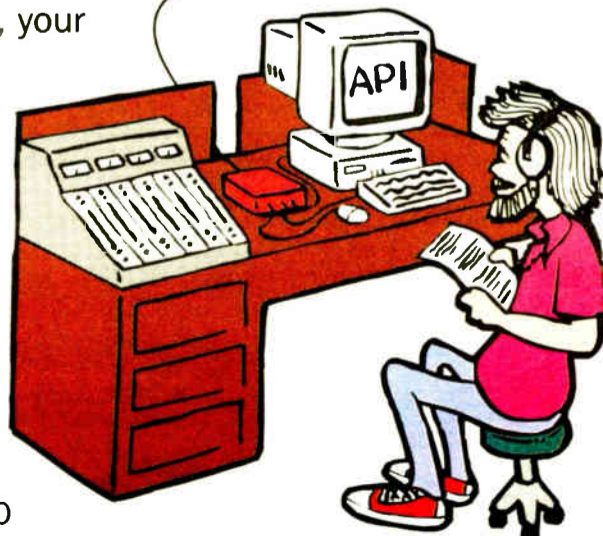


Distribute your important information without a costly and complicated network. Instead, experience the advantage of having a second keyboard, monitor and mouse up to 250 feet away from your computer. Privacy options let you control the flow of information. Whether you're in the office or the booth, your computer is still close at hand.

Options include: Audio channel, remote serial printer line, PS/2 or serial mouse, Macintosh or Sun workstation support.

CYBEX™

4912 Research Drive
Huntsville, AL 35805 U.S.A.
(205) 430-4000 • Fax (205) 430-4030



PC and PS/2 are trademarks of International Business Machines Corp. Macintosh is a trademark of Apple Computer, Inc. Sun is a trademark of Sun Microsystems.

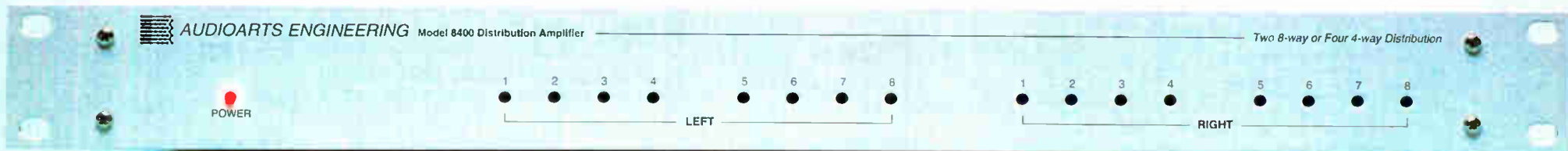
Dealer Program Available

Made in USA

Circle (170) On Reader Service Card

World Radio History

continued on page 57 ►



SECURITY

THAT'S WHY YOU NEED A DA

NATURALLY you'd expect the design experts at AUDIOARTS to provide it. After all, we've built hundreds and hundreds of audio consoles; we've got the track record.

The AUDIOARTS 8400 is now the only DA with performance specs good enough to keep up with our other designs.

COMPONENTRY: High quality of course! Individual 15-turn output gain trims for precise calibration, fully regulated DC supply (current protected), low magnetic field power transformer, high quality FR4 glass epoxy circuit boards (with solder mask coating to reduce the chance of foreign particle shorts) plus clearly marked component legends for easy service.

FEATURES: It's got what's needed! It's **DUAL FUNCTION:** the 8400 can be used as an eight output stereo DA or easily configured as four 1x4 DAs (using simple rear panel jumpers)—sixteen outputs total, each with its own front panel gain trim. It also has **separate connectors** for every input and output. This allows for easy wire changes in the field, rapid troubleshooting, and further avoids the conductor pinching that plagues screw terminals.

The 8400 has the componentry, performance specifications and interconnect system that make it the obvious choice for your facility. At AUDIOARTS we've got the engineering know-how; **benefit from our experience!**



AUDIOARTS ENGINEERING

7305 Performance Drive, Syracuse, New York 13212 (tel 315-452-5000 / fax 315-452-0160)

AudioVAULT! Now!

The screenshot shows the AudioVAULT software interface. At the top, there is a logo for 'BE' and a 'Menu' button. The time is 4:05:11 PM on 9/9/94. A digital display shows 00:06:17 and the number 11. Below this are several track controls, each with a track number, title, artist, and a button (Clear, Start, or Load). For example, track 21 is 'All She Can Do is Dance' by Don Henley. Below the track controls are tabs for 'Classic Rock', 'Liner's', 'News', 'Live', and 'Sound Effects'. A 'Wednesday' tab is selected. Below the tabs is a table with columns for Name, Title, Artist, and Length. The table lists tracks 347 through 626, including 'More Music', 'Turnpike Buick', 'Crown Auto World', 'Cimeron Bar and Grill', 'Mitch Jingle', 'What I Am', 'Mmm Mmm Mmm Mmm', and 'Found Out About You'.

Real screen. Real radio. Not an artist's rendition!

The Broadcast Electronics Digital Studio System.

- ▶ Run live or automated. Play up to sixteen things at once.
- ▶ Music-On-Hard-Drive; Instant access. Any compression ratio, cut-by-cut, including no compression!
- ▶ Drag-and-drop scheduling on-screen.
- ▶ Unlimited flexibility. You can't outgrow AudioVAULT®.
- ▶ Cut-and-paste editing.
- ▶ Complete, graphical on-line help.
- ▶ BE tech support 24 hours a day.

- Optional touch-screen • Back-up and hard disk mirroring • Optional integrated SADiE™ 8-track editing
- Optional WireDESK™ news copy software • Spanish, Chinese, other language versions available

FOR A FREE AudioVAULT PC DEMONSTRATION DISKETTE, FAX US AT (217)224-9607 OR CALL (217) 224-9600 NOW!

BE BROADCAST ELECTRONICS, INC.
 WORLD LEADER IN RADIO BROADCAST TECHNOLOGY

4100 N. 24th • P.O. Box 3606 • Quincy, IL 62305-3606 • (217) 224-9600 • FAX (217) 224-9607

Audix PH-15 Clear, Easy To Connect

► continued from page 50

In the beginning of "The Firebird," the very deep bass-drum roll is inaudible. Strings have a lush, velvety, airy tone. The speakers seem to disappear; you hear a clear soundstage behind the speaker plane. Good realism.

•**Blame It On My Youth.** Holly Cole Trio, Manhattan CDP7 97349 2 (jazz).

Warm or boxy vocals, as if the midbass were bloated or puffed up. Deep bass notes are weak, but do not masquerade as fake bass an octave higher. This shows that the harmonic distortion is low.

Audix wisely notes that it helps to play your mixes on a variety of different monitors.

Because of the speaker's midbass rise, it makes female vocals sound fuller and warmer than they really are. As a result, mixes made on the PH-15 tend to sound a bit thin in the midbass when played on more accurate speakers. So I would not use this speaker for critical EQ decisions.

Measurements

Using a Techron TEF-20 sound analyzer, I measured the anechoic frequency response of the PH-15. The mic was 1 meter away at woofer height. The response is impressively smooth and wide range for the price: 60 Hz to 20 kHz +/- 5 dB. There's a broad 3 dB rise centered at 250 Hz that gives the PH-15 its warm, sometimes puffy sound I noted in the listening tests. Below 100 Hz, the lows start to roll off, but there is still good output at 50 Hz. The highs go right out to 20 kHz. Upper mids show some dips between 2 and 6 kHz. Off-axis response is nearly as flat as on-axis.

When the PH-15 is mounted on a wall, the response is much rougher. The grille creates a notch at 6 kHz. According to the measured Energy Time Curve, transient response is very good.

Summary

The Audix PH-15 sounds clearest when used at ear height, away from the walls and without the grille. Then it sounds very pleasant, warm, smooth and crisp but not harsh. Transient impact and dynamics are good, too. Bass goes surprisingly deep considering the speaker's size. The speakers have a wide sweet spot.

Because of the slight midbass hump, you might not want to use the PH-15 for critical EQ decisions during mixdowns.

But it's a wonderful high-end system for digital workstations and multimedia. You can drive the amp directly from most sound cards.

If you have a tight editing suite with no room for a power amp, you'll like how these powered speakers fit in.

The PH-15 is easy to listen to during long editing sessions. Its extra warmth helps to compensate for the ear's loss of bass at low listening levels. What's more, the PH-15 is rugged, compact and easy to connect.

□ □ □

Bruce Bartlett is a microphone engineer and technical writer for Crown International and the author of "Practical Recording Techniques," published by Howard Sams. Jenny Bartlett is a technical writer. Bruce can be reached at 219-294-8388.

SIGNAL-TO-NOISE

Audio Pioneers Leave Artistic Legacy

by Frank Beacham

NEW YORK This is a story about quality. About doing things right. About not cutting corners. It is a story of how human ingenuity in a recording studio 35 years ago led to the sonic preservation of a musical gold mine that is certain to thrill listeners for generations to come.

The story begins in 1958 when impresario Harry Belock and producer/engineer Bert Whyte teamed to create a series of symphonic recordings in stereo.

This was no ordinary team. Belock's commitment to the music went far beyond the bottom line, and Whyte's uncompromising engineering skills were much needed at a time of transition in LP record production.

In the late '50s, stereo recordings were a new breed, and the

industry was only beginning to react to the technical demands of this new medium. Monaural albums were traditionally mastered on quarter-inch tape at 15 inches and most labels at the time were recording stereo on the same quarter-inch media.

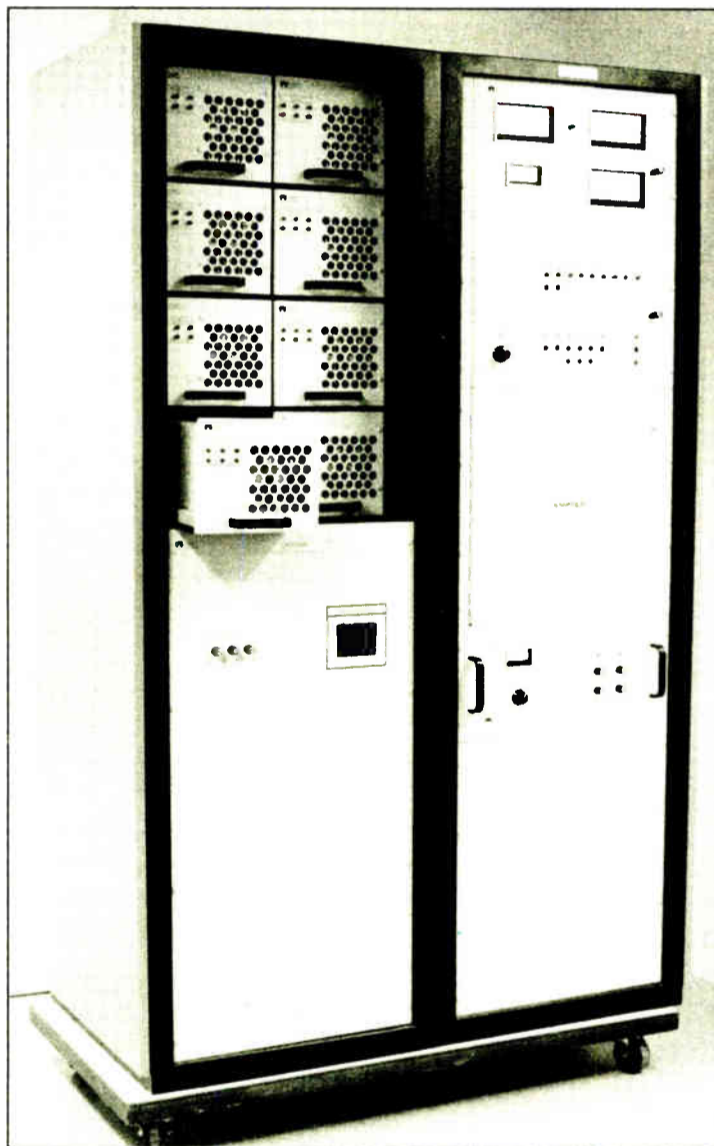
Using film

Belock and Whyte wanted better recordings for their new enterprise. To achieve it they chose to record on 35 mm magnetic film rather than tape. There were major advantages to this.

The substantial width of the film accommodated three channels, each of which was as wide as the standard quarter-inch recording tape. Running at 24 film frames per second, this format yielded stereo recordings in which the usual background noise was virtually inaudible. And, because the 35 mm mag used sprocket holes,

continued on page 58 ►

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



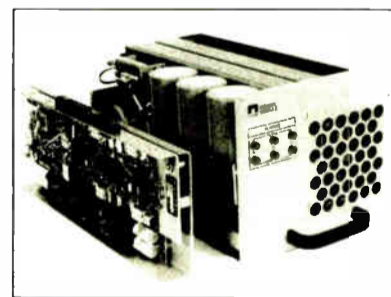
Totally solid state AMPFET ND 10 10kW AM

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

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

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

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



Removable AM Power Module

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



Nautel Maine Inc.
201 Target Industrial Circle
Bangor, Maine 04401 USA

Phone: (902) 823-2233

Nautel

(Nautel Electronic Laboratories Limited)
R.R. #1, Tantallon, Halifax County,
Nova Scotia, Canada B0J 3J0

Fax: (902) 823-3183


Circle (145) On Reader Service Card

World Radio History

Products & Services Showcase

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

The world's most capable, expandable digital satellite receiver



More and more networks are moving to Satcom C-5 digital. Why take a chance on a less expandable receiver?

We Repair & Rebuild all Popular Receivers Quick Service! 24 Hour Tech Support

Ariel
Used Equipment for All Satellite Formats LNA/LNB/Splitters

Zephyrus for JSA Zephyrus 700 SCPC
Visa/MC/Discover Leasing W.A.C.

Satellite Systems (719) 634-6319

READER SERVICE NO. 96

ANNOUNCING FOR FALL '94
THE ONLY ADJUSTABLE POP FILTER FOR RADIO



Variable Acoustic Compression™

"Aesthetically Excellent, Sonically Satisfying."
Human Numan, Z100 New York

"Well, your new design has certainly eclipsed the old. As soon as I saw one, I just had to put them everywhere! Not only is it better looking and less obtrusive visually, but it installs much easier. And they still cut the 'pops' without muffling the highs. Best of all for us, your new clip-in design lets the ZeeJoys pop their 'Popless's' screens in and out in a flash!"
David P. Reeves III, Chief Engineer, Z100 New York

Greatly reduces popping and sibilance
DJ's sound clearer and need less equalization
Washable and replaceable screens
Easily adjusts for each DJ
Protects your microphone


POPLESS
VOICE SCREENS
PO Box 1014
New Paltz, NY 12561

\$49 plus shipping

TOLL FREE (800) 252-1503
MONEY BACK GUARANTEE Call for FREE BROCHURE

READER SERVICE NO. 205

Excilbur Electronics
CD-1 Interface Amp



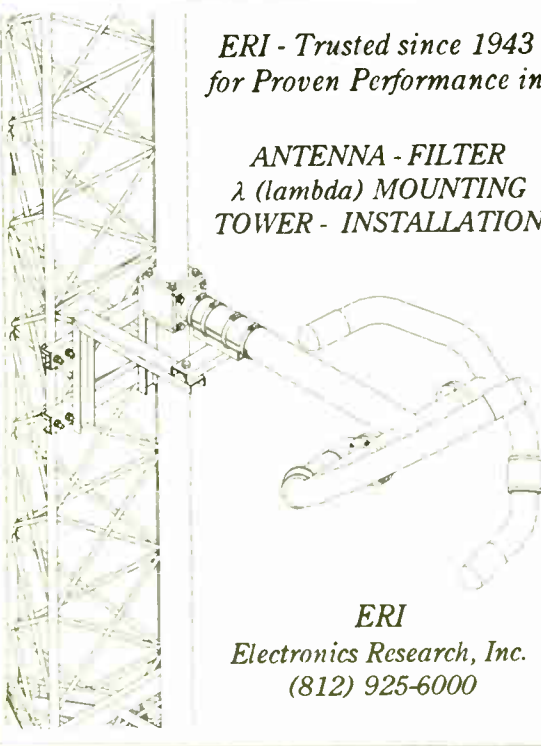
The industry's favorite unidirectional interface amplifier is designed to match IHF output standards (10kΩ unbalanced, -10dBV) to broadcast input standards (+4dBm, balanced). DC coupling, <0.006% THD & IMD, and >90dB S/N make the CD-1 appropriate for use with the highest quality CD players, as well as with monitor tuners, cassette and tape playback, DAT playback, and ENG equipment. Table-top mounting or, using the included angle brackets, may be attached to a rack panel, your cabinet, or anywhere convenient. A dual version, the CD-2, is also available.

EXCALIBUR ELECTRONICS, INC., CHANTILLY, VIRGINIA
Please circle our bingo number for a data sheet and a dealer list

READER SERVICE NO. 115

ERI - Trusted since 1943 for Proven Performance in

ANTENNA - FILTER
λ (lambda) MOUNTING
TOWER - INSTALLATION



ERI
Electronics Research, Inc.
(812) 925-6000

READER SERVICE NO. 89

"SR"

the original ANTENNA SYSTEM DESIGN SOFTWARE, already adopted by the CCIR, now available from ITALY!

- Multiple patterns comparison
- Up to 100 antennas each system
- Field strength forecast (rec.370 CCIR) up to 100 locations
- Tri-lingual operating (English, French, Spanish)
- Personalized outputs
- 450 antenna patterns already included
- New antenna patterns (amplitude & phase) can be generated
- MS-DOS PC
- 3" 1/2 HD diskette
- VGA screen

only **695 US\$** + shipping charges (credit cards accepted)

SEND YOUR PURCHASE ORDER TODAY BY FAX:
+ 39 - 2 - 90390475

ALDEN TELECOMUNICAZIONI ALDEN s.r.l.
20090 Cusago (MI) Via A.Volta 13
Tel.: + 39 - 2 - 90390461

READER SERVICE NO. 122

DIGITAL AUTOMATION SYSTEM

- The Best Integrated Play List Scheduler (Music & Breaks) & On-Air Playback Combination Available Today
- Music on Hard Disk and/or CD Jukeboxes
- Dolby AC2 Overlapping Hard Disk Audio

Pristine SYSTEMS INCORPORATED

- Feature Rich Digital Automation at an Affordable Price & Updated Quarterly
- Complete On-Line Redundancy
- Provide Your Own Computers/Players and Save \$\$\$, or Buy/Lease From Us
- Pays For Itself By Increased Productivity

WEST/INT'L **310/670-7500**
FAX 310/670-0133

EAST **803/370-2400**
FAX 803/370-2314

READER SERVICE NO. 176

ARE YOU LOOKING FOR A COST EFFECTIVE ALTERNATIVE TO MANUFACTURER SERVICE?

SERVICE, REPAIR & CALIBRATION

- STL's
- RPU's
- TSL's
- Exciters
- AM/FM Broadcast Monitors
- Remote Control Systems

SPECIALIZING IN EQUIPMENT BY

- Belar
- Marti
- Moseley
- McMartin
- TFT
- And others...

An authorized TFT service center

IN CASE OF EMERGENCY

We can help get you back on the air with our STL Loaner Program. We have STL's available that will be set to your frequency prior to shipping. We also provide over-the-phone technical assistance.



2198 Hubbard Lane, Grants Pass, OR 97527

(503) 471-2262

READER SERVICE NO. 18

AXS (Ax'-sess)... Jocks Love It!

AXS is an entirely new approach to digital audio controllers. It starts with superb audio using the premium quality apt-X™ system. AXS is easy to learn, easy to use, and powerful beyond words.

AXS is a modular design that begins as a simple cart replacement and grows to any combination of CD, hard disk, satellite or specialty programming with ease.

AXS has all the sophisticated feature options including device independent multi-channel background audio record and replay. Macro programming makes tough to run event sequences easy. Software drives a powerful programmable real time IOMAP.

Jocks love AXS: A fast 99 page, 28 button Jock F/X panel that can be time linked and remote wired is standard.

Use a software driven four-channel stereo audio switcher with on-screen control or the powerful eight-channel dual-buss routing switcher, or include both if you wish. AXS is controlled through a trackball, touchscreen, keyboard, buttonbox, telco or remote modem.

AXS Systems...


From \$6000.00 using your 486 computers and hard disks.

READER SERVICE NO. 52

AXS
The Management

800-334-7823 • 817-625-9761
FAX 817-624-9741

P.O. Box 1-36457 Fort Worth, TX 76136
1700+ Stations • Our 14th Year





Systems with Style

When KABC/KLOS decided to rebuild from the ground up, they called Pacific Recorders & Engineering to provide its expertise in studio systems planning and execution. After all, when you're dedicated to winning, you don't gamble with success. PR&E has a proven track record of building the world's leading broadcast facilities for over twenty years. This record translates into the uncommon depth and breadth of experience which we bring to each new project. From news to rock, talk, or full-service, we're comfortable and conversant with all formats.

When you see the attention to detail, the design elegance, and the fanatical commitment to quality, you quickly realize why PR&E consoles and studio systems are found in nearly every leading broadcast facility in the nation.

But what may really surprise you is how much money you can save by working with us. That's right, save money. You see, we design and build so many world-class studio systems, we avoid the "surprises" by having the details down to a science. Why don't you give us the opportunity to work with you on your next studio project? We think you'll be pleasantly surprised at how easy it is to realize the operational efficiency and benefits of a genuine PR&E system.



Pacific Recorders & Engineering Corporation
 2070 Las Palmas Drive, Carlsbad, CA 92009
 Tel: 619-438-3911 Fax: 619-438-9277 GSA: GS-03F-2057A

DESIGNS THAT MAKE THE DIFFERENCE

TUBES

Want To Sell

TUBES Broadcast Tetrodes

Mesh-Filament Performance

- Rock-Solid Tuning
• Low Distortion
• Low Noise
• Long Life
• 10,000 Hour Warranty

A Quality Manufacturer for over 50 Years ISO9001 accredited

EEV, Inc.

4 Westchester Plaza Elmsford, NY 10523 Fax: (914) 682 8922 Call: (800) 342 5338

Buy Factory Fresh New Tubes

- ✓ EIMAC, BURLE, SIEMENS, AMPEREX, NATIONAL, and more
✓ Off-the-shelf delivery
✓ 24-hour emergency service

Richardson Electronics, Ltd.

1-800-348-5580 FAX: (708) 208-2550

TURNTABLES

Want To Sell

Empire 909 E/X diamond cart, never used, \$20. G Finney, WPWB, 7137 Heather Lane, Macon GA 31206. 912-788-2124.

Harris/Gates CB1200, \$50 ea; BE/QRK, \$20; some preamps. D Morgan, KJYE, 1360 E Sherwood Dr, Grand Jct CO 81501. 303-241-9230.

Russco 720, 3 spd w/Micro-Trak arm and Shure cartridge, BO. B Clain, POB 51978, Indian Orchard MA 01151. 413-783-4626.

Technics SL1200, rarely used, \$325. K Thomas, Rebel Rec, 5555 Radio Lane, Jacksonville FL 32205. 904-388-7711.

Technics SP-15 turntable, good condition, w/ProBase, \$110.00. Call 806-372-5130.

ADVERTISER INDEX

This listing is provided for the convenience of our readers. Radio World assumes no liability for inaccuracy.

Table with 4 columns: Page No., Advertiser, Reader Service No., Page No., Advertiser, Reader Service No. Lists various companies and their page numbers.

Table listing staff roles and names: Publisher, Associate Publisher, Marketing Consultant, etc.

Advertising Sales Representatives

Table listing advertising sales representatives by region: U.S. East, U.S. West, Europe, Japan.

Free subscriptions are available upon request to professional broadcasting and audiovisual equipment users.

ACTION-GRAM

EQUIPMENT LISTINGS

Radio World's Broadcast Equipment Exchange provides a FREE listing service for radio stations and recording studios only.

Please print and include all information:

Form fields for contact information: Contact Name, Title, Company/Station, Address, City/State, Zip Code, Telephone.

I would like to receive or continue receiving Radio World FREE each month.

Signature and Date fields.

Please Circle only one entry for each category:

- I. Type of Firm: A. Commercial AM station, B. Commercial FM station, C. Educational FM station, D. Combination AM/FM station, E. Network/group owner, F. Recording Studio, G. TV station/teleprod facility, H. Consultant/ind engineer, I. Mfg. distributor or dealer, J. Other
II. Job Function: A. Ownership, B. General management, C. Engineering, D. Programming/production, G. Sales Manager, E. News operations, F. Other (specify)

Brokers, dealers, manufacturers and other organizations who are not legitimate end users can participate in the Broadcast Equipment Exchange on a paid basis.

Form for listing: WTS WTB Category, Make, Model, Brief Description, Price.

Form for listing: WTS WTB Category, Make, Model, Brief Description, Price.

*Closing for listings is every other Friday. Please be aware that it does take approximately 1 month for your listings to appear.

Broadcast Equipment Exchange

Phone: 703-998-7600 PO Box 1214, Falls Church, VA USA 22041 FAX: 703-998-2966

Radio World Broadcast Equipment Exchange advertisement with contact info for Simone Mullins.

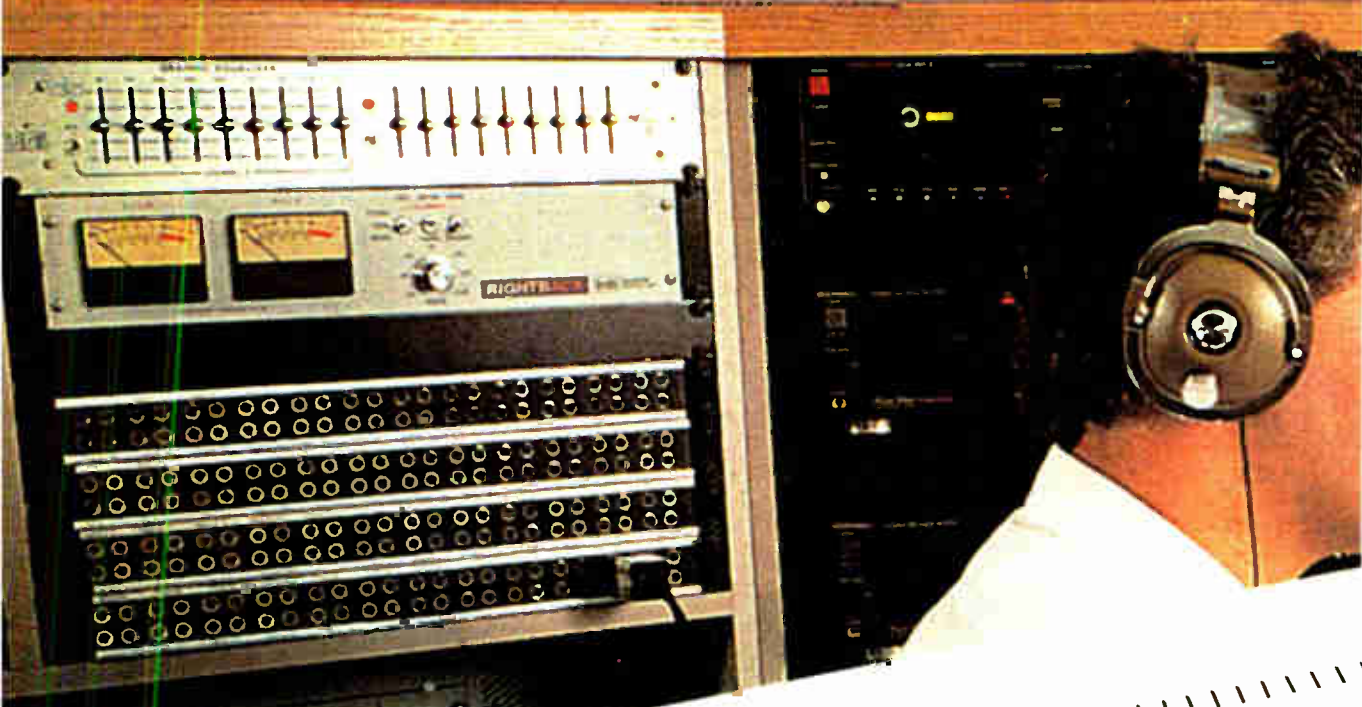
SUBSCRIPTION/READER SERVICE FORM

Form for Radio World subscription and reader service, including contact info and a grid of numbers.

Copy & Mail to: Radio World, PO Box 1214, Falls Church, VA 22041, or FAX to: 703-998-2966

AIRMASTER 90

**Very
Affordable.
Very
Reliable.**



The Sound Of Perfection

AUDITRONICS

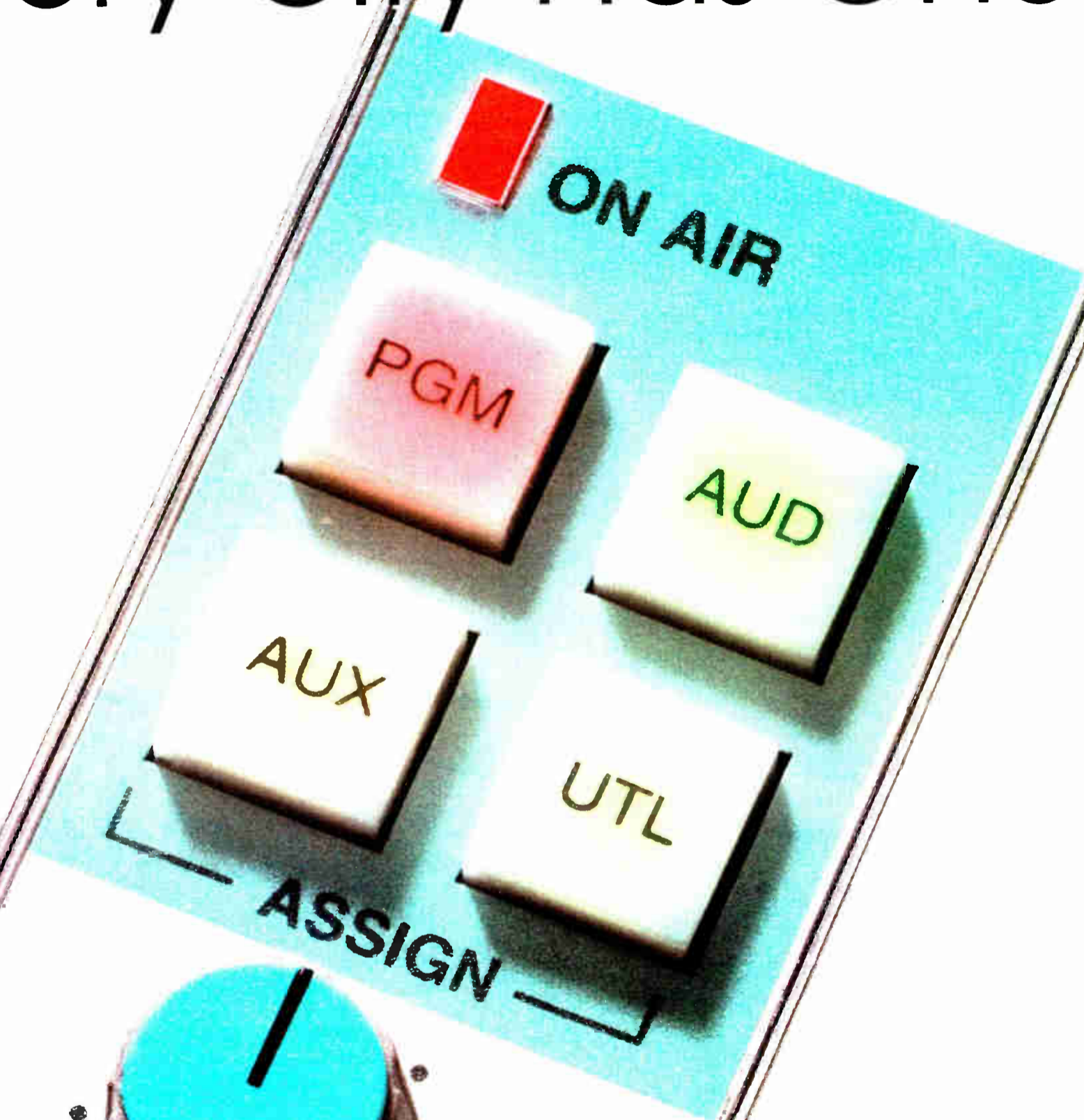
3750 Old Getwell Road, Memphis, TN 38118
901-362-1350, FAX: 901-365-8629

Circle (81) On Reader Service Card

The new AirMaster 90 specifications are compatible with digital technology. It uses superior thick-film hybrids. The AirMaster 90 has a user-programmable logic control system that utilizes a PIC microprocessor. Faders control precise stereo-balanced VCA's and push buttons are electronic with LED status indicators.

The AirMaster 90 has a TWO YEAR WARRANTY . . . after all, it has the highest possible reliability in the industry.

Every City Has One.



A Number One Station.

The A-6000 On-Air Console is for you.

 **Wheatstone[®] Corporation**

7305 Performance Drive, Syracuse, NY: 13212
(tel 315-452-5000 / fax 315-452-0160)

Circle (104) On Reader Service Card