

EPA Sets RFR Alternatives

by Edward Wytkind

Las Vegas NV ... The US Environmental Protection Agency (EPA) issued 12 June, for public comment, four alternatives for national radio frequency radiation (RFR) exposure standards. The guidelines range from roughly 1/10th the federally recognized American National Standards Institute (ANSI) exposure limit to having no standard at all.

This is the first action taken by a US government agency concerning the issue of controlling human exposure to RFR since the FCC adopted the ANSI standard 1 January 1986 as an "application processing guideline."

While the EPA claimed that "in excess of 99% of the American people are typically exposed to low levels of RF radiation that are not believed to be harmful," it added that it has been "concerned" about the health effects of exposure to "relatively high levels" of RFR for persons living or working in proximity to RFR-emitting facilities.

The EPA, through various site measurement surveys, has determined that "time-averaged" exposure calculations and distance from a broadcast tower are two key elements for determining whether possible hazards from short- or long-term exposure exist. Time-averaged exposure takes into account emission levels and the amount of time one is exposed continuously in an RF field.

After the EPA receives comments on the recommendations, it will submit one or several to the president, who will either reject the recommendation or approve it as an official federal guideline to be used by all related federal agencies.

A public hearing will be held in Washington, DC during the 90-day public comment period. At press time, neither a date nor location for the hearing had been announced.

The four levels

The EPA's recommended RFR levels are shown in Table 1.

The first alternative, equal to about 1/10 of ANSI, would affect about 4,215 broadcast sites and 56 non-broadcast sites. Cost of compliance to the broadcast industry is estimated by the EPA to be \$34 million.

Second, the EPA recommends a level equal to roughly 1/5th the ANSI standard, which is equal to Massachusetts' current public exposure standard. This exposure standard would

(continued on page 10)

Synch Xmtr CPs Awaited

by David Hughes

Washington ... The FCC said it has received several construction permit (CP) applications for experimental AM synchronous transmitter operations, with some plans calling for more than one additional synchronous transmitter.

The "six or so" applications are still pending Commission approval, according to FCC Engineer Gary Thayer. To date, only one application has been approved—for Laughlin Roughrider Broadcasting in Laughlin, Nev.

Following the release of its sweeping AM improvement report in April, the FCC said it may propose a rulemaking later this year to allow wider use of synchronous AM transmitters, which extend the signal coverage area by utilizing a second, closely coordinated transmitter on the same frequency.

Synchronous transmitters are widely used in Europe, but only have been used in a few isolated incidents in US broadcasting history.

Laughlin project

The Laughlin synchronous transmitter project is still being constructed, with a scheduled 20 July startup date, according to KROL VP Joe Reynolds. KROL is a new AM station located about 90 miles south of Las Vegas.

The 10-kW day, 1-kW night, AM facility on 870 kHz was theoretically able to

cover Las Vegas. But, Reynolds said, ground conductivity in the area was not as good as it was "on paper." The station therefore decided to utilize a synchronous transmitter.

Reynolds said that both transmission facilities feature three-tower directional arrays, but each has a different pattern.

The KROL slave transmitter, actually located in Henderson (near Las Vegas), will operate with 300 W days and 500 W nights.

Laughlin Roughrider President Tom Letizia said KROL will feature separate studio facilities at each transmitter site. Four microwave links will transmit programming between the two studio/transmitter facilities.

Often programming will be going "both ways" on the links; DJs will be located in both studios, he added.

Letizia said he has been contemplating the use of a synchronous transmitter since he began work on the radio project six years ago, when he discovered that the actual ground conductivity in the area was substantially less than what the FCC believed it was.

He added that he is working on a plan to expand KROL to a second synchronous operation, with the addition of another transmitter 500 miles to the northwest at Reno, which will require six microwave hops. "We want to become a statewide network," he explained.

"We have received lots of calls from

engineers at other AM stations around the country, even as far away as Hawaii, that are waiting to see how the KROL synchronous operation works before they apply for their own synchronous transmitters," Letizia said.

According to its experimental license, KROL must file a progress report to the Commission every six months.

KGNW

In another case, KGNW, a 5 kW operation on 1150 kHz in Seattle, Washington, has applied with the FCC to operate two low-power synchronous transmitters.

A circular 5 kW pattern cannot adequately cover the "long and narrow" Seattle market, according to KGNW CE/Operations Manager Richard Harris.

The station, he said, has applied for a 50 W transmitter at Everett, 30 miles north of Seattle, and for a 90 W facility at Tacoma, 30 miles south.

While the synchronous operations would improve KGNW's signal in both cities, the signal still will be on the weak side in between Seattle and the two cities, Harris added.

"We're keeping in touch with Laughlin Roughrider (KROL)," he said. "We just wanted to be in on the ground floor. It's a unique thing."

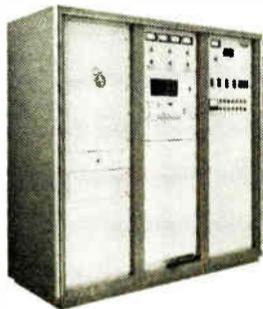
KOB situation

Officials at KOB-AM, Albuquerque, New Mexico, hope their synchronous transmitter plan will remedy a lapse in coverage brought about by being required to protect a New York station.

Ever since KOB, located on 770 kHz,

(continued on page 6)

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Regulatory News

FCC Clips

FM CP Notices

As of 16 June, the FCC started releasing public notices listing all commercial FM broadcast applications for construction permits (CPs) that have been received for filing.

The notices will contain the name of the applicant, an application reference number (including the date or receipt), the frequency, and the city and state.

According to the FCC, the notices are being issued "to inform the public concerning FM applications that have been received but not yet accepted for tender."

The Commission said it would also issue a notice if a commercial FM application is found not to be acceptable for tender.

For more information, call George Enuton at the FCC: 202-632-6908.

Record Keeping Changes

The Commission has modified its program record keeping requirements for commercial licensees.

The new rule, issued in May in response to an appellate court's remand, requires stations to list, each quarter, programs that have provided the most significant treatment of community issues during the period.

However, the FCC said that the new rule does not impose a requirement to maintain comprehensive public file lists. The Commission maintained that a comprehensive requirement "would place an inordinate record-keeping burden on licensees."

Docket number is BC 79-219. For more information, contact Freda Lippert Thyden at 202-632-7792.

FCC Office Moves

The FCC relocated its San Diego office 6 June. The new address is 4542 Ruffner St., Room 370, San Diego CA 92111-2216. The phone number remains 619-293-5478. Office hours are 8:30 AM to 4:30 PM.

NAB Daytimers, FCC Seek DST Solutions

by David Hughes

Washington DC ... The NAB's Daytimers Committee met with FCC Mass Media Bureau Chief James McKinney 9 June to discuss possible solutions to the loss of AM drive-time programming associated with the expansion of daylight savings time (DST) next year.

However, by RW's mid-June press time, neither McKinney nor Daytimers Committee Chairman David Palmer would reveal any specific solutions being discussed.

McKinney did say, however, that the daytimers committee was mindful of international agreements that place firm restrictions on the level of interference that would result from an increase in presunrise authority (PSA) power levels for daytimers.

Earlier, McKinney told the NAB that since the "laws of nature" and the "immutable laws of physics" govern radio wave propagation, there was little the FCC could do to change PSA levels.

Some daytimers have previously indicated that they would like to see a 50 W minimum power level be instituted for PSAs, while others favor a plan that would allow daytimers to increase to full power at a specific time, such as 6 AM, rather than at local sunrise.

McKinney said it was up to the daytimers committee to decide on a solution and propose it to the FCC. He said the Commission would then treat it as it treats any other rulemaking proposal.

"The situation is difficult to solve, but

it is not impossible," he said.

Palmer, of WATH/WTXQ, Athens, Ohio, said that, as of 18 June, the daytimers' group had scheduled more meetings in the next few days. "Many different things are being looked at," he said.

Many daytimers were upset about recent bills passed by both the Senate and the House that propose starting DST on the first Sunday in April, rather than the last Sunday of the month, thereby adding three weeks of later sunrises and sunsets.

The House bill would also extend DST one week beyond its traditional end on the last Sunday of October.

A Congressional conference committee was examining both bills and working out differences, according to the NAB. The final version must then be signed by the president to become law.

McKinney indicated that he expected presidential approval of the bill.

With the extra hour of darkness each morning in early and mid-April, daytimers fear they will suffer audience losses because they will not be allowed to broadcast at their full power level until sunrise, thereby missing out on an hour of revenue-generating time.

If DST is extended, daytimers will be forced to utilize their much lower PSA power levels for an hour of prime morning drive time instead of operating at full power. Many PSAs are below 50 W.

For more information, contact the NAB public affairs office at 202-429-5480.

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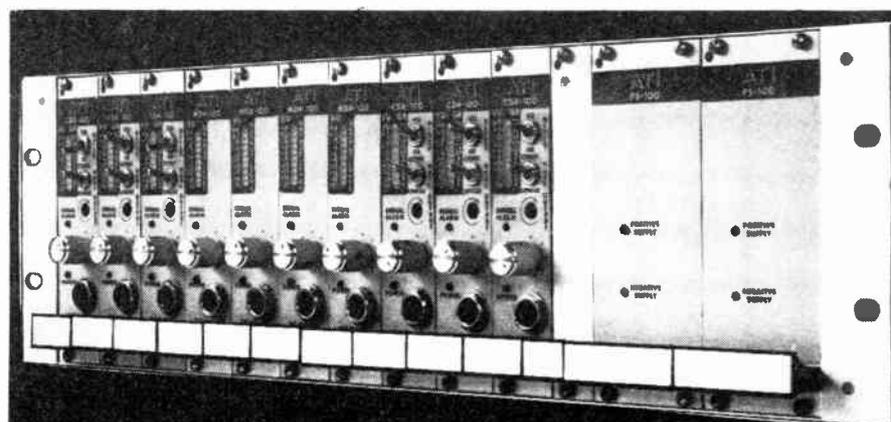
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Regulatory News

AJC: 'City of License' Outdated

by Edward Wytkind

Washington DC . . . The Arizona Justice Committee (AJC), an ad hoc group of 14 radio licensees, has petitioned the FCC to revise its rules requiring a station to maintain a main studio within the city limits of its community of license.

The petition, filed 10 June, also urges the Commission to eliminate rules mandating that the majority of a station's programming originate within the city of license.

The AJC's efforts to revise the FCC's rules were fueled in part by the increasing number of fines issued by the Commission this past year to stations found in violation of the city of license rules. In two recent cases, KDUK-FM, Florence, Ore., and WXTR-FM, La Plata, Md., were fined \$10,000 each.

Current FCC rules, which were formed to ensure that the local community has access to a station's main studio, require that the main studio be located in the city of license, according to Charles Kelly, enforcement division chief of the FCC Mass Media Bureau.

However, AJC representatives maintain that "the current standards regarding main studio location and program origination are outdated, unnecessary and contrary to providing the best radio service to the listening public."

Greg Skall, of Baker & Hostetler, Washington, DC and AJC legal counsel, said the FCC's rules are "outdated" because the delivery of quality local programming is no longer dependent on whether the main studio is located within the city of license. He added that the FCC's rules were adopted prior to the

emergence of high quality remote equipment.

Offered as an alternative, the AJC said that stations should only have to "maintain" an office that is accessible to the community, and should be allowed to operate a studio anywhere within its prescribed "service area."

AJC members include Beasley Broadcast, Capitol Broadcasting, Communications Enterprises, Dick Broadcasting Co., Fuller-Jeffrey Group, Hicks Communications, Joyner Broadcasting Co., Key-market Communications, Metroplex Communications, Sconnix Broadcasting Co., Swanson Broadcasting, Twin Cities Broadcasting, Westcom, Ltd. and WHAL/WYCQ, Shelbyville, Tenn.

Violations cited

According to Kelly, "A number of stations haven't seen fit to build their studio in the city of license . . . even those who have been granted an 'Arizona Waiver.'"

An "Arizona Waiver" of the rules is granted to stations that agree to provide "at least 51%" of public affairs and news programming from within its city of license, Kelly explained.

In return, the FCC, in its calculation of whether the community of license rule is being complied with, will not count nonrecorded music programming, which at some stations represents a large percentage of programming, he said. A station, however, must still maintain a studio in the city of license.

A station operating without an Arizona Waiver, Kelly added, would have to provide a majority of "all its programming" from within its city of license.

A recent case in which a station was

cited for violating the city of license rules involves KDUK, which, according to Kelly, "never proceeded to build a studio in Florence—its city of license." Instead, the station built a studio in Eugene and "essentially was a non-factor in Florence, except for a telephone answering service," he said.

KDUK, which was operating under an Arizona Waiver, was found in violation of the rules, and the FCC enforcement division fined the station for a "proposed \$10,000," said Kelly, who pointed out that the fine had not been "officially levied."

Kelly added that "KDUK not only failed to maintain a main studio in the city of license," but apparently originated all its programming from outside its city of license.

KDUK officials could not be reached for comment.

In another case, Dalton Group, Inc.-owned WXTR, under "inaccurate legal counsel," operated from April 1985 to

April 1986 as if it had been granted an Arizona Waiver of the rules without ever officially filing for one with the Commission, according to station President William Dalton.

As such, FCC enforcement fined the station \$10,000 because it was licensed to the city of La Plata, Md. (30 miles outside of Washington, DC), but it operated its studio in Marlow Heights, Md., which is 10 miles from the city.

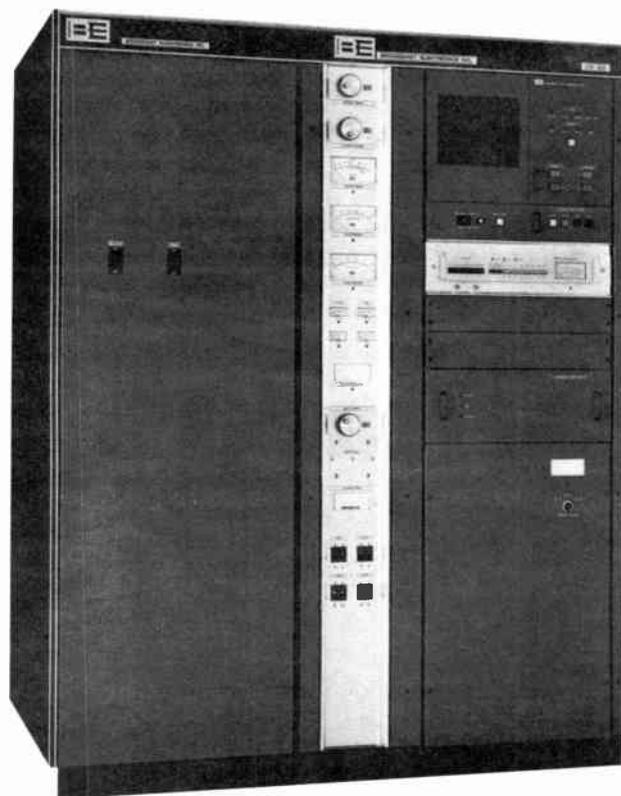
In addition, WXTR provided more than 50% of its "non-entertainment" programming from La Plata, but its non-recorded entertainment programming was delivered from its Marlow Heights "auxiliary" studio, which would have been legal had the station been operating with an Arizona Waiver, Dalton explained.

"Since it was our legal counsel's error," he added, the law firm (name not disclosed) has appealed the fine, but has agreed to pay whatever fine is levied.

(continued on page 7)

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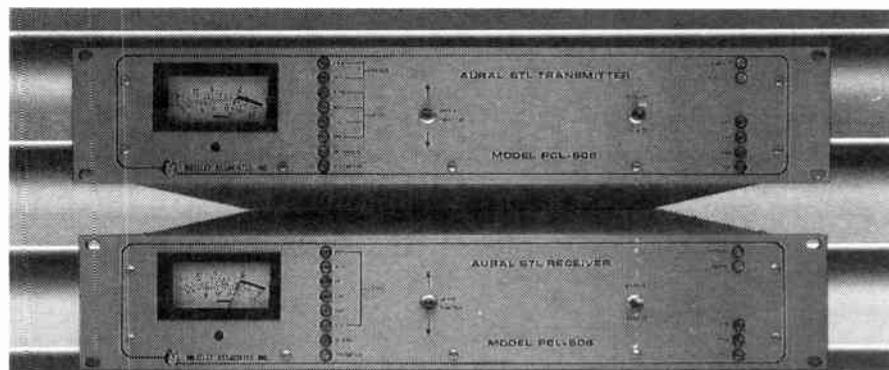
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Shortwave Making Gains In US

by David Hughes

Washington DC ... Shortwave radio is riding a new wave of interest in some segments of the broadcasting community, fueled by a recent number of new US stations signing on, with plans for still more.

One ambitious project is a station called "NDXE," with which founder H. Dickson Norman plans to beam an international entertainment service to the world in stereo. Plans call for broadcasts to Canada, Central and South America, and Europe.

Norman is not alone in his interest in starting a private, shortwave station—one not government sponsored. In the past few years, a number of private shortwave stations have signed on in the US, including WHRI, based in South Bend, Ind. and KCBI, Dallas, Tex.

Several other new stations are being planned. Besides NDXE in Opelika, Ala., plans are in the works for WMLK, Bethel, Penn., KVOH, Rancho Simi, Calif., KRSP, Salt Lake City, Ut., and a Christian Science Monitor station in Maine.

These, and other new stations, will join the handful of US private shortwave broadcasters already on the air, such as WYFR, which operates the religious "Family Radio" in nine languages from 10 transmitters in Okeechobee, Fla.

Other existing private stations include KGEI, Redwood City, Calif., WRNO, New Orleans, La., and WINB, Red Lion, Penn. Still more shortwave broadcasters operate outside the 48-contiguous states—from Alaska (KNLS), Guam (KTWR), and the Mariana Islands (KFBS, KYOI).

Norman, founder and chairman of "NDXE," plans to feature "state-of-the-

art" audio processing, in addition to stereo, when he starts up his Alabama shortwave station this fall.

Reasons for growth

He credits the growth in the number of private shortwave stations in the US to the assumption that shortwave is the



only cost-effective form of global communications. "It's the most efficient form of broadcasting to reach a large number of people."

Norman said NDXE will feature the latest in technical equipment, including an antenna that rotates in a 360° azimuth to serve a variety of target areas. Plans call for two 100 kW transmitters to be installed this year, with two 500 kW units to be installed in the future.

He also plans to utilize the Kahn/Hazeltine ISB AM stereo system, despite the lack of shortwave stereo receivers on the market.

Norman said he is still "answering questions" from the FCC, which is attempting to determine whether Norman needs rule waivers to broadcast in stereo.

"I chose the Kahn/Hazeltine system because it's the only one that will work in HF (high frequency) without platform motion," Norman said.

However, some shortwave experts have questioned the utility of stereo shortwave broadcasts. Unlike the AM band, shortwave is subject to severe fading and interference, which contributes

to bandwidth restrictions.

However, Norman said, "We want to experiment to see what listeners want."

He said he hopes that, with the recent movement to extend the AM broadcast band to 1705 kHz, receiver manufacturers will also see fit to produce consumer oriented all-frequency radios (everything below 30 MHz) similar to those used by shortwave hobbyists.

Sony is "looking into" making a stereo shortwave radio, he said. Even if receivers are not available, listeners can tune in ISB stereo shortwave broadcasts by using two radios—one tuned slightly above and the other tuned slightly below the frequency.

Start-up problems

Norman has had his share of problems with NDXE's start-up, and has had to delay its sign-on several times. Since 1985 he had planned to sign on 4 July 1986 with "President Reagan (throwing) the first switch." Now he has his sights set

Senate Votes Dennis To FCC Appointment

Washington DC ... Patricia Diaz Dennis was confirmed by the Senate 13 June to become the newest FCC commissioner.

The unanimous vote by the full Senate followed a Senate Commerce Committee mark-up in early June. At press time, President Reagan had to approve the Senate action, which was seen as a certainty since he nominated her.

Vice President George Bush was scheduled to administer Dennis the oath

on 15 October.

The main problem has been getting a transmitter, he maintains.

The Voice of America, the international broadcasting arm of the US government and one of the world's largest shortwave broadcasters, is in the midst of a massive equipment upgrade program, Norman said, thereby tying up the two main shortwave transmitter manufacturers—Harris and Continental.

Equipment delays are compounded by the fact that shortwave transmitters are "made to order—they are not off-the-shelf equipment," he said.

When NDXE signs on it will feature a Continental transmitter that produces an ERP of 3 MW, he said.

A dispute with a local Alabama power utility has also slowed his plans, Norman added.

Norman has also been busy promoting the station. A full-color ad in the *World Radio and TV Handbook* indicates that NDXE will have a wide variety of programming, ranging from news, sports and talk shows, to "all types of music."

For more information, contact H. Dickson Norman at 205-749-1898.

of office on 25 June. When sworn in, she will become the fifth commissioner. Her term will expire in June 1989.

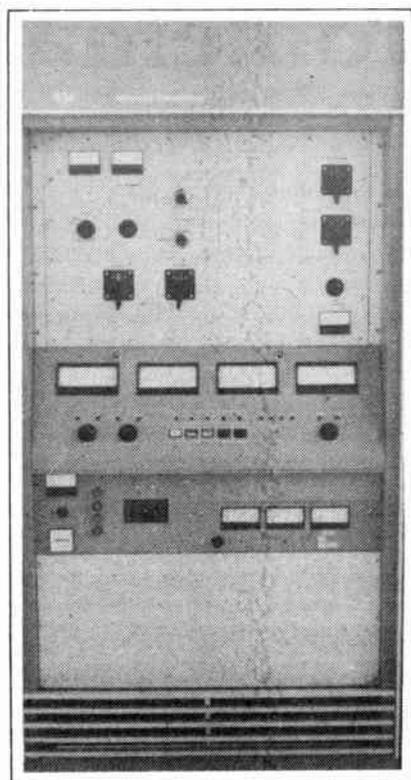
Dennis, 39, was nominated to serve the remainder of the term held by Henry Rivera, a Democrat, who resigned his commission post late last year.

Dennis, also a Democrat, has been a member of the National Labor Relations Board since 1983, and previous to that was a labor relations and legal affairs attorney at ABC.

In related news, FCC Chairman Mark Fowler announced that he will serve another term with the Commission. His first term was to officially expire 30 June.

President Reagan, reportedly very pleased with the Commission's recent deregulation efforts, has officially renominated Fowler. However the Senate must still hold confirmation hearings and vote on the renomination.

For more information on Dennis' nomination, contact Macky Ayers at 202-224-1251 or Dale Brown at 202-224-8144 (Senate Commerce Committee). For more information on Dennis or Fowler, contact the FCC's news media office at 202-254-7674.



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AM stereo bandwidth

Dear RW:

In all the discussion on AM stereo and its technical problems, the subject of bandwidth is often discussed. However, I have never seen either of two things: the actual bandwidth required or a graphic spectrum analysis.

When the Harris system was still in contention, one of its big selling points was that it required the least amount of spectrum space.

I pressed a Harris salesman into telling me that it required about 30 kHz, while the "others" require up to 90 kHz of spectrum. Considering that the old FCC proof of performance only required an audio proof up to 7.5 kHz frequency response (or 15 kHz of spectrum), AM stereo requires an enormous increase in bandwidth.

Since the beginning of FM stereo, a graphic analysis of its spectrum has been available depicting the L, R, L+R, L-R, pilot and 38 kHz injection. Has such an analysis ever been done on the AM stereo method? I have sure it would help us visualize what is happening in order to address bandwidth problems in the transmitter, phaser, antenna tuners and antennas.

Surely the change in resistance and reactance above and below the carrier frequency has effects on the stereo signal. FCC rule 73.54 requires that resistance and reactance be measured up to 25 kHz above and below the carrier, but if the stereo system actually requires as

much as 90 kHz, shouldn't these measurements be made at least to include this?

Nondirectional stations are required to do these measurements on the antenna only, while the rules completely ignore the ATU input impedance. The standard procedure has been to do the ± 25 kHz "sweep" on the antenna, then tune the ATU on carrier and assume that it has no effect on the sidebands.

This has always amazed me, because a tee network is to some degree a band-pass filter, rolling off the sidebands to a greater or lesser amount and not always symmetrically.

When you combine the bandpass of the output network of the transmitter, the ATU and the antenna, narrow bandwidths of curious shape often evolve. Multiple antennas and phasers further compound the problem.

How about hearing from some smart guys who can put together the information for an article, including graphic illustrations? Spectrum analyzers are available to allow the photographing of actual signals at the different stages of the RF output. Then they can draw some pictures depicting where the various components of the AM stereo signal are located with their amplitudes.

Going to AM stereo involves much more than just installing the stereo generator and audio equipment. What trav-

(continued on page 6)

Testing is underway on the jointly designed CBS Technology Center/NAB FMX transmission system. The tests include a number of volunteer stations working with CBS, with others soon to begin testing with other companies having active interests in developing FMX.

From the onset, FMX has been openly discussed. Test results on FMX have been made public, and criticisms/queries on its limitations have been addressed.

The FMX story parallels the developments in synchronous transmitter use. Though an old technology being put to new uses, the open testing of synchronous transmitters on existing stations under actual conditions in order to solve real problems can only make for better radio.

One reason both of these technologies have a chance to survive and find acceptance in the broadcast community is because of this candid, open discussion of the applications of each technology, along with a full viewing of the benefits and drawbacks involved.

Demand An Open Forum

Compare this willingness to air the issues with the AM stereo situation. More resembling guerrilla warfare than promotion of a technical development for the industry, the AM stereo marketplace approach has been characterized by everything except an open forum in which the industry could discuss and compare the facts about the competing systems.

The outcome of the Delco tests is one thing; the unwillingness, hesitation or outright fear to discuss measurements they have taken by stations which have had the opportunity to compare systems is lamentable.

However, any broadcaster has the right to test and make public the results of system tests which will help him/her choose the best transmission system for the station. In light of the FCC's current testing of both remaining systems for out-of-channel violations, there is no reason for broadcasters not to make public, either to the FCC or to the press, their experiences with either or both systems.

Choosing a transmission system based on the number of receivers out there is a valid approach based on economics; but a report on a series of side-by-side tests by independent observers would best serve the technical side of the industry. Hopefully the FCC will make public the results of its current testing, and stations who have conducted tests will make them available to any interested party.

—RW

Public Perception Problematic

by Barry D. Umansky

Washington DC . . . We in the information and communications industries have a problem—a perception problem. The public believes that this invisible, colorless, odorless, tasteless entity we call radio frequency radiation, or nonionizing electromagnetic energy, is a hazard to its health and safety.

To borrow a 'Pogo-ism,' from the '60s comic strip, "we have met the enemy and the enemy is us." The public's misperception resulted from our own complacency. For too long, we were idle while the half-truth, myths and inaccuracies about electromagnetic energy flourished.

Now, the "uninformed" are becoming more vocal and adopting a more activist stance. It is time to get to work to ensure that the uninformed do not set policy.

Local citizens groups, zoning boards

Barry D. Umansky is Deputy General Counsel of the National Association of Broadcasters, and President of the Electromagnetic Energy Policy Alliance. Call him at 202-429-5456.

and city, county and state governments have begun to raise barriers to the expansion and construction of new equipment, and the utilization of new technology. In the absence of federal guidance, they have begun to examine methods of regulation to answer the growing public demands for protection of health and safety.

Guest Editorial

Because of a lack of federal direction, many community, city, county and state governments are considering, and may soon enact or promulgate, their own standards and regulations. The result spells chaos for information or communications firms that must operate across jurisdictional boundaries.

No one questions a citizen's or local government's concern for health and safety. But public concern about electromagnetic energy persists in light of overwhelming evidence which indicates that, within current standards, there is little cause for concern. Yet public distrust of

these new technologies is growing.

We have several avenues open to us to turn this growing opposition around:

(1) We must educate the public about EM energy. We must correct the inaccuracies and debunk the myths. Seminars, dissemination of fact sheets, provision of technical studies and reports, and the production of public radio and television programs on EM issues can help our effort.

(2) We must contribute to research to add to the body of knowledge regarding the bioeffects of nonionizing electromagnetic energy.

(3) We must actively advocate rational federal standards to govern the production and use of EM energy. And we should support federal preemptive action over state and local standards and regulations which conflict with federal policy goals.

With regard to federal preemption, the National Association of Broadcasters (NAB) recently filed a petition with the Federal Communications Commission (FCC) seeking a policy statement through which the Commission could ex-

(continued on page 6)

Radio World

Vol 10 July 15, 1986 No 14



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Free subscriptions are available to professional broadcasting and audiovisual equipment users. For address changes, send current and new address to RW a month in advance at the above address. Unsolicited manuscripts are welcomed for review; send to the attention of the appropriate editor.

More RW Letters

(continued from page 5)

els through the RF system and radiates from the antenna is enormously important to the end result. We need all the information we can get to get the best performance from the station.

Ron Nott, Pres.
Cortana Corporation
Farmington, NM

Hallicrafters, anyone?

Dear RW:

I have come into the possession of an old Hallicrafters receiver, which I would like to restore to working order. Unfortunately, I have been unable to locate a schematic for this unit.

Recently, I happened upon a gentleman who was a short radio operator. He suggested I contact you with this problem, as you might be able to help me. I would appreciate any suggestions you would have on restoring the unit.

- Make: Hallicrafters Ultra-high Frequency, Communications Receiver;
- Model: S-36A;
- Licensed by Hazeltine Corporation.

The unit is missing a few knobs and tubes, so any information regarding replacement parts would be greatly appreciated.

ciated. Kindly forward all information to:

Bruce Tolbert
4627 Sansom St.
Philadelphia, PA 19139

Tubular request

Dear RW:

I am looking for a tube rebuilding service that services 4CX1000A tubes.

Econoco—a tube rebuilding service—says they do not rebuild our type of tube.

Would you or your readers know if an outfit exists that performs this service? Thank you for your time.

Steve Tuzeneu, Asst. Eng.
WIHS, Box 117
Middletown, CT 06457
203-346-3846

Orban clarification

Dear RW:

There was a minor error in your otherwise excellent NAB Convention report on FMX (RW 15 May).

It stated that, "Orban offers a separate FMX Chassis to be interfaced with any existing OPTIMOD or other processor retrofitted to accept FMX." In fact, OPTIMOD-FMX will interface, without modification, with any audio processor offering adequate lowpass filtering and preemphasis.

Howard Mullinack, Mktng/Sales Mgr
Broadcast Products
Orban Assoc. Inc.
San Francisco

RFR Badly Perceived

(continued from page 5)

ercise preemptive powers over conflicting state and local standards and regulations. The FCC has asked for public comment on the NAB petition by 1 August 1986.

Through industry support for the NAB petition, we are given an opportunity to tell the Commission of situations where state and local authorities have delayed construction or expansion of your federally licensed facilities, or have enacted regulations which conflict with federal standards or which have frustrated federal policy of providing unfettered interstate communications services.

By filing comments and supporting the NAB petition, you can urge the Commission to solve a problem that other-

wise, sooner or later, will face each and every communications firm.

Much industry effort has also been provided by such groups as the Washington, DC-based Electromagnetic Energy Policy Alliance (EEPA), which recently held a two-day symposium in Washington to discuss these EM issues.

Get involved; the industry needs your help. Contribute your time and resources—individually or through industry associations—to educate the public, to research the facts and to advocate national policies that will permit us all to continue to provide our services and to develop our technology within the bounds of accurate, rational, scientifically based information.

Synch Xmtr CPs Awaited

(continued from page 1)

lost a court battle in 1985 with WABC, the unrestricted New York City 50 kW clear channel facility, KOB had to change its nighttime pattern to further protect WABC, according to GM Arthur Schreiber.

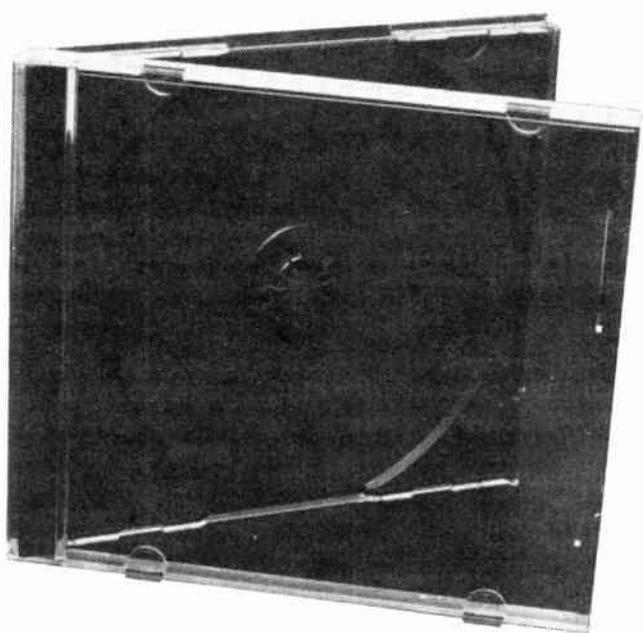
The pattern change most affected listeners in Santa Fe, about 65 miles north-east of Albuquerque. While they could still receive KOB during the daytime, listeners complained that the signal was very weak at night, he said.

In order to restore its coverage in Santa Fe, Schreiber applied for a synchronous transmitter to be operated at night with 190 W.

KOB CE Gary Diamond said he hoped to have the new transmitter on the air by mid-summer, pending FCC approval. However, he said the synchronous operation will cause a "narrow band of interference" with the main transmission in a small zone south of Santa Fe.

For more information, contact Gary Thayer at the FCC: 202-632-7010.

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Madison Seminar Shaping Up

by Edward Wytkind

Madison WI . . . Expecting close to 300 attendees at the University of Wisconsin Broadcast Engineering Seminar 15 to 18 September, seminar director Don Borchert announced in June that all 72 equipment booths are "verbally booked."

Last year's conference drew 130 managers/engineers to the first-day management session, while 240 attended the three-day engineering event—a 10% growth in attendance, according to Borchert.

Borchert said he expects this year's conference to continue the marked growth the symposium has shown over the past few years.

"We can handle about 150 more attendees than we had last year," he said. "We're excited for what has turned out to be quite a group of speakers for what is a relatively small conference."

Session topics will include RF radiation exposure and measurement techniques, contract engineering, CD technology, solid state transmitters, SCAs, broadcast studio acoustics, digital studios, the impact of international agreements and more.

In addition, the seminar will again offer the popular "nuts and bolts" session, an FCC forum and several management sessions.

According to comments from last year's attendees, the "nuts and bolts" session provided a much needed forum for engineers to share their ideas and gripes regarding industry trends and issues.

Madison not a convention

Attendees at last year's symposium voiced a great deal of concern about what affects the Society of Broadcast

Engineers (SBE) first national convention, which is scheduled for October in St. Louis, will have on the Madison attendance.

"Madison is different from SBE . . . We're a technical conference, not a convention," Borchert said. He added that the seminar attracts a large group of loyal attendees.

Despite the differences between the two events, several engineers were angered by the SBE's convention announcement because it may force engineers with limited budgets to choose between the two.

To date, both Borchert and SBE officials have reported strong booth

sales.

Among the several presentations scheduled for the first-day management session, John Cummuta, GM of WCFL, Chicago, will give a talk titled "Modern Management Techniques."

Other participants in the management session will include H. Richard Hiner, director of Navy Broadcasting, Washington DC, and Jim Loupas, president of Houston, TX-based James Loupas Broadcasting.

Scheduled engineering session speakers and topics include: Sound Engineering Associates President Jim Brown with a discussion of life after the TV stereo revolution; a talk on RF and microwave

radiation by Holaday Industries VP Burton Gran; Mike Connell of Quantel on "tomorrow's" digital studio; ABES President Wallace Johnson discussing international agreements; and three FCC representatives, who will roleplay a "mock inspection" and lead the FCC Forum on Tuesday night.

Other speakers and topics include: Mark Persons/contract engineering; Straight Wire Audio President Bill Sacks/CD technology; Modulation Sciences President Eric Small/SCAs; Consulting Engineer Don Markley/antenna design and new RF radiation standards; and Hubbard Broadcasting Direc-

(continued on page 8)

AJC: 'City of License' Idea Outdated

(continued from page 3)

The FCC granted WXTR an Arizona Waiver last April.

"These rules are outdated. It doesn't make sense for a (Washington) DC suburban station to have to operate a studio so far from the metro area, which is our major coverage area," Dalton said.

"Our obligation is to serve the entire coverage area, not just the city of license," he added.

"No quarrel with principles"

"We have no quarrels with the principles of the FCC's rules, which are to maintain quality service to the local public," Skall said.

"But with today's technology, the issue of the (originating) location or type of transmission line isn't really relevant to the quality of programming," Skall said. "There's no logical connection."

The AJC also pointed out that when

the rules were originally adopted (in 1950), "high-quality tape recorders were not available . . . and now, radio stations can bring the studio to any location with high fidelity audio recorders."

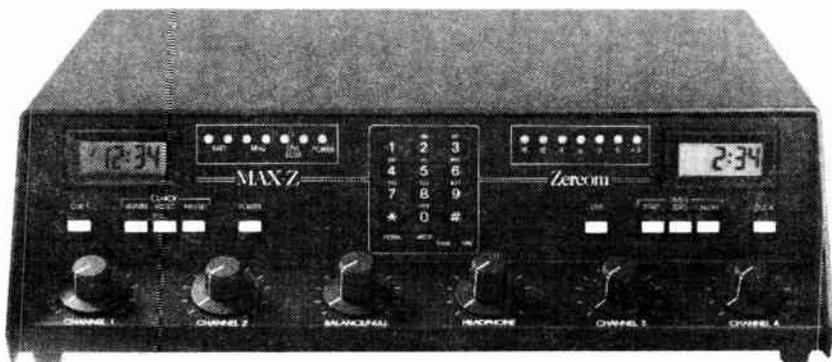
In the petition, AJC also argues that, "Continuation of these rules imposes significant opportunity and out-of-pocket economic costs on some radio licensees and represents an unnecessary intrusion by government on small business activity."

NAB legal counsel Barry Umansky said the NAB Radio Board's position is that the FCC should explore the issue "to afford greater flexibility to radio stations."

"Ensuring the delivery of quality public programming is no longer dependent on maintaining locally based hardware," Umansky maintained.

For more information, contact the FCC Enforcement Division at 202-632-6968, or call AJC legal counsel Greg Skall at 202-861-1500.

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FMX Tests Continue at WLTW

by David Hughes

Stamford CT . . . While tests of the FMX FM stereo coverage extension system are underway at a New York City station, similar plans for testing have been called off in Boston.

FMX tests are now taking place at WLTW, the Viacom-owned adult contemporary station in New York City, according to FMX co-developer Emil Torick, VP/audio technology of the CBS Technology Center, Stamford, Connecticut.

FMX tests had been scheduled for WZFM, in nearby Briarcliff Manor, NY, but since it shares the same CE as does WLTW, the test location was switched.

Tests at WGBH, a classical music formatted station in Boston, have been "set aside indefinitely," Torick added. The WGBH tests, which began in February, ran into snags when RF interference was noted in the prototype FMX equipment.

Torick maintained that the problem is "not FMX related." He said that because WGBH runs 100 kW and has a "short stick," RF interference affected a proto-

type FMX generator—supplied by CBS Technology Center—which was "not hardened for that environment."

He said WGBH will be able to use standard production FMX gear once it is on the market. Such gear would be less susceptible to RF interference when placed close to the transmission facility, he added.

Classical music station WFMT, Chicago, temporarily ran an FMX test during the Consumer Electronics Show (CES) in early June. Torick said the station acted as a signal source for NAD Electronics, which displayed FMX receivers on the show floor.

Other FMX news originating from the CES show included an announcement that Sprague Electronics is developing an FMX chip that will allow mass production of FMX receivers. Availability is set for early 1987.

Torick added that Tandberg privately displayed an FMX receiver at the CES show, and hinted that a Japanese manufacturer is also developing an FMX receiver.

"We've offered the technology to

about 30 receiver manufacturers," said Torick, adding that many companies will wait for FMX chip production.

A limited number of receivers will also be on store shelves this year. NAD said it plans to have its new Model 4300 FMX tuner on retail shelves this summer.

More station tests are being planned, according to Torick. Tests are scheduled at KMZK, in suburban Phoenix, Arizona in conjunction with Circuit Research Labs (CRL), and at an unnamed San

Francisco station with Orban Associates. Apex Systems has also said it will start testing its FMX generator with KIIS, Los Angeles.

Tests are still being conducted at the original FMX test site, public radio station WPKT, Bridgeport, Connecticut, Torick said.

The FMX system allows listeners in the fringe areas of an FM station's coverage area to receive a clean FM stereo signal without the hiss that normally accompanies such distant, weak signals.

For more information on FMX, contact the CBS Technology Center at 203-327-2000.

Madison Seminar Lines Up Respected Speakers

(continued from page 7)

tor of Technical Development Mark Durenberger/The "Great Idea" Give-away.

Exhibit floor

Major firms booked to show equipment this year at Madison include: Sony; Panasonic; Harris; Nautel; Fidelipac; Modulation Sciences; 3M/ITC; Ampex; Allied Broadcast Equipment; Quantel; Amperex; Tektronix; Full Compass Systems; Broadcast Audio Corporation; Bradley Broadcast Sales and ADC.

Borchert said that companies that provide session speakers are granted one free

booth space.

Although last year's exhibitors generally did not perceive the Madison symposium exhibit area as a "buyers' arena," some called the event a "mini-NAB," and said the atmosphere is conducive to technical discussions at the booths.

One exhibitor characterized the seminar as a key place for a company to "plant the seed" for future sales at larger conventions.

For further conference information, contact Don Borchert at the University of Wisconsin-Extension, 821 University Ave., Madison WI 53708, or call 608-263-2157.

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3D'er Calls When Carrier Down

by Joe Davis

Fairfax VA ... I have enjoyed reading about all the do-it-yourself telephone/cart auto-answering devices over the last few months in RW. Here at B-106, I have incorporated a number of them in our telephone system. I'd like to share one of mine, with a twist—it calls me instead of answering a phone line.

Upstairs, in the telephone closet amongst dozens of punch blocks and miles of telephone station wire, there sit two ITC triple-decker cart machines.

The 3-D number one, deck one, performs night-answer duty for our business line.

Deck two contains a brief recording to which the receptionist may connect callers who dial the business number trying to request a song ("You have called our business line! The request number is 691-1067! You idiot!" etc.).

The third hole on the first 3-D has information and directions to the station for our contest winners. This triple-decker uses an optoisolator scheme for telco ring voltage detection, which has worked fine.

The second 3-D machine uses the tried-and-true capacitor and relay method to fire the carts from the telco. Slots number one and two answer our concert information lines.

I was finally out of things to put on an answering machine, but there was still an empty slot in the second 3-D. Then I had an idea.

I recorded a series of touch-tones

Joe Davis is CE at WBMW-FM, Fairfax, VA. He can be reached at 703-691-1900.

from a telephone onto a cart. I put this cart in the last slot and stuck a coupler between the audio output and the second concert line. I played the cart and, bingo!

A minute or so later, my digital beeper was going off and it displayed the digits I had recorded.

Big deal? The remote cart start was connected to the carrier-fail relay on a

tuner we have. Now, whenever the station's carrier goes down, I know about it in very short order.

Whenever the "carrier fail" cart is started, a relay connected to the machine's start light moves the second concert line from deck number two to three.

The phone coupler is connected through deck number three's EOM normal-closed relay contacts. An EOM

tone recorded prior to the touch tones will hang up on anyone who may have been on the concert line to ensure a dial tone.

A couple of variations: The cart can have a voice message on it and call a voice-type pager or your home. Or, using the EOM to hang up, it can call as many different numbers as you can put on a cart.

RADIO Classics

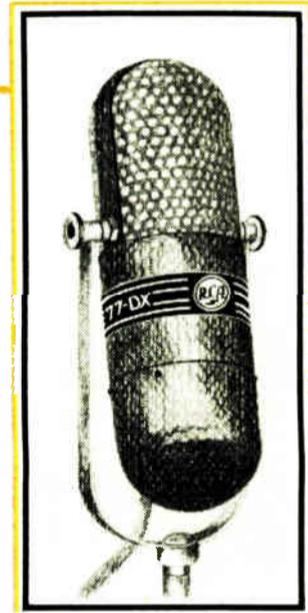
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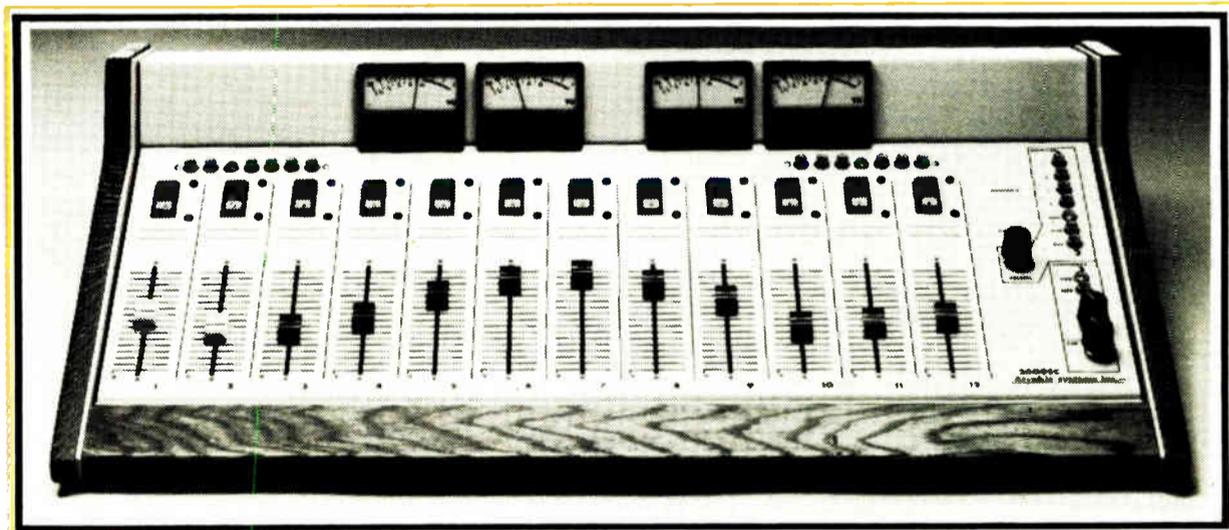


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Circle Reader Service 37 on Page 31

Circle Reader Service 27 on Page 31

EPA Issues 4 RFR Standards

(continued from page 1)

affect about 1,816 broadcast sites and less than 56 nonbroadcast sites, and would cost the broadcast industry an estimated \$22.7 million, according to the EPA.

The third, and least stringent, recommended exposure level is equal to the ANSI standard, or 0.4 W/kg. This exposure level would cost the broadcast industry about \$12.4 million, and would affect an estimated 1,136 broadcast sites and less than 56 nonbroadcast facilities.

The fourth option recommends "other activities in lieu of adopting federal guidance for RF radiation," such as information distribution to the public and providing technical assistance to non-federal government authorities.

"This is definitely a positive move," said NAB legal counsel Barry Umansky, who also serves as president of the Electromagnetic Energy Policy Alliance (EEPA). "The last option of no action at all is not what we'd like to see. We'd like

to see a recommendation as close as possible to the ANSI level."

Umansky added that this action by the EPA strengthens the NAB's and EEPA's case in its push for federal preemption of all nonfederal RFR standards that are more stringent than the ANSI exposure level.

On 17 March, the NAB filed a petition for declaratory ruling urging the Commission to issue a preemptive policy statement. In response to the petition, the FCC issued a public notice 1 May asking broadcasters to submit their "horror stories" regarding compliance with non-federal RFR regulations and ordinances.

The federal preemption issue has drawn much attention due to the increasing number of cases around the US where state and/or local governments have adopted, or are considering adoption of, nonfederal RFR standards. Such activity has occurred in Massachusetts, Oregon, Washington, New Jersey, New York, Texas, California and elsewhere.

Umansky said the NAB is also considering a lobbying campaign in Congress with hopes of achieving some sort of federal mandate.

FCC not surprised

FCC Staff Scientist Robert Cleveland said the Commission "has been expecting this," and that the FCC will probably submit comments on the matter.

Explaining a possible scenario at the FCC, in the event that an EPA recommendation is signed by the president,

Cleveland said the FCC would first have to decide whether it wants to implement the new federal guidelines. "But I'm sure we'd be under some sort of pressure to consider the EPA guidelines," he said.

Cleveland added that if the EPA's recommendation was considered by the FCC as a replacement to the Commission's current rules, there would first be a notice and comment period.

For a copy of the recommended standards, contact the EPA: Washington DC 20460, or call 202-475-8388.

Table 1.

1: Limits SARs (specific absorption rate) to 0.04 W/kg for frequencies above 3 MHz and limits electric field intensity to 87 V/m and magnetic field intensity to 0.23 A/m (amps per meter) at frequencies below 3 MHz.

2: Limits SARs to 0.08 W/kg for frequencies above 3 MHz and limits electric field intensity to 275 V/m and magnetic field intensity to 0.73 A/m at frequencies below 3 MHz.

3: Limits SARs to 0.4 W/kg for frequencies above 3 MHz and limits electric field intensity to 614 V/m and magnetic field intensity to 1.63 A/m at frequencies below 3 MHz.

4: "Conducting other activities in lieu of adopting federal guidance for RF radiation, such as establishing public awareness programs to distribute information on health effects and environmental measurements, and providing technical assistance to states and federal agencies."

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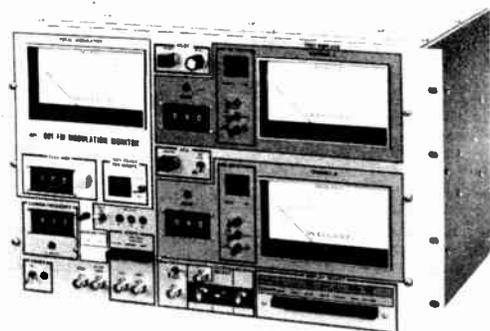
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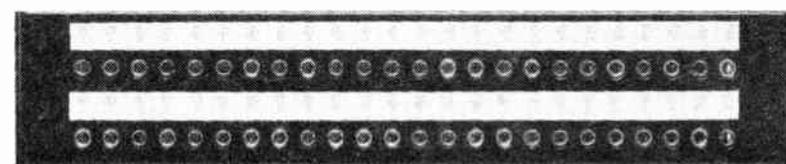
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Circle Reader Service 3 on Page 31



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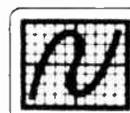
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Circle Reader Service 12 on Page 31

'Trouble' Logs Minimize Grief

by Ronald F. Balonis

Wilkes-Barre PA . . . There are as many maintenance philosophies in radio engineering as there are engineers. That's the nature of the business. But, regardless of how a radio station is maintained, one thing is sure—either your's works—while satisfying the needs of both masters—or you don't.

These days, to make the task much more of a challenge, one of the masters, the FCC, won't help you.

A while back the FCC said there was no longer any need (as if there ever were) for the ritual of keeping an operating log, and, perhaps, not even a maintenance log. They proclaimed that they were no longer in the business of specifying how-you-do-it; *how* you maintain a radio station so that it operates legally, and *how* you prove that it is, when they check it, is now up to the discretion of the station.

I didn't mourn the loss of the mandated logging rituals and procedures. For a very long time, it had been obvious that the logs were only a place to put repetitious little numbers. The FCC, as far as I was concerned, just acknowledged the past and present fact that it is only the skill of a station's engineer that keeps things working right.

It was not that the logs themselves were, or are, useless; it is that the procedures, for some, became the end instead of the means. The purpose of a log, in broadcasting and elsewhere, is to maintain the operation of a station and its equipment. Provided the procedures don't get in the way, most logs can be quite useful to that end, and some can

Ron Balonis is CE at WILK, Wilkes-Barre PA, and a frequent contributor to RW: He can be reached at 717-824-4666.

even work for you and your station.

My "Trouble Logs" are an example of that. At the top of my radio station maintenance system/philosophy, I use a system with logs like the one in Figure 1.

One of these logs hangs on a clipboard at each equipment location in the station.

The left half of the log is filled out by the announcers or operators when they notice or experience an equipment or

operations related discrepancy—be it quality, malfunction, or whatever.

The right half is filled out by the engineer with a notation about what was done to fix it. The notations, of course, are primarily directed to engineering, but everybody reads them, so they also serve to keep everyone informed about troubles and what's being done to correct them.

The troubles (problems) from the Trouble Logs then become the do-first items on the daily engineering what-to-do-list, superceding routine or deferrable maintenance tasks.

In my maintenance system, all maintenance tasks have a priority level, from high (do now) to low (do tomorrow) to very low (do next week). The overall maintenance philosophy, of which the Trouble Logs form the foundation, is based on a non-rigid schedule and listing of the maintenance tasks—one that is re-

(continued on page 20)



Microprocessor control, amorphous metal core heads, and superior performance . . . technology that's typically AEG.

Chances are that the M-21 Professional Audio Tape Recorder from AEG will outperform whatever 2-Track you're currently using or considering for future purchase. No other machine is built to such exacting standards, no other machine handles tape as gently yet rapidly, and no other machine is presently available with Amorphous Metal Butterfly Core Heads. (Ours are standard equipment; ask about our exclusive head warranty.)

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Circle Reader Service 50 on Page 31

Circle Reader Service 5 on Page 31

AEG

Aphex Results Crisp, Dramatic

by Tyree S. Ford

Baltimore MD . . . Back in April of this year, I ran two production workshops at the NAB convention in Dallas. One of these workshops consisted of five different companies demonstrating their latest signal processors.

Don Elliot, production director of KIIS-FM, provided some master tapes of music and promos for program material. We used a Soundcraft board, JBL monitors and a Crown amp for a house system.

The idea was to be able to assess and compare equipment, all of which was part of a common system. There was no chance for the system to be optimized for any one device.

Producer's File

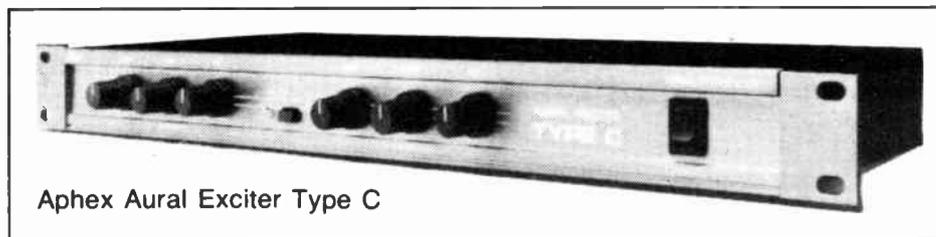
One of the most dramatic demonstrations was that of Don Werrbach of Aphex, in which he ran an Aphex Type C through its paces. The results prompted my continuing interest in the box.

Reaching audio goals

How many times have you run a dub from one of the better agencies and become downright envious of how crisp the audio is?

You can convince yourself that because you're such a small operation, you can't afford a boatload of condenser mics and EQ devices to get that crisp edge. The boss will tell you that it not only is

Ty Ford, a radio audio production consultant, helps stations optimize their use of production equipment and airstaff skills. Call him at 301-889-6201.



Aphex Aural Exciter Type C

not in the budget, but that it sounds OK to him anyway.

If crispness is your goal, first make sure your heads are clean and aligned. Check the bias and EQ adjustments for the tape you're using.

You are using only *one* formula of tape, aren't you? It is professional quality audio tape, and *not* bargain-bin stuff, isn't it?

There are no "exotic" connections, parallel audio loops or multiple terminations that are creating mismatch nightmares, are there?

If your answers are, "Yes," "Yes," "No," and your audio still isn't where you want it, check out an Aphex Type C Aural Exciter.

If the name Aphex rings a bell, it's because they've been pioneers in signal processing for recording studios. The invention of the aural exciter was the result of a happy accident that happened over 10 years ago. While wiring a stereo amplifier kit, Curt Knoppel got a few of the connections wrong. One side of the amp sounded fine; the other didn't. When he mixed the two channels together, he liked the sound even better! The rest, as they say, is history.

The Aphex IIB and IIS, for broadcast and stereo respectively, are the big brother and sister of the Type C. They offer more control, beefed-up shielding and more headroom. In stereo, they list at \$2495. The Type C, however, only lists

for \$299.95! For that \$299.95, you get a rack-mountable stereo unit that's easier to operate (fewer controls) and operates at -10 dBv (Aphex will ship you a 0 dBv if you wish).

Test spin

Paula Lintz, marketing director of Aphex, kindly shipped me a Type C to take for a test spin. I wasted no time in patching it into my own system. Input and output for both channels are via 1/4" and RCA connectors, with RCA's having priority. This feature came in handy later in my test when, after using the 1/4" connection to get to my patch bay, I patched a Beta audio machine (RCA to RCA) directly to the input of the Aphex.

I put a record on the turntable and started the simple setup procedure. There are three knobs and a tri-color input LED per channel, an in/out light and switch, and a power switch on the face of the 1 3/4" high, rack-mounted Aphex C.

Using the drive control, I set the input level of each channel so that the tri-color LEDs were showing mostly green and yellow, with very little red. In order to hear the full effect, I turned both mix knobs up all the way and hit the in/out button in the center of the front panel to engage the circuitry.

The change was as dramatic in my own studio as it had been at the convention. It was as if I had removed a blanket

from in front of each monitor. In fact, the sound was a bit harsh. I backed the mix knobs to 1 o'clock and the harshness disappeared.

I then experimented with the tuned circuits. In the CCW position, they allow frequencies from about 1 kHz on up to pass through to the harmonics generator. As you tune CW, fewer of the lower frequencies are passed. For practical purposes, the lowest setting was just right for voice frequencies.

Since the tuned circuitry is ahead of the harmonics generator, the more narrowly CW you adjust the tune gate, the more drive you will need to push the harmonics generator. After satisfying myself that the Aphex C worked well in my system, I was curious about how it would work in other studios.

Making the rounds

I contacted Tom Alonso, who runs a -10 dBv MIDI-synth music studio. Tom produces music for TV and radio commercials. We inserted the Aphex C in front of his two-track mastering recorder and experimented with a mix from his eight track. The same dramatic difference that I had experienced was repeated. Two hours later, Tom was convinced, he needed one.

I then contacted Eugene Mauro of The National Recording Studio for a chance to test the Aphex in a +4 dBm chain. Here we A/B'd using separate foldback circuits, running the mix knobs wide open. Eugene's MCI console was flexible enough to allow the insertion of the -10 dBv unit. (The operations manual for the Aphex C advises against using levels in excess of 0 dBv. I asked Aphex Marketing Director Paula Lintz about this and she said Aphex would modify the circuitry for higher levels; call her for more information: 818-765-2212.)

Eugene made several good observations. Preceding the Aphex C with a limiter or compressor will effectively control those peaks. He also thought the unit worked well during the recording of individual tracks.

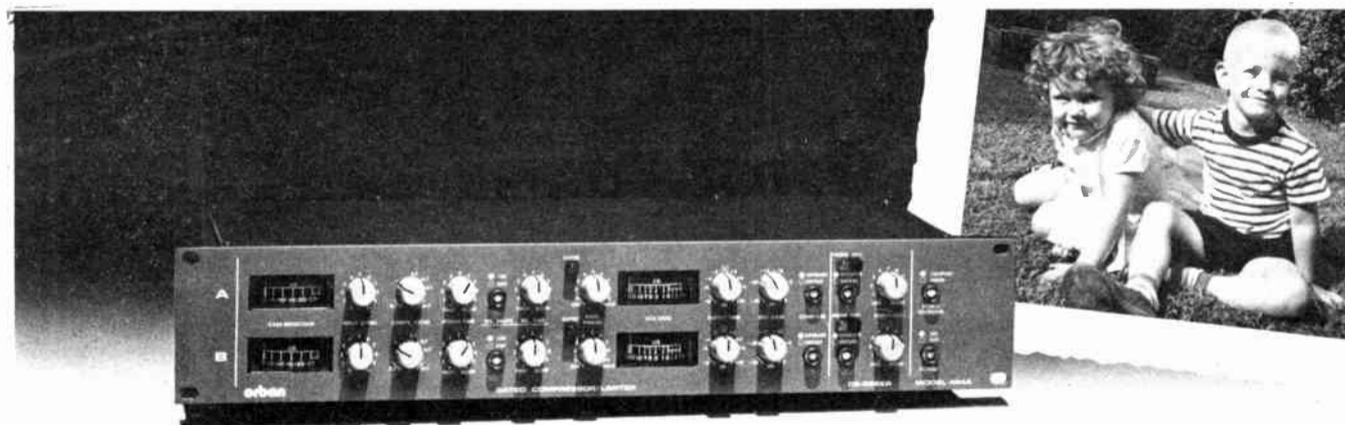
Continued experimentation in my own studio proved dangerous. A friend of mine who is being courted by some major record labels called. He had just finished working out some demos on a cassette portastudio and was ready to send them off. Would I like to hear them? Sure!

Not surprisingly, his master cassette lacked definition. The sound was very muddy. With the Aphex C in place, not only did the crispness return to the top end, but the definition of the bass lines and lower synth lines were restored!

Unlike equalizers, which boost fundamentals and harmonics, the Aphex C apparently discriminates between the two and works mostly on the harmonics. As a result, you hear quite a boost with very little level increase.

The operating manual explains that fragile elements (harmonics) are regenerated and reinserted in a way that involves frequency-dependent phase shift and amplitude-dependent harmonic generation. The phase shifted signal 'beats' against the dry signal, but without causing phase cancellation. I check for L+R operation; there was no loss.

As more and more equipment filters
(continued on page 21)



A friend for life.

It's time you got to know Orban's 422A (Mono)/424A (Dual-Channel/Stereo) Gated Compressor/Limiter/De-Esser—known in reputable broadcast circles as the "Studio Optimod". Users of the 422A/424A tell us that what impresses them most is the unit's astonishingly natural sound—in fact, "non-sound"—even at high compression ratios and with substantial gain reduction, where most other units pump and breathe.

Whether you use it as a hard or soft peak limiter, a gentle "soft-knee" compressor, a full function de-esser, or all simultaneously, the versatile 422A/424A gives you the controls you need to get your sound

just right—quickly and surely. Best of all, the 422A/424A's wide control range means that the *same* unit can create either natural gain-riding or special effects—you don't have to buy two boxes to get these capabilities.

One economical package is all you need to handle your basic production level control chores, DJ mic enhancement, or STL/telco protection. The 422A/424A does it elegantly with a timeless design that will solve your gain-control problems now, and for years to come.

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AN OPEN LETTER TO AM BROADCASTERS:

It appears at long last that the battle over AM stereo is nearing an end. This is not the good news that many had hoped it would be. Unfortunately, it does not mean that we as broadcasters have resolved the issue of not having a national standard system. What it means is that AM stereo receiver manufacturers have begun withdrawing from the market due to lack of consumer demand.

Pioneer has discontinued production of the KE-443A in-dash car radio, their only AM stereo product. Sony, once an ardent supporter of AM stereo, has discontinued two of their three AM stereo receivers. Removed from production were the SRF-A1, AM stereo "Walkman," and the SRF-A100, the hand-held receiver over which most broadcasters first listened to AM stereo. Some industry watchers had theorized these were discontinued to make room for a newer AM stereo product to be released soon. This theory is not based on fact. These products were discontinued due to lack of demand. No replacement products are waiting in the wings.

An editorial in the June issue of *Broadcast Engineering* magazine likened the battle over AM stereo to "... the Hundred Years War." The same editorial went on to say "... AM radio is getting killed in the marketplace." It continued "AM stereo must get off the ground in a big way, and soon. Otherwise, the receiver manufacturers that have gone out on a limb and produced high-quality AM radios will conclude AM isn't worth the trouble." The cover story of the June 16th issue of *The Pulse of Broadcasting* magazine opened with the statement "AM stereo, that noble experiment, appears to be failing." The title of the article was "AM Stereo is Dead ... Long Live AM Stereo."

The birth of AM stereo presented an awkward "chicken-or-egg" dilemma. No station could see financial benefit to implementing AM stereo unless consumer receivers were available in quantity. Similarly, manufacturers would find no demand for their receivers if no AM stereo service were available for the listener. One group or the other would have to perform an act of faith and act first, believing that the other group would follow. Someone had to go out on a limb.

The receiver manufacturers took the initiative with enthusiasm and produced AM stereo receivers in all shapes and sizes. Manufacturers from Radio Shack to J.C. Penney produced in-home receivers. VW and SAAB made AM stereo standard in some model cars. Chrysler included AM stereo at no extra charge with every FM stereo radio sold.

When it came time for AM broadcasters to do our part, a grim reality presented itself; we did not have a national standard. Many stations which would have converted to an AM standard did not, because it was not and is not clear which system would eventually have the greatest number of receivers in the field. Two of the original four proponents of AM stereo systems have withdrawn, leaving many broadcasters with a multi-thousand dollar investment in a transmitting system which no one can hear.

Ten-thousand dollars is a significant amount of money, even to the largest station. No one wants to guess wrong on the remaining two systems. No one wants to spend the money until it is clear that it will be of value to the station for at least longer than it takes to install it. So most AM broadcasters sit and wait ... and watch. To this date, only about 10% of licensed AM stations have invested in AM stereo.

Another reality is that the fixed costs of a manufacturing production line are prohibitively high. Without demand for the product produced by that assembly line, the manufacturer has no choice but to close it. "It can't happen here" is simply not a realistic outlook. Those who doubt this should look to the disappearance of the television video disc player.

The point is not that large electronic manufacturing firms are losing money and we as broadcasters have a moral obligation to bail them out ... to make their unprofitable divisions profitable. The point is that one day AM broadcasters will resolve the issue of a national standard and will find that it no longer matters. Receivers will not be available in sufficient numbers or from a sufficient variety of sources to make it a competitive medium. Once the receiver manufacturers are gone, the damage will be permanent and irreparable. Once burned, the receiver manufacturers will not return. Our inability to organize ourselves may also negatively impact the image which manufacturers have of us, and dampen their enthusiasm for the next time we need new products, such as perhaps FMX receivers.

Some ideas are simply bad ideas and *deserve* to die. AM stereo is not a bad idea. It is simply an idea without an established standard.

It is not our purpose to become embroiled in the midst of the holy war that the choice of an AM stereo system has become. Certainly there are knowledgeable and honorable people who advocate each of the remaining two systems and it is not too difficult to imagine that *both* of the two remaining systems work sufficiently well to get the job done.

The purpose of this letter is not to advocate one system over the other, but to say that we need ONE NATIONAL STANDARD, and we need it very soon. Without it, AM stereo will die, very soon ... and so will AM radio as we have known it.

Your government in Washington can best help you if you help them. Let them know how AM stereo is doing (or not doing) in your market. If you have an opinion regarding the current state of AM stereo, or if you have other information which you believe would be of interest to the Commission regarding AM stereo, please send it to:

Mr. William Tricarico
Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

It is true that the more thought that appears to have gone into a letter, the more credibility it is likely to receive when read. A dispassionate presentation of your opinion or facts is to be preferred over emotion-packed rhetoric. FCC staff members are people too and an emotion-packed letter is just as draining to read for them as it is for you. Your letter will be more effective if it advocates the positive aspects of one viewpoint rather than ridiculing another ... if it addresses what can be done in the future, not what has happened in the past.

If you have something to say, please say it now. AM stereo and AM radio can still be saved, if we are able to unify behind a national standard. But we must act now.

TEXAR

616 Beatty Road, Monroeville, PA 15146-1502
(412) 856-4276

Delco Radio 'Disappointment'

by Bill Sacks

Arlington VA ... I bought a new GM car last month—a Fiero (I call her "Geraldine"). The radio which came bundled with the car is billed as a high-performance audio system featuring a sub-woofer. Of course, it was added to the sticker at a substantial price. The car runs great; the Delco radio was an absolute disappointment.

The radio has C-QUAM AM stereo. I guess it works OK, but one of my favorite AM stations here is firmly committed to the Kahn system. I can understand making a cheap radio as a single mode. This was not a cheap radio, and multimode chips are available.

Sensitivity and selectivity are fair, but some lack of sensitivity may be due to the lack of a proper ground plane because of the plastic body (the car also seems to have a low radar profile).

The graphic equalizer cannot be switched out, and any attempt to do much EQ produces very phasey, unnatural effects. The loudness button is heavy handed and "tubby" sounding.

Tuning, volume control

Tuning is accomplished via a pair of up/down pushbuttons. Delco calls this arrangement electronic "Touch-Control." Also included are decent seek and scan modes. There are four station presets for each band. The front/rear fader control works in a similar fashion and has a bargraph display. The balance control also has a bargraph display.

Bill Sacks, a senior RW columnist, is president of Straight Wire Audio. You can call him at 800-368-2081 or 703-522-7780.

The volume control is also a pair of pushbuttons that step up and down. I like knobs. You cannot conveniently whip down the volume control when a siren requires your attention, or a chewing gum commercial comes on. A mute button would be useful.

Straight Talk

Not knowing the position of the volume control can be irritating. The other day I punched up a station which was not modulating (a rare situation for this particular station). I pushed the up button a couple of times until I figured out that there was no audio on the station. I had the presence of mind to push the down button a couple of times before punching in another station. Well, I didn't push it down enough times (good thing I didn't have to do a mix that night).

Regarding the above incident, it's a good thing that the radio is so underpowered or I could have done serious damage to myself.

The unit has an auto-reverse cassette deck with a chromium dioxide button. I haven't used the cassette deck yet because all of my home tapes are encoded with Dolby B, and there is no Dolby decoder in this radio; I guess there is not enough margin in a \$500 unit to send Ray Dolby his dime.

Alas ... noise reduction

But alas, there is noise reduction of sorts in the radio. They use a technique, based on a National Semiconductor chip, called DNR. This is a technique which applies a sliding low-pass filter automati-

cally in response to program material. It sounds like a misadjusted Berwin filter. I liked the DNR better in my last Delco radio—because it could be turned off. It stayed off.

This unit has what Delco calls "Auto DNR." I'd like to rip it out. The DNR circuit is apparently triggered by FM signal strength. I'd rather listen to the static. This thing makes it sound like the entire Washington, DC FM market has reverted to first-generation Volumax units with needles hitting the peg.

Speaker system shuffle

The radio doesn't seem so bad if you consider the quality of the speakers. The front speakers were oval coax types that paled in comparison to the \$11 Radio Shack replacement speakers I installed.

The speakers are mounted in the front dash and aimed half at the window and half at you. The underside of the dashboard is open, so there is not the proper baffle for the speakers. I found that adding a couple of cheap Radio Shack piezo tweeters mounted a little higher and aimed directly at you helped provide a

little bit of airiness to an otherwise boomy system.

The rear speakers were 4" ovals that I simply disconnected. I can't describe how bad they sounded by themselves.

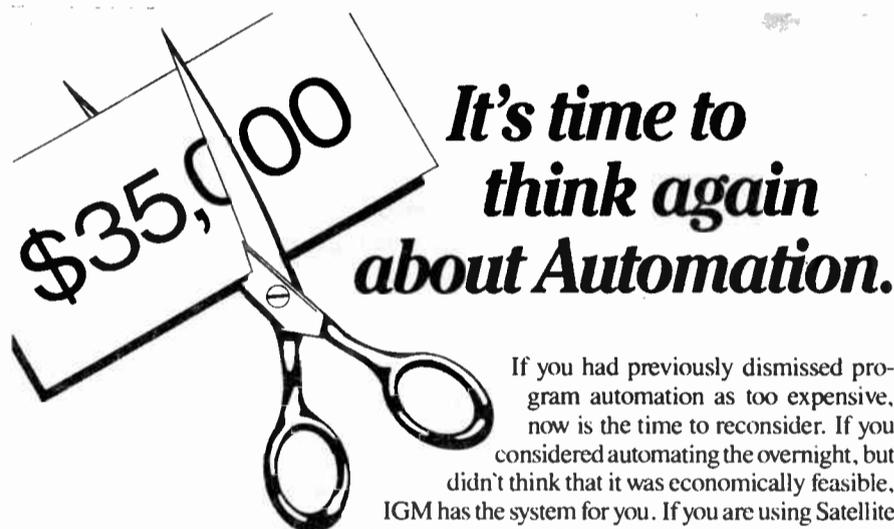
The sub-woofer system is a joke. It seems resonant somewhere around 100 Hz, and tends to vibrate.

I tried in vain to buy the car without the radio, but the dealer said it would cost more by the time I special ordered a car.

He was willing to negotiate the price only for models in stock. The choice was pay for the radio and get it, or pay extra for the car and not get the radio. That's a shame, because Delco is the largest US manufacturer of radios, and they've created an entire market for quality imported replacement radios.

I don't really enjoy having to be so down on this radio, but products like this hurt the broadcast industry. I'm in the process of trying to find a good sound system for the car and I promise to have some positive things to say when I find the right replacement.

Happy trails, and stay straight.



\$35,000

It's time to think again about Automation.

If you had previously dismissed program automation as too expensive, now is the time to reconsider. If you considered automating the overnight, but didn't think that it was economically feasible, IGM has the system for you. If you are using Satellite Music Network, Transtar, or any of the satellite services and have not automated because of the expense, IGM provides a cost-effective system today.

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What Is 'Engineer'?

by Floyd Hall

Crestline CA ... DID YOU KNOW THAT ... ?

In all of the history of radio communication in this country, not one of the three regulatory agencies have ever used the term "Engineer?" Or "Radio Engineer." They have never licensed one—they have only licensed "Operators." They have never used the term "Chief Engineer" as we are prone to do, but instead have only called him the "Chief Operator."

Now, I have a thing about this "engineer" business. First, let me tell you that in the '30s, I helped organize the Los Angeles chapter of the Institute of Radio Engineers; and in 1951 was elected to Senior Membership.

I am now a senior member in the Institute of Electrical and Electronics Engineers. However, I don't think the Institute today is devoted to the welfare and promotion of *engineers*. To begin with, I have a great respect for chemists; physicists; research scientists; and the profound developers of computer science; but these people should *not* be termed "engineers!"

Old Timer

Before you start tearing up this copy of RW, let me give you the definition of "engineer" found in my old *Webster's New Collegiate Dictionary*: "en'-gi-neer', N. A designer or constructor of engines. 2. One versed in, or who follows as a calling, any branch of engineering."

OK, now, this leads to a definition of the term "engineering:" "en'-gi-neer'-ing. 1. Originally the art of managing engines (!) 2. Applied science concerned with utilizing inorganic products of earth, properties of matter," et cetera, et cetera (to a long list of sciences) and winds up by saying, "and other productive work!"

Now, note these two important terms in the above definitions, i.e. "applied science" and "other productive work."

I hold that R&D is not engineering. I like to think of the old story of the large company that had a big engine which had developed an alarming knock and was not running properly. This company had hired mechanics and so-called engineers from all around, but none could find or cure the trouble.

Finally, they heard of a famous "engineer" in a distant metropolis, and they engaged him to come out and fix their engine. When he arrived, he watched the engine for a time, and then asked for a sledgehammer!

When it was brought to him, he placed his feet carefully in position, reared back and hit the engine with a terrific *whack*, whereupon the knock stopped and the engine ran perfectly.

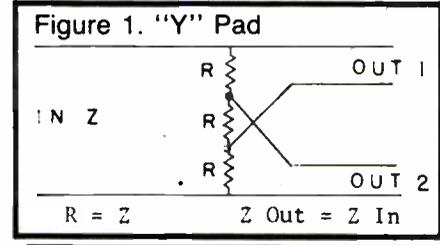
The company was extremely pleased, and told him to send them a bill. He did,

Floyd Hall is a regular RW columnist and an engineering consultant at Consulting Radio Engineers, Crestline, CA. Call him at 714-338-3338.

and it was for \$1,001. The company sent him a check, said they were grateful, but were curious about the amount. He wrote back and said, "The \$1 was for labor; the \$1,000 was for knowing where

to hit it."

Now this is what I call "engineering." I have never seen a "real" engineer who didn't have dirty hands and black fingernails. He manages *engines*! You cannot construct, install and manage "engines" and not get your hands dirty! Like the farmer said when he saw the giraffe, **(continued on page 18)**



Don't just optimize . . . maximize



The Secret Is Out . . . THE FM 3 SYSTEM FROM CRL

In the past few months we have been receiving orders for the two units pictured above. Since it was not a complete system, we were curious about how they were being used. A few phone calls revealed that they were being placed in front of the 8100A. It seems that the multiband processing provided by CRL greatly improved the loudness and allowed precise adjustment of the sound to fit any format. The 8100A was then "backed off" so that it sounded better. The result was a louder, brighter sound that was very consistent. Well, it's hard to keep a good thing secret. Because so many customers have discovered this combination we decided to give it a name: **The FM 3.**

Customers using the CRL/O'mod combination include many of America's major broadcasters, including all three networks. Call us for more information. We can arrange a FREE 10 day trial of any CRL system: The FM 2, FM 3, or FM 4.

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Defining Engineer

(continued from page 17)

"There ain't no sech animal!" Most broadcast "engineers" (operators) that I have seen have clean hands!

I have never indicated I was anything but an "applications" engineer. I remember that one time a prospective client asked me, "Are you a radio engineer?"

"Well," I replied, "I think I am a pretty damn good mechanic."

I get my data from the science boys, which I use thankfully to build 'em, maintain 'em and fix 'em. What I am really saying is "engineering" is applied science. It has little to do with design, development and invention.

I'm happy to be what I call an engineer. Research and development would bore me to tears. I love to go in and find what is wrong, fix it and maybe even make it work better than before. That's why I say I'm just a "damn good mechanic!"

Now I've got that off my chest, let me tell you of some of the things I have seen in broadcast stations. I went to one once in Nevada where everything had seemed to have developed trouble and operated poorly.

The station was pretty old, and had had a procession of "CEs" over the years, and almost everything was haywire. The

DA was way out of adjustment; the station sounded bad, and none of the monitors worked properly. I had driven a long way to get to this job; they had agreed to my price; and were expecting me to deliver.

In the course of the night I was tracing out some wiring in the gutter from the equipment racks to the two transmitters, in a massive bundle of audio wire and cable. Finally, in desperation, I grabbed my big dikes and just cut the whole bundle! Nothing changed! Both transmitters still worked. Both the frequency and modulation monitors still worked about the same!

I don't remember now how this was possible, but I do know I pulled about 20 or more pairs of audio wire and RG-58 and other coax and what-have-you out, and ran about three or four new pairs that hooked up the whole works.

I do remember there were four pairs of audio wire connected to the output terminals of the limiter, but I never found out where they went to, other than to the audio inputs to the two transmitters.

I often find this situation, where the output from the limiter and/or processor is run to two or more pieces of equipment without a branching pad or other means of matching distribution.

Here is something we used to use often in the early days of broadcasting, but seldom see today in AM or FM stations. That was a device we called a "line amplifier." The TV boys use distribution amps, and audio DAs are available from some equipment suppliers. Our old line

amps—or boosters, as we called them—were usually two-stage (often push-pull), and had no more than about 20 or 25 dB gain: 600 in and out.

Incidentally, if you can't think of a better way to feed two circuits from one amplifier in a hurry, do it with a "Y" pad. This device was invented by the telco boys about a hundred years ago, I re-

member (see Figure 1).

The three resistors are each 600 ohms, and the loss to each feed is 6 dB. You can turn it around, too, and combine two outputs into one feed.

There are better ways of course, but not with just three 1 W resistors! Put this pad up on three pairs of jacks, and you have a handy and quick divider.

64 Years Ago in Radio World

The Federal Telephone & Telegraph Company of Buffalo has recently placed on the market, new amplifying units which are very unique in design and extremely efficient in operation.

The Type No. 8, consists of Detector and one-step Amplifier. Type No. 9, which is a two-step Amplifier, has a panel made of the highest grade of black laminated phenol plate. The cabinet is ruggedly constructed of heavy sheet brass with securely welded corners. This makes the apparatus dust proof. Dimensions of the cabinet are 9" long, 6" wide and 6 $\frac{3}{4}$ " deep.

The cabinets are finished in a black satin enamel. Metal partitions in the cabinets serve to shield the separate stages of amplification from interacting with one another, thereby eliminating the usual howling due to audio frequency feedback. These partitions place each stage in a separate compartment.

A separate rheostat is supplied in each stage, thus making possible the best adjustment from each stand, independent of the others, and assuring through the gentle heating of the rheostat the maintenance of each compartment in an absolute moisture-free condition.

The units are equipped with Federal automatic filament control jacks, which provide a convenient and rapid means of shifting the telephones from one step to another without necessity of adjusting filament rheostats. They are so connected as to cause the insertion of the telephone plug in any stage to light only those filaments required by that stage of amplification. The use of the automatic filament control jacks greatly increases the useful life of the vacuum tube and the drain on the filament battery is reduced to a minimum.

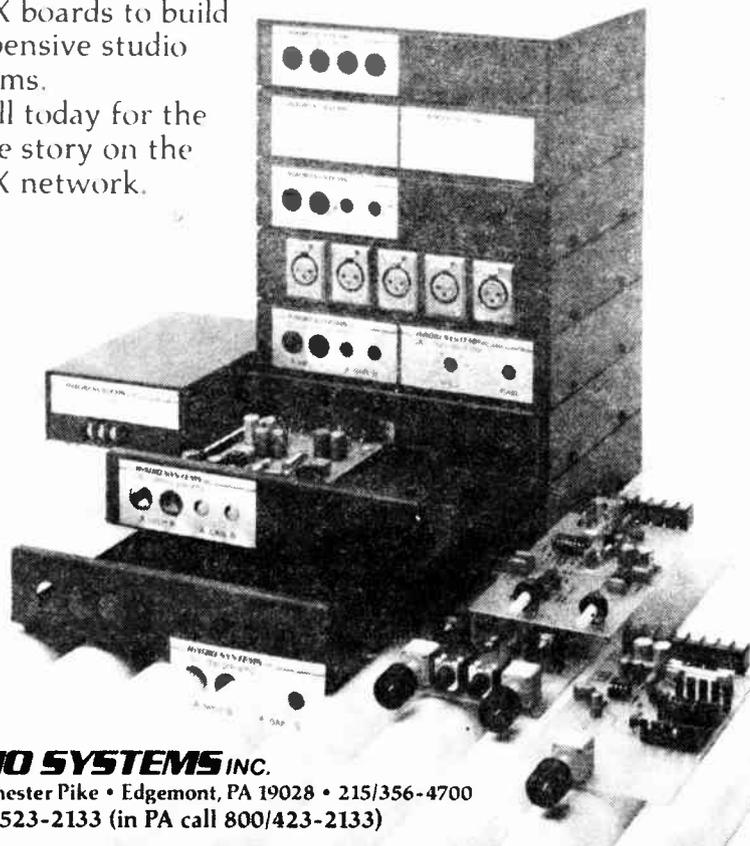
Reprinted from Radio World 1922

Stereo Headphone Amps—\$6900! That's DC-X from Radio Systems.

The DC-HP is actually two independent stereo headphone amps, each with balanced inputs, gain control, and full output.

Like all DC-X Products, it can stand-alone with its universal enclosure and power supply (available separately) or be combined with other DC-X boards to build inexpensive studio systems.

Call today for the whole story on the DC-X network.



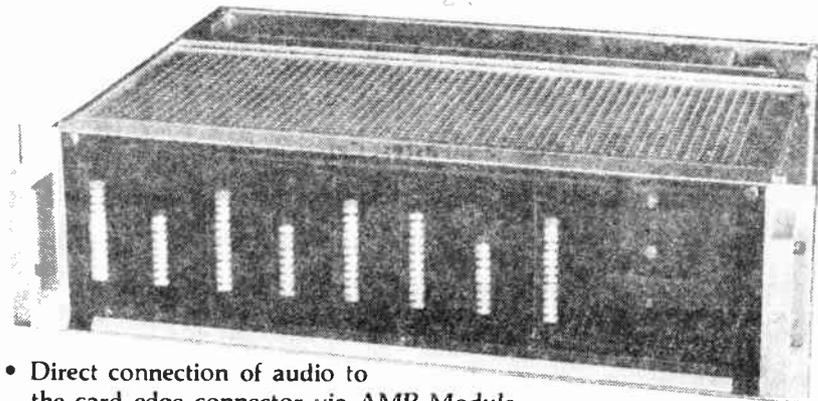
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Circle Reader Service 20 on Page 31

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Circle Reader Service 13 on Page 31

Only Clear Goals Bring Results

(continued from page 13)

cally, you'd think that you would first establish an objective, then the strategies to reach it. However, what we're doing at this point is a step beyond that.

You already set your basic objective when you decided to have a business that offered a product or service to a given market segment. Then, in the strategy stage, you and your team decided the fundamental approach to reaching that target market. Now you're defining the quantitative level of progress that you'll accept as success.

The profit and loss effect of the plan should be a precise breakdown of the expected costs and income benefits of the proposed action. The bottom of this situation should clearly define the net increase or loss expected by the end of the measured marketing period.

Being overly optimistic with this element of the marketing plan is a prescription for disaster. If anything, be conservative. If you've been living outside your parents' home for more than a year, you've discovered that everything takes longer and costs more than you planned for it to.

Communications plan

Here is where you'll begin to look at actual media, and what you can hope to accomplish through each. In other words, should you advertise through ra-

dio, TV, national magazines, local papers, direct-mail, or what? The key is that whatever you do plan must be in line with your predetermined strategies and aimed at reaching your goals. Otherwise, it's a wasted effort.

Objectives: Write a few sentences on what you want to accomplish to help meet your overall marketing objectives. Include specific goals, such as increasing phone-in information requests by 100% per week. Make sure that these objectives are realistic. Nothing puts a damper on a plan for growth like continuously falling short of goals.

Make sure you always evaluate your marketing objectives from a typical target-market person's perspective—it's the only one that counts.

Strategies: A strategy is an overall philosophy of approach to a given situation or requirement. An important part of your communications plan is the development of strategies for such key areas as the creative approach (what fits the image you wish to project), the media selection, promotional efforts and public relations.

Again, each one of these substrategies must be in line with your overall marketing strategies and your marketing objectives.

Specific Plans: Each communication plan strategy must then be followed by a specific plan to execute that strategy.

For instance, you must develop a creative plan to execute your creative strategy. It would plan how to design layouts for print advertising, scripts or storyboards for broadcast advertising, artwork and copywriting for direct-mail, etc.

The media plan should detail which media will be used, and in what mix. It should specifically name stations and papers involved.

The promotion plan lists promotional activities from contests to major events designed to communicate the right message to the right target market.

The specific public relations plan will detail whose opinions you are trying to influence, how you want them to see you and your business. It is a plan to pinpoint the perfect image to the target marketplace.

How will research provide information to assist you in preparing and executing the marketing plan? Sound decisions can only be based on facts.

Whatever you do, don't guess. Don't fly by the seat of your pants. Don't blow your marketing effort on your "instincts." Objectively get the facts, or have a professional research organization get them for you.

Develop a research plan. To execute anything effectively you must 'plan your work and work your plan.'

If you want to try it yourself, I recommend the book *Do-It-Yourself Marketing*

Research by George Breen and A. B. Blankenship, published by McGraw Hill.

An effective management plan distributes the responsibilities for the implementation and execution of each area of the marketing plan. Someone, or group of someones, has to be responsible for making sure that those things planned are actually happening, and that the expenditures and income are according to projections.

Any project, to be successful, must have its organizational structure, centers of authority and decision makers. The management plan details the structure and the people filling the various posts.

We've covered the marketing plan outline in such a way that you can simply use the headings and fill in your own information.

This marketing plan is the document that covers the one-year execution of the basic marketing strategies developed from your situation analysis.

You'll notice how the analysis took you into the general strategies and goals for a five-year period. Then the marketing plan fleshes out the specific marketing activities, over the next 12 months, that will execute your strategies.

Next month we'll specifically discuss advertising and which media work best for what purpose.

With specific objectives declared, and plans established to reach them, you have the right weapon, you can see the target, and it's time to start shooting toward success in the marketplace. Ready, Aim, Fire!

Talk Shows Aren't Tough Anymore!

New Eventide BD980 Broadcast Delay Takes The Hassles Out Of Talk Show Production Sounds Better, Too

①

Cleanest, Fastest Catch-up Ever...
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⑨

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Or other "live cued" event, with no timing or monitoring hassles. Just push the WAIT & EXIT button. The Eventide BD980 makes the "impossible" switch easy!

②

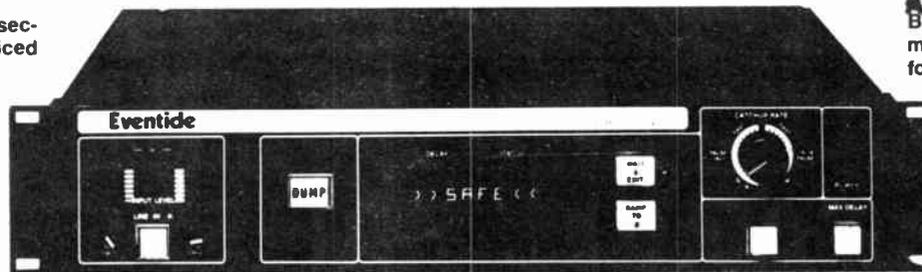
BD980 Comes Fully Loaded.
Stereo operation, 20KHZ. bandwidth and 10 seconds of delay are standard. And BD980 is priced to be a great value.

⑧

As A Production Tool.
BD980's Manual mode lets you set delay in one millisecond steps, from zero to 10 seconds. Ideal for vocal doubling, echo, and other effects.

③

Stereo Audio So Clean.
You'll want to keep the BD980 in-line at all times. BD980 features 16 bit linear PCM design and 50kHz digital sampling rate.



⑦

4, 6, 8, or 10 Seconds Of Stereo Delay.
All of BD980's automatic modes can be set to give you 4, 6, 8 or 10 seconds of on-air stereo delay.

④

Large Alphanumeric Display.
Shows amount of delay, "safe" reading and operating mode at a glance. BD980 operating functions are fully remoteable and plug-compatible with our BD955.

⑤

It's A Stereo Time Compressor, Too.
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⑥

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Logs Help Workload

(continued from page 11)
prioritized daily according to our needs on that day or time.

To picture my system, think of a huge pyramid of maintenance tasks. The top most tasks are the current Trouble Log problems; below them are the Trouble Log carryovers. Spread out at the base of it are all the routine maintenance tasks which need to be performed on a daily, weekly, monthly, yearly, or as-needed basis.

The system, as conceived, is organic, with priority levels subject to changing conditions and highlighting the areas of equipment strain due to use or age. Depending on what is happening, tasks bubble up and down this imaginary task pyramid.

The real advantage (actually, an after-the-fact objective) of the system is that it spreads out and randomizes the maintenance tasks so that the workload is evened out. The system does this by forc-

ing an allocation of engineering time to the weakest areas of a station. By thus directing engineering effort to the trouble areas, it maximizes productivity. As a side benefit, it makes room and time for "engineering creativity."

Though the main purpose of the Trouble Log is to provide a mechanism to record troubles for maintenance, it is, in operation, much more than that.

The Trouble Log system takes advantage of the best proof of performance an engineer could ever find—the critical ears of the programming staff and those found in a competitive radio market. Invariably, they will find a fault, or the be-

ginning of one, before the routine maintenance can. The overall feedback they supply helps to make everything work better.

When I created the Trouble Logs in 1973, the sole purpose of them was to improve engineering productivity and to cope with the change in how radio was being done. But since then, as engineering time has become more valuable, the logs have become the productivity tool that enables more to be done with much less.

The Trouble Logs also can function as a catalyst to other benefits.

By letting everyone know of the problems, they lessen announcer stress.

By letting everyone know what's being done, they force a level of interdepartmental communications which lessens conflict.

By documenting engineering's role in the effort, they force the use of problem solving approaches to a station's human and equipment engineering problems, since there's no way to ignore persistent problems. Finally, the Trouble Logs form a historical engineering maintenance record for analysis, review, and documentation of the engineering effort.

That's my system, and it works for me.

Comtech's 3.8 Meter has the Extra Performance Margin Needed for Crystal-Clear Audio Reception.

Why Settle for Less?

Major network affiliates all over the country are specifying Comtech's 3.8 Meter Antenna. The reason is simple: No other antenna in its size category can deliver a gain of 42.9 db at 4 GHz.

This increased performance margin means outstanding audio reception on SCPC sub-carrier signals, and digital even in low EIRP areas.

Comtech's leadership in satellite antenna design is no accident. They pioneered the exclusive 3-piece "splice-strap" parabolic reflector with a superior sur-

face tolerance unequalled by mesh or other home-type antennas. The result is higher efficiency, optimum side-lobe performance and increased gain. This is the extra margin of performance that only a Comtech Antenna can provide. That's why literally hundreds of Comtech 3.8 Meter Antennas are operating today at radio stations throughout the U.S.

So why settle for marginal performance when you can have a performance margin today and in tomorrow's 2° spacing environment.

Allied Broadcast Equipment distributes Comtech Antenna systems to the radio industry nationwide. Call today for more information.

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for availabilities. Phone 800-336-3045.

New Products

IGM Off-the Shelf Control Package
IGM Communications has introduced two new control systems that utilize computers off the shelf.

The IGM-EC, Economic Controller, and the IGM-SC, Sophisticated Controller, include the software to handle the commands for controlling programming, and an audio switcher to facilitate the switching and control of audio sources.

Both systems use established computers, enabling the user to receive comput-

er service locally. The SC uses the IBM-PC, while the EC uses any PC which uses MS-DOS or PC-DOS (e.g., Tandy, Compaq, Kaypro).

The EC handles up to 12 audio sources and includes interfacing for Go-Carts. Possible configurations include operating: four reel-to-reels, two single carts, two Go-Carts, a network feed, one news feed and two live studios. The price would be under \$5,000.

If a station has Instacarts, has live

assist needs, network affiliation or other complex requirements, the SC is capable of handling the demands. The SC controls 16 audio sources—which may be expanded to 32—and provides for total English verification logging, is capable of talking to other computers in the station, permits advanced programming while on air and accommodates remote terminals.

The SC performs these duties economically compared to older control systems.

For more information, contact Tom Ransom at IGM: 206-733-4567.

Telfax Phone Remote Audio Mixer

Telfax Communications has introduced its new TFX-131B Phone Remote Audio Mixer, a miniature four-channel audio mixer that features built-in, two-way telephone circuitry, allowing the broadcaster to connect the unit directly to a phone line to send and receive audio from a remote site to the studio.

Up to four mics, two high-level feeds and four headphones can be connected.

The TFX-131B features pushbutton dialing with switch-selectable tone or pulse dialing signals.

Other standard features include: built-in, rechargeable Ni-Cad battery pack, LCD digital stopwatch/clock with alarm function (audible in headphones), headphone amp, 1 kHz test tone oscillator,

spotter channel, line level selector, 6-pin accessory interface jack for external processors, electronic ringer and LED to indicate incoming calls.

The TFX-131B is compact and weighs 5 lbs. The unit is priced at \$795.

For more information, contact Craig J. Pringle, Telfax, at 515-832-1263, collect.

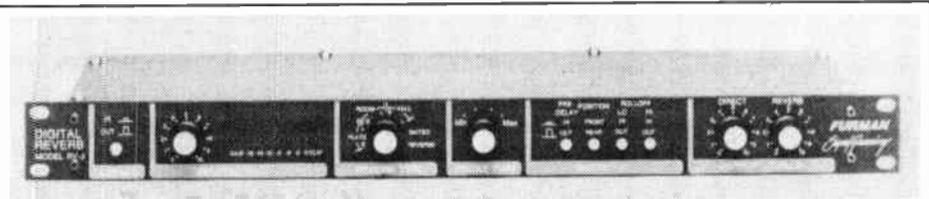
Aphex Gear

(continued from page 12)

down from the recording studio to production studio, the chances for improving your audio increase. Aphex, very wisely, has made a device that is effective, easy to operate, and relatively inexpensive. To find out more, contact your local broadcast supply, studio supply or music store.

Paula assured me that she would send demo cassettes to anyone who doesn't have a dealer nearby. She also asked me to mention that circuitry update kits for the IIB and IIs are now available. You can either send your units back to Aphex for the new board and tweaking for \$200 or order the board for \$100 and do the tweaking yourself.

Your correspondence and calls are always welcome. For quicker attention, send your mail to me at: TSF, 3804 Ednor Rd., Baltimore, MD 21218.



Furman Digital Reverb System

Furman Sound has introduced its new RV-3 Digital Reverberation System, featuring custom-tailored programs, including two different plates, two sizes of rooms and two types of halls.

Other programs simulate a gated reverb and a reverse reverb for special effects. Each reverb type is offered with four reverb times.

Switches for pre-delay, position (front or rear) and high and low cut filters are provided. A total of 512 distinct pre-programmed settings are

possible.

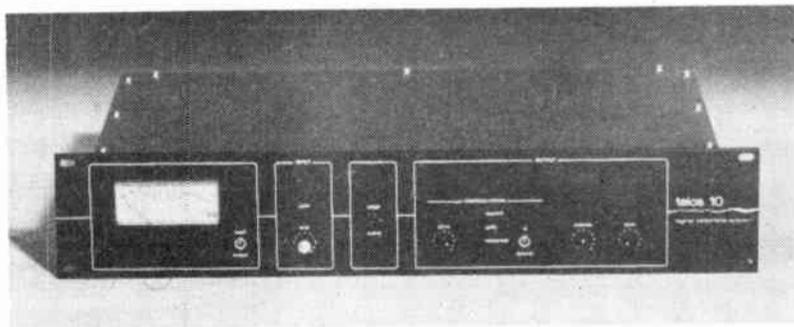
The RV-3 is designed to make digital signal processing technology easy to use. Two rotary controls give immediate access to the major program types and decay times, and clear indication of which program is selected.

The RV-3 is a mono-in, stereo-out device featuring a 79 dB dynamic range and 14 kHz bandwidth. List price is \$599.

For more information, contact Diane Poole, Furman Sound: 415-927-1225.

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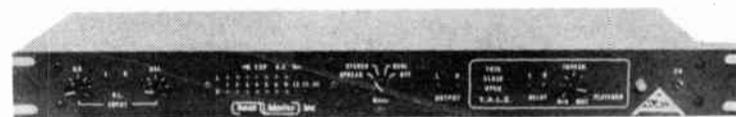


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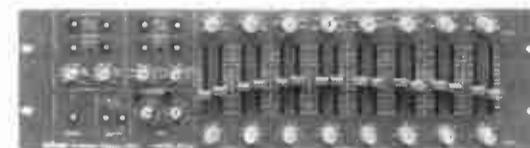
275A Automatic Stereo
Synthesizer **\$1,895**



622B Parametric Equalizer **\$879**



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Buyers Guide

Studio Audio Equipment

KBNA Consistent with 424A

by David L. Stewart, CE
KDXX/KBNA

El Paso TX . . . KBNA had an inconsistent air sound caused by indifferent gain riding by its operators. While processing held peak levels to close tolerance, it gave varying densities with changing input levels.

User Report

The subjective "sound" of the station was in the DJs' hands. To their credit, most DJs are consistent, and will peak most sources at the same level (-20 and pegged are two popular choices).

However, we needed some kind of "smart" gain riding device that converts poor input levels into healthy output levels while retaining the music. After consulting with Marvin Fiedler, our cor-

porate engineer at KCOR, San Antonio, we decided to purchase an Orban 424A.

The extremely versatile 424A is a stereo-integrated gated compressor, limiter and de-esser. With active-balanced ins and outs, the unit can be connected to most any audio source or processing equipment.

Designed as an adjustable, multipurpose, high-quality audio processor, the 424A controls can adjust input/output levels, compression amount and ratio, attack time, release time, release envelope shape, gate threshold, idle gain, de-esser sensitivity and VCA gain.

The book, with condensed operating instructions, can help you get on-line quickly. It also provides an expanded operating section.

Our best advice for learning how to use the 424A is to "play" with it for a few days. We fed a cart machine into it, fed the output into a pair of 600 ohm headphones and started turning knobs.

We had a very wide variety of carted music to try through this jig. Three days of our spare moments were spent on this exercise, which proved to be very educational.

At KBNA, our FM, we used the 424A with relatively fast attack and release times, 1:4 ratio, gating set to blink syllabically only on straight voice and less

than 10 dB indicated compression. Where consistency is the goal, less is truly more.

A second unit was purchased for KDXX-AM. In addition to the "ride gain for consistency" mode described above, it also has prevented overmodulation in our Marti STL-10s.

(continued on page 26)

New Studio Painless

by Andy Lovell
Radio Systems, Inc.

Edgemont PA . . . The performance of the best studio equipment in the world can be compromised by imperfect installation. Often the pressure to get a new studio on the air requires that otherwise competent station engineers cut corners.

The problems can be obvious: ground loop buzzes, hum, RF in the audio, intermittents, or erratic behavior in control circuits. While such problems are usually not the engineer's fault, there simply isn't always enough time to do the job properly, and to document it for future repairs.

Other deficiencies in a hurried installation become obvious over time. Even the best equipment can prove inflexible if it's

not properly wired and installed.

An engineer who is pushed to "get it on the air" often must neglect some discretionary circuits and optional wiring that will restrict use later on.

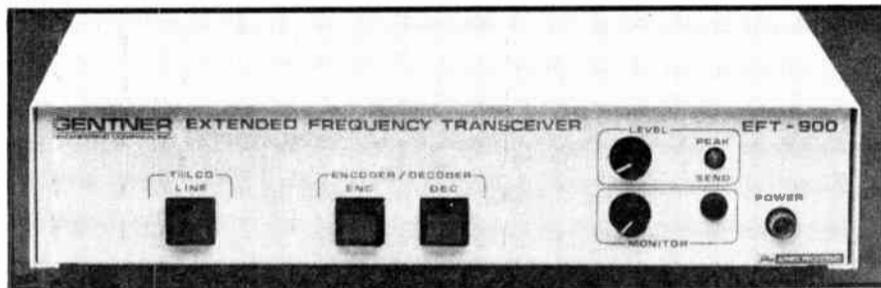
Prewiring

A better available method is prewiring. Utilizing this method, Radio Systems constructs entire control rooms in our facility in Edgemont, PA.

We take the time necessary to do the job with concealed but easily accessible wiring, convenient punchblock termination for the inevitable configuration changes that occur at every station, heat-shrink tubing on all cables, and a consistent and proven grounding system that eliminates ground loops and RF suscepti-

(continued on page 24)

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Buyers Guide

Installing New Studio Painless

(continued from page 23)

bility. We also wire numbers on every pair for immediate identification and tracing and add other refinements.

The control room can be carefully planned with an eye toward the future so that the equipment is used to its fullest potential—both now and tomorrow. Ex-

tensive discussions with station personnel enabled us to create a studio that fills all the needs.

The prewiring is done by skilled technicians in an unhurried, clean environment. All wiring is thoroughly tested with the actual equipment.

Upon completion, the furniture—with

its integrated cabling, punchblocks, connectors, etc.—is crated for shipment to the customer.

Installation a breeze

Now comes the best part. Instead of a rushed installation on a Sunday night by a tired engineer, the new studio is

completely installed and tested by Radio Systems personnel. In less than eight hours (often as few as two hours), the studio is ready for use. When necessary, the installation can be done overnight.

For an on-air studio, it means far fewer hours of originating programming from a production studio. In addition, the need for off-air time is eliminated.

Since Radio Systems does the entire job, the station engineer is not stuck with a half-completed control room if station technical problems arise.

Technical documentation

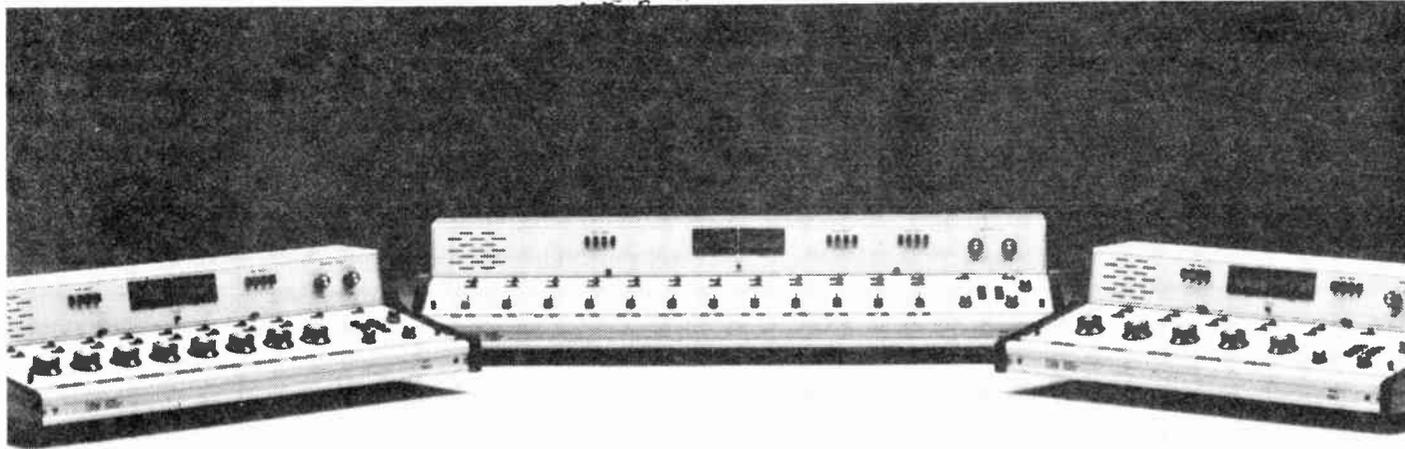
Complete documentation comes with every prewired installation. Cable is uniquely numbered; punchblock locations are identified, and multipair cables are color-coded to industry standards. A bound reference book with documentation of every connection is also provided.

After an installation is completed, Radio Systems technicians will brief station engineers and operators on important details concerning equipment operation and maintenance procedures.

In addition to providing maintenance and operation tips, we also demonstrate features that might not be obvious to the new user. For instance, we present to the engineer a thorough explanation of the wiring details, with emphasis on the provisions for expansion and changes.

To date, many stations around the US have utilized Radio Systems' prewired control rooms. A few recent installations include WJRR, Rutland VT; WSNL, Philadelphia PA; WJTL, Lancaster PA; WCWM, Williamsburg VA, and WCZN, Chester PA.

Editor's note: For more information, call the author at Radio Systems: 215-356-4700.



THE DESIGN WILL INSPIRE YOU. THE NAME WILL IMPRESS YOU. THE PRICE WILL CONSOLE YOU.

UREI has some consoling news for stations with ideas that are bigger than their budgets: our superior line of broadcast consoles put a better on-air board within your reach.

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Buyers Guide

New Studio Design 'Balanced'

by Mark M. Moore

Orlando FL... "Ergonomics: see biotechnology."

"Biotechnology: 1. the aspect of technology concerned with the application of biological and engineering data to problems relating to the mutual adjustment of man and the machine #2. the application of natural forms to problems of design and engineering."

The above definition can be found in two places. The first would be Mr. Noah Webster's big book. The second would be in the control room of WDIZ radio in Orlando, Fla., thanks to the form and function of a new furniture system created exclusively for the broadcast industry by the designers at Cruz Bay, Inc.

According to Dave MacAdams, CE for WDIZ, the decision to use Cruz Bay's new and innovative Balance System furniture design came as a natural outgrowth of the pursuit to create a true state-of-the-art control room environment.

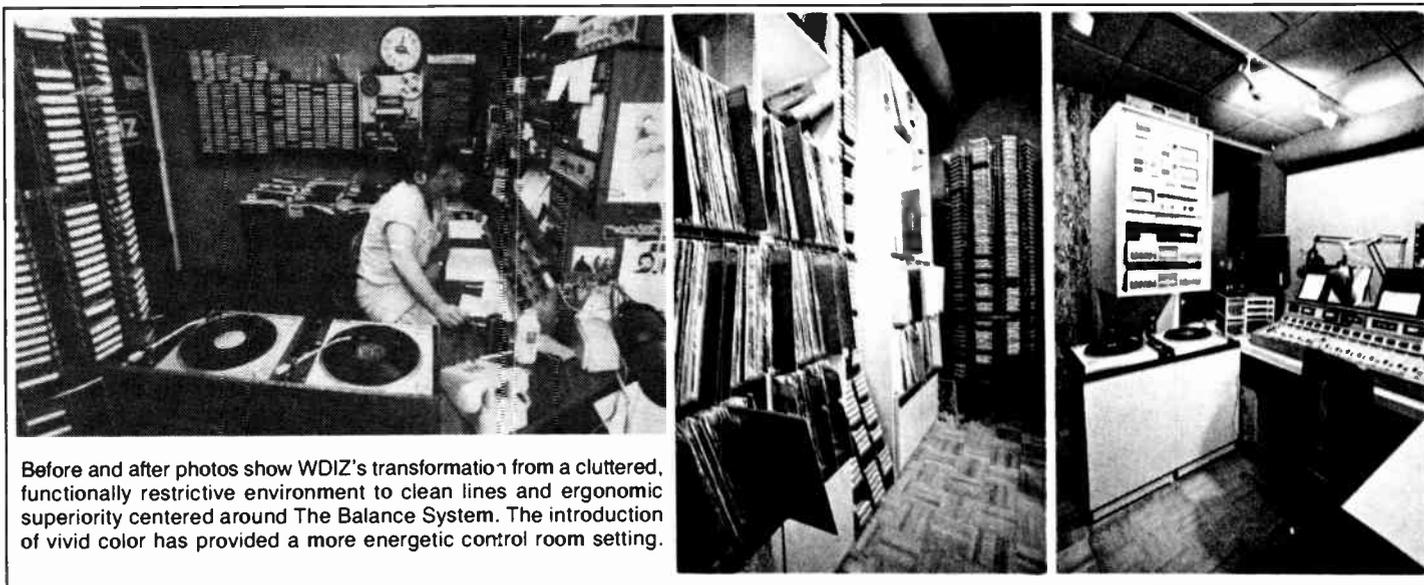
"Naturally, when we began our renovation, we were concentrating on the equipment," MacAdams said. "The technological bonanza included two Revox B-225 compact disc players, new Delta cart machines from ITC, Nakamichi cassette recorders, Otari reel-to-reel tape machines and a monitor system utilizing Westlake BBSM-4F loudspeakers. But the star of the new lineup was the Howe Audio 9000 console."

"After putting together a lineup like that," he continued, "we couldn't see putting this new stuff—which goes to the leading edge technologically—into rinky-dink furniture."

The Balance System

Enter Cruz Bay and the Balance System. "From the very beginning, the Balance System was designed with one thing in mind. That was to achieve a new level of excellence in operator comfort," said Gary Schwerdt, national director, Sales and Marketing, for Cruz Bay.

Schwerdt says that the relationship between the disc jockey and furniture/equipment that surround him in the control room has been an overlooked concern in the broadcast industry for some time now.



Before and after photos show WDIZ's transformation from a cluttered, functionally restrictive environment to clean lines and ergonomic superiority centered around The Balance System. The introduction of vivid color has provided a more energetic control room setting.

"We have to remember the human form and how it best operates within the immediate area surrounding it," he explained.

Through the innovative use of splayed turntable pedestals, the System creates what is referred to as circular work patterns that allow for greater freedom of movement. "We think the Balance System's ergonomic approach will render obsolete the horseshoe-shaped control room furniture commonly in use today," said Schwerdt.

"We think the industry is ready to wake up to a concept like this. All of our design research in this field has shown that a truly useful and functional design is one that allows the greatest freedom of movement and flexibility for the operator," he added.

This kind of progressive thinking was not lost on MacAdams. "Once we had made our equipment selection, our focus shifted to providing a better working environment for the announcers. It makes sense to me that, if they are going to be spending so many hours a day in this environment, we should try to make it as pleasant and easy to use as possible," he said.

Acoustics

Cruz Bay's interest in the control room atmosphere and ergonomics did not end with the furniture system. Said MacAdams, "They opened our eyes to many problem areas that radio stations regularly ignore, mainly in the area of acous-

tics."

Each part of the control room was integrated into the acoustic and aesthetic whole. Changes included acoustic wall panels for their sound absorbent qualities, tree bark and moss panels (imported from Portugal) for their aesthetic accent and minimally diffusive acoustic qualities, and the use of a hardwood floor for its reflective properties. Finally, fabric-covered acoustic cylinders were used to even out the low frequency response of the room by preventing bass build-up at ceiling-wall junctures.

Additionally, the design of the furniture itself lends to the positive acoustic qualities of the new room. The use of elevated equipment bays leaves the center console area acoustically obstruction free and offers excellent reference points for near field monitors.

"Our new room sounds 500% better than the old room with its carpet-on-the-walls approach. The announcers appreciate the fact that not only do they sound better while on the air, but they now can 'hear' the station as it is meant to be heard," said MacAdams.

Each part of the renovation in terms of furniture and decor was carefully design and color coordinated. "Functional no longer means ugly. With the correct choice of primary colors, accents and materials, ergonomics can be extended beyond the physical to the aesthetic. An environment that is pleasing to the eye adds to the operator's comfort," said Schwerdt.

"This is no longer the kind of place I'm embarrassed to show to visitors at the station," added MacAdams.

Size advantage

A further advantage of the Balance System is inherent in its size. As was the case at WDIZ, many radio stations are limited in the amount of area available to work with. A colossal furniture system simply won't fit or, at the very least, makes working conditions cramped, inefficient and hectic.

"Another design criterion in The Balance System was to put a maximum amount of easily usable work space into a minimum area," said Schwerdt. The System uses only 38 square feet of floor space.

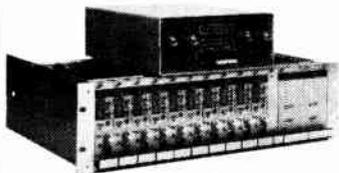
"Our control room is only 11'9" by 11'9", so we didn't exactly have a lot of room to play with, says MacAdams. "Before we got the Balance System, it was an exercise in controlled madness to have more than one personality on the air at the same time. Our two-man morning drive time team was constantly shuffling about trying to make the space around them work to best advantage. They could barely even see each other from where they finally ended up. And when we tried to get an entire band in there for an interview... ha!" he laughed.

MacAdams went on to say, "Not only did we more efficiently conserve what previous little space we do have, but we now have the luxury of adding additional equipment to the system without actually expanding in size. It's so roomy and flexible that it allows for growth within a restricted area."

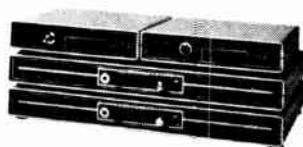
In almost every other workplace, we see changes in engineering and environment making the employee's time under work conditions more comfortable, enjoyable and productive. Utilizing Cruz Bay's whole-room ergonomic approach, WDIZ has come one step closer to establishing this as a standard in the broadcasting industry.

Editor's note: For more information, contact Gary Schwerdt at Cruz Bay: 305-682-4400.

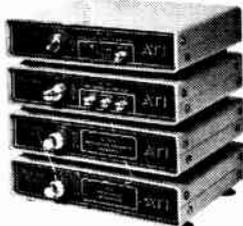
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Buyers Guide

JBL Amp 'Seen & Not Heard'

by Frank Kelly, CE UREI

Sun Valley CA . . . In today's radio stations, audio amplifiers are as common as consoles, program sources and speakers.

Once installed and adjusted, a well-designed amp should be seldom seen and never heard. An amp must never introduce new sounds while performing its primary task of driving low impedance complex speaker loads from a line level program source.

The new JBL 6215 power amp meets

these requirements, and does so while fitting into a single rack space. Designed for use when a minimal amount of power is required, the 6215 is ideal for stations using small speakers or headphones in confined broadcast facilities.

The 6215 as a stereo amp provides 45 W per channel output into 4 ohms at 0.2% THD, and 35 W into 8 ohms at 0.1% THD. If used in the bridged mono mode, the unit will drive a single 8-ohm load to 90 W at 0.2% THD.

The amp's 1 3/4" single rack space

height and internal low-hum field semi-toroidal transformer allow operation in tight spaces with sensitive equipment nearby.

Improves studio sound

Improving sound in the control or production room can increase on-the-job creativity and enjoyment, and lessen fatigue during a long shift.

Instead of utilizing the low-level power amp built into a broadcast console, stations can hook the 6215 to the low-level monitor signal output (found on most consoles). The added power will noticeably enhance the sound in a control room.

The 6215 is also useful for critical monitoring of air feeds distributed around the station. With its small size, the unit is well suited for use with small-to medium-sized speakers. The 44K ohm input impedance permits feeding many monitor amps from a single 600 ohm air source—even if long lines are used.

Control functions

For control function accessibility, the AC power switch, recessed precision detented level controls and 1/4" stereo

monitor jack are located on the front panel, along with stereo CLIP indicators (red LEDs). In addition, a single red STANDBY LED alerts the user that the amp's load protection circuits are enabled.

The rear panel provides a choice of input connectors: a standard barrier strip; a three-pin XLR type and a 1/4" phone jack. Active differential input circuitry offers the benefits of balanced operation without the use of input transformers, with design optimized for minimum RFI susceptibility.

Outputs are made via heavy-duty insulated five-way binding posts. At the rear is a convenient three-way input mode switch to provide for stereo, dual mono and bridged mono operation without special patchcords.

Finally, a removable audio (signal) ground-to-chassis (earth) strap is provided on the rear barrier strip to assist in solving "ground loop" or hum problems often encountered in a station's wiring.

Engineering approach

The 6215 reflects JBL/UREI's emphasis on low distortion, complementary circuit topology and the optimization of each stage for high slew rate and relatively low feedback. This design results in an

(continued on page 30)

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Circle Reader Service 14 on Page 31

KBNA Happy with 424A

(continued from page 23)

The 424A is well documented, functionally laid out and well constructed. Each unit has worked well out of the box, and has measured up to published specifications. After about six months of use, we haven't even replaced a lamp.

It's worth mentioning that the 424A's de-essing feature, which some people call their favorite feature, gets no use at our station. Gating, however, has proven to be a much needed, desirable function.

The 424A offers adjustable gating level, as well as control of the idle gain, which is the level the unit settles to shortly after gating.

The idle gain is ordinarily set at the same level as the operating gain reduction. For example, if you compress 15 dB and the input goes silent, the compressor will slowly go to the level of the idle gain control.

For our broadcast uses, gating is adjusted to merely avoid noise pullups (i.e., during a pause in a phone conversation). But we can see many applications for such a device in a production studio, such as track clean-up, special effects and gain riding on discussion shows.

Controls interact so that adjustment is less critical and the unit is "idiot-proof," so to speak. In addition, the manual is first-rate, and service and operation instructions are clear and concise.

The 424A has neatly solved our problem. There are other ways we could have gone, but we feel this was the simplest and most cost-effective method.

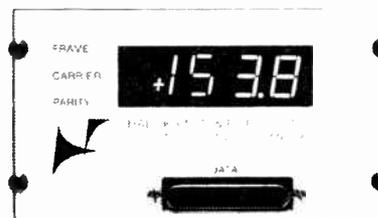
The stereo 424A cost is around \$1,000. The 414 (the 424A but without gating and the de-esser) costs less. Both models are available in mono as the 422 and 412, respectively.

Editor's note: For more information on the 424A, contact Sid Goldstein at Orban: 415-957-1067. Call the author at 915-775-0900.

ANALOG METERING WENT OUT WITH SLIDE RULE HOLSTERS.

If you've decided to go digital this year, why not do it now? You'll not only save money, you'll prevent all the hassles brought on by misreading your existing analog remote controls.

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pictured: TEL 171 for the Moseley TRC-15A \$800
TEL 172 for the Moseley PBR-30A \$920

Hallikainen & Friends

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Circle Reader Service 42 on Page 31

Buyers Guide

Compression Now Convenient

by Richard Factor, Pres
Eventide, Inc.

Little Ferry NJ . . . Ever since the advent of spot commercials, radio folks have wished for and gotten various methods of reducing the playing time of the over-length spots foisted upon them by agencies, and either produced in-house by production directors with rusty stop-watches or read by clients and announcers with even rustier senses of timing.

And just like the wishes granted by the genies of fable, these methods have proved to be mixed blessings.

The following is a description of what we believe to be the most convenient method to date to perform audio time compression, or, as we like to call it, Timesqueeze™.

It turns out that, believe it or not, you do not need a variable speed tape recorder to do time compression. Before you write to ask me how much I'm charging for the Brooklyn Bridge, let's categorize Timesqueeze applications.

They break down fairly neatly into two groups. One is the removal of from many seconds to several minutes from full-length programs. This is common in the TV industry to accommodate that extra commercial in syndicated reruns that originally ran in prime time.

The other group, the one we're talking about here, is the common desire to remove (or even add) a brief period . . . say up to 10 seconds, from a 20-, 30- or 60-second spot, or perhaps get a musical theme which has been edited almost to the correct length, to match the voiceover.

Let's say you have a digital delay line capable of up to 10 seconds of delay (if you don't, you can buy one . . . it's called the Eventide BD980). Say that the delay can be decreased unobtrusively, at a convenient rate (i.e. one second for every eight seconds of realtime). Connect the output of your tape recorder to its input, and listen to the delay line output.

Assuming the delay remains constant, the sequence is obvious. You start the tape; 10 seconds later, the audio reaches the output.

At the end of the taped 60-second spot, you are still listening to the delay line's output; and, sure enough, you hear the last 10 seconds of the spot. If you were to time the spot at the output of the delay line, it would still be 60 seconds.

Now let's try a variation. We press START on the tape or cart and "RAMP TO ZERO" on the delay line simultaneously. Remember, the delay is capable of decreasing unobtrusively. As we listen to and time the commercial, we notice that it finishes in less time, 52 seconds.

Why? Because at the start of the spot, the delay line was reading 10 seconds, and at the end, it read about 2 seconds. Adding the 60 seconds of the commercial and the -8 seconds of delay, we get 52 seconds as the time measured at the output of the delay line.

Stereo commercials are now the rule

rather than the exception. Music, sound effects and other program material with no pauses are at least equally common.

The challenge we had to overcome was to "splice out the pauses" even though they didn't exist! While precise details about how this is done are highly complex and more than somewhat pro-

prietary, a conceptual outline follows.

The best way to do the job is to remove chunks of several tens of milliseconds at every convenient opportunity, being careful to limit the rate of removal so that the proportion of pauses to signal does not change so radically that the cadence of the program is lost.

The easiest way to limit the rate is to guarantee a certain interval after each removal.

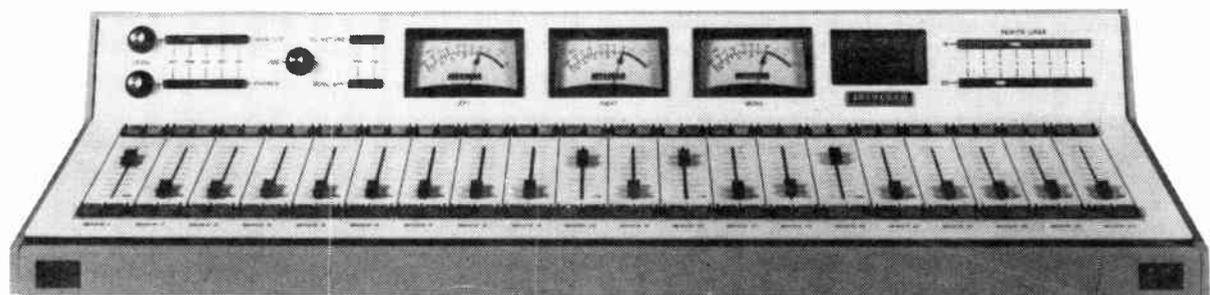
The BD980 has a control which lets you choose the "catch down" rate, primarily by selecting this time interval. It also varies the audio level at which a "pause" is detected so that, at the slower rates, the unit looks for real silence, while at faster rates, it makes compromises.

The switch is divided into two arcs.
(continued on page 30)

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Buyers Guide

ESL V Aces Field Test

by Dave Gale, CE WCUZ-AM/FM

Grand Rapids MI . . . In many stations, the importance of proper cartridge erasure and splice detection isn't stressed enough to operators. Unfortunately, operators don't like to take time to properly erase and splice-detect carts manually, even when they know how to do these jobs correctly. As a result, poorly erased carts and carts with audio recorded over the splices got on the air.

User Report

At WCUZ, we decided a long time ago to take most of the burden off the operator with a device that performs both these troublesome tasks. For quite some time, WCUZ had used an International Tapetronics Corporation/3M (ITC) "ESL-IV" eraser/splice locator.

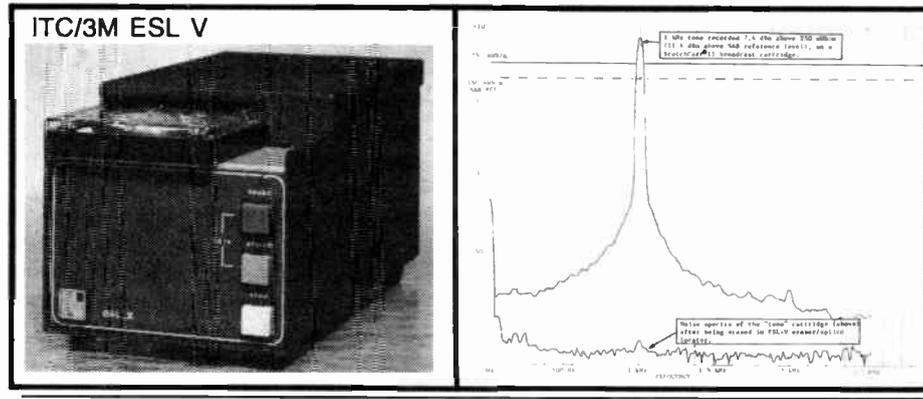
But, with the advent of "hot" tapes of

all types, the ESL-IV version fell short of adequate erase depth. When ITC asked WCUZ to field test the new ESL V eraser/splice locator, we jumped at the chance.

Operation

The size of the ESL V unit is identical to the older ESL-IV model, except that it is slightly shorter in depth. The unit has three pushbuttons on the front panel: erase, splice and stop. To erase and splice locate a cartridge, you push erase and follow it by pushing the splice button. (The factory has recently made a modification which allows a single button to activate both erase and splice locate, if desired.) To erase only, hit erase. To splice detect only, hit splice. To stop any of the functions, hit stop. It's a pretty straightforward operation.

The ESL V system functions are controlled by a microprocessor. A temperature sensing circuit will prevent damage to the bulk erase coil, if the coil should



overheat. A front panel lamp indicates coil overheating and remains illuminated until the coil cools enough to be used again.

The microprocessor also provides accurate speed control for the brushless DC servo motor.

Specs at a glance include;

- Cart Sizes: NAB A and AA;
- Tape Speed: 30 ips in splice locate mode, 1 7/8 ips in erase mode;
- Splice Detect Sensitivity: Detector senses 1/2 mil or greater tape thickness change;
- Complete Erase/Splice Locate Cycle Time: Maximum 30 sec erase plus 1/4 total tape time;
- Erase Depth: 55 dB band limited (20 Hz-20 kHz) typical residual coherent noise, 75 dB below 1 kHz recorded at 250 nWb/m (using Scotchcart® II broadcast cartridges).

Erase performance

WCUZ obtained an ESL V prototype for use in a studio environment. After the unit was checked out on the bench, it was installed in the production room. The announcers and news people failed to make the unit break down, and the ESL V bulk eraser erased remarkably

well, time after time.

The microprocessor slowly ramps down the erase field, minimizing residual noise, thus providing a consistent erase, cartridge to cartridge.

Erasing 10 carts back-to-back showed no adverse effects. The overheating indicator never came on during any of the tests or during normal operation. Using an eraser with a bulk erase coil like the ESL V model will save time over those models which require all the tape be passed over an erase head. Erase time in the ESL-V eraser is 30 seconds maximum for any length cartridge.

Playing back an erased cart in our production room 99B cart machine with the console gains at full proved the cartridge was erased well into the noise, with no trace of any erase cycle footprint.

Cartridges erased at WCUZ's AM and FM transmitter sites, close to the towers, again showed no signs of problems when played back at full volume in the production room. There were no hints of erase spokes or prerecorded noise of any type. I was pleased with the performance in the erase circuitry of the ESL V eraser.

The ESL V model uses a new system of splice detection which incorporates a

(continued on page 31)

DELTA'S Impedance Measuring Products

INDUSTRY-STANDARD

RG-4



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- Receiver/generator isolation: >120 dB
- Generator output: to 10 VRMS into 50Ω
- Modulation: 400 Hz, 90% AM, 50 Hz square-wave
- Receiver sensitivity: 5 micro V nominal

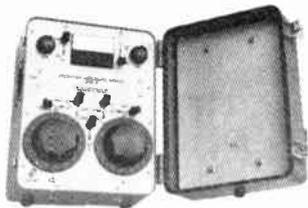
OIB-1

The **Operating Impedance Bridge** measures the impedance of networks, radiators, and the like while they operate under full power. VSWR as well as complex impedance of up to 400 ohms ± j300 ohms can be measured.



- Frequency Range: 500 kHz to 5 MHz
- Through Power Rating: 5 kW Modulated 10 kW Carrier only
- Accuracy: R and X, 2%, ± 1 ohm
- Direct Reading in R: -400 to +400 ohms, standard -1000 to +1000 ohms, optional
- Direct Reading in X: -300 to +300 ohms, standard -900 to +900 ohms, optional
- Measures VSWR: Z₀ = 0 to 400 ohms

OIB-3



The OIB-3 Operating Impedance Bridge provides extended resistance and reactance ranges, measuring up to 1000 ± j900 ohms. The bridge has a built-in carrying case and RF amplifier for improved nulling.

- Frequency Range: 500 kHz to 5 MHz
- Through Power Rating: 5 kW Modulated 10 kW Carrier only
- Direct Reading in R: -1000 to +1000 ohms
- Direct Reading in X: -900 to +900 ohms
- Accuracy: R and X, 2%, ± 1 ohm

CPB-1 (5 kW), CPB-1A (50 kW)

The **Common Point Impedance Bridge** is designed for permanent installation. It allows continuous monitoring of the common point, thus facilitating network adjustment. This model can be provided with one of Delta's TCA ammeters mounted in the front panel.

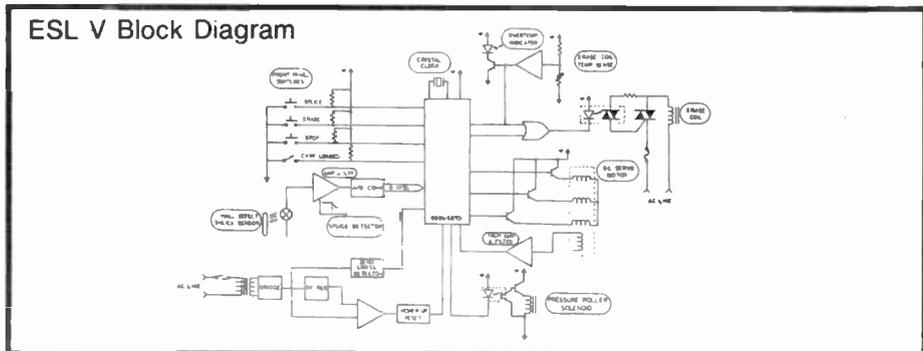


- Frequency Range: 500 to 1640 kHz
- Power Rating: CPB-1, 5 kW CPB-1A, 50 kW
- Resistance Measurements: 30 to 100 ohms Range ± 2%, ± 1 ohm accuracy
- Reactance Measurements: ± 50 ohms (1000 kHz) range ± 2%, ± 1 ohm accuracy

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Buyers Guide

EMT 258 Design New

by Karl O. Baeder, Tech Dir
EMT-Franz GmbH

New York NY ... Eliminating hiss and noise from poorly made recordings is a difficult task. Audio engineers face this problem almost daily, trying to coax usable audio from badly recorded video tracks, *n*th-generation tape dubs, old film optical tracks and worn-out records. The usual technique for remedying these problems is a low pass filter, but this often yields results worse than the original.

For just this purpose, EMT has developed a non-complementary noise reduction device. It is non-complementary because, in contrast to Dolby or dbx, the original recording is not encoded.

The objective is to reduce irritating noise, especially at high frequencies, during playback only.

The processing is activated when the signal level falls below a certain threshold and the noise becomes disturbing to the ear. At high signal levels, the system is transparent because noise is masked by the program modulation.

The device uses a sliding low pass filter with a dynamic cut-off frequency, combined with an expander and some very unique control circuitry.

The low pass filter's cutoff frequency is controlled by the program content itself. At any moment, the filter is automatically adjusted to pass the highest frequency program material while attenuating higher frequency noise components.

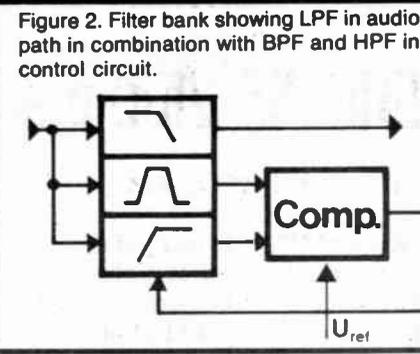
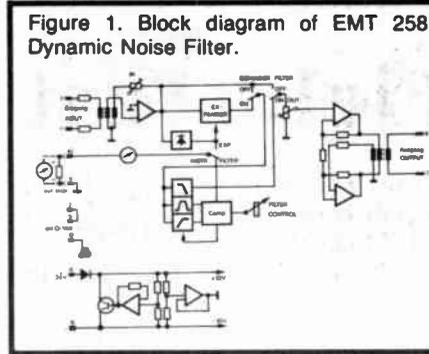
The device is called the EMT 258 dynamic noise filter. It is comprised of an expander and a filter bank (connected as shown in Figure 1). Both the expander gain and filter cutoff frequency are controlled by the incoming audio signal.

The filter control circuit is depicted separately in Figure 2. Program material passes through the low pass filter with cutoff frequency ω_0 .

In addition, the control signal is routed to separate high pass and band pass filters. The outputs from these filters are fed to an analog computer circuit, which compares their signals using ear-weighted noise sensitivity factors.

If the energy content of the high pass signal is greater than that of the band pass signal, the cutoff frequency ω_0 is too low and is shifted to a higher frequency (see Figure 3).

Filter displacement occurs very rapidly because the control circuitry compares instantaneous values. The slide time is

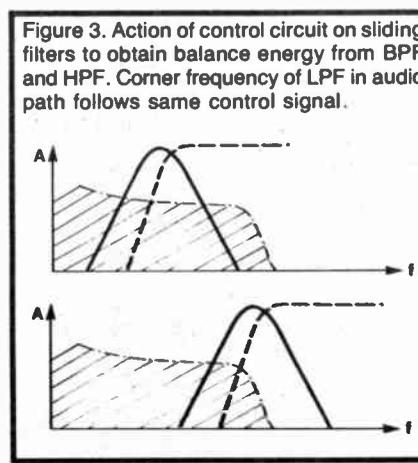


approximately 0.8 msec per octave which, in practice, proves to be inaudible.

When the energy content of both filter outputs is identical, the control circuitry recognizes that ω_0 is set correctly for the highest frequency in the program material. The low pass filter position remains at this ω_0 until a change of energy content at the outputs of the control filters is again detected.

This form of control servo has an advantage such that even instruments with a particularly high harmonic content, such as a muted trumpet, are recognized correctly. Such instruments are particularly problematic since the energy spectrum is concentrated in the fundamental and higher-order harmonics, while the lower-order harmonics are comparatively weak.

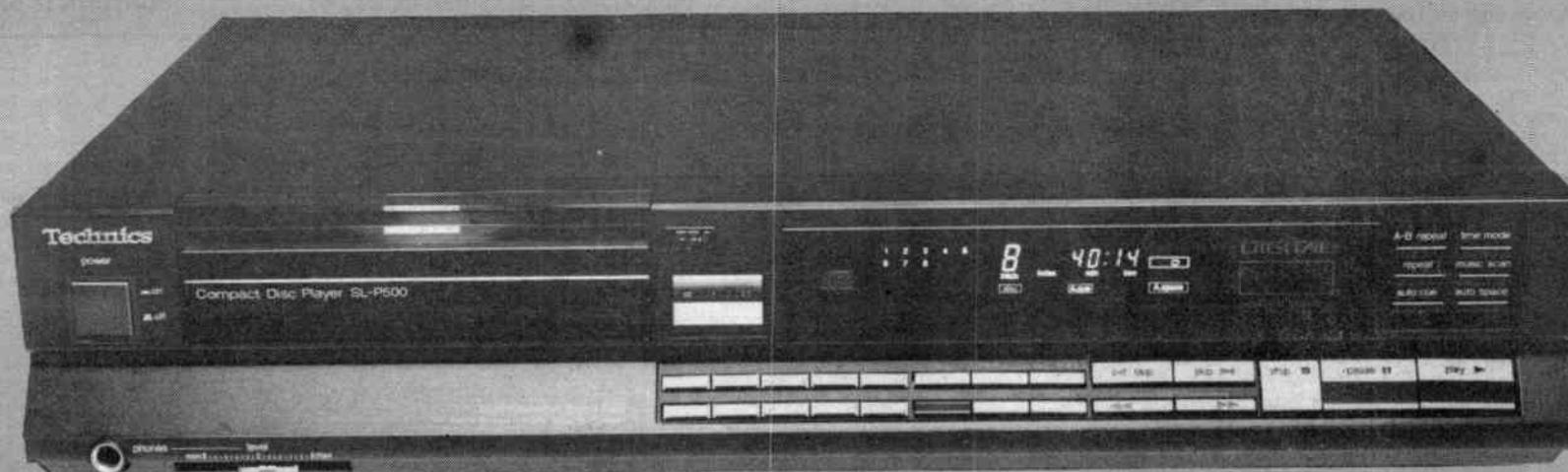
The combination of the band pass plus



high pass enables the unit to detect the upper frequency limit of the signals because the high pass has no upper limit in the transmission range. Therefore, it sends **(continued on page 31)**

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Buyers Guide

Eventide's Compression Easy

(continued from page 27)

the first of which deals with the rate at which pauses are cut out. The second deals with the more serious problem of how to cope with program material which effectively has no pauses.

Again, going to our tape splicing analogy, remember that tape is almost inevitably spliced on an angle, so that a "crossfade" occurs from one section of the tape to the other.

This prevents a click or glitch as the discontinuity crossed the tape head.

Even so, it is important to carefully select the splice point so that the listener isn't jarred by an improbable juxtaposition.

If your material has no pauses, the BD980 is forced to use its other method

of "catching down." By setting the rotary switch in the "OSC/PAUSE" mode, the unit electronically looks for good splicing points if it fails to find pauses.

It does this far faster and more accurately than a person possibly could, and removes variable lengths of program material. The unit restricts its search to splice points from about 6 to about 30 msec apart every 100 to 200 msec or so. Six to 30 msec is a typical interval during which the ear is insensitive to individual events.

The BD980 is especially successful in its search because it has more leeway in picking splicing points than do systems employing variable speed tape machines.

With these machines, the time compressor must work with the signal at

hand and, in effect, is forced to do a deletion even if the time isn't optimal.

This characteristic also allows it to time compress true stereo signals more successfully.

The BD980 is a single box. Not only does this reduce complexity, but it makes synchronization between the channels far easier than it would be if vast amounts of digital information had to be interchanged between different units.

Operationally, the system is about as simple as can be. You still need two tape machines, but they can be any type.

The setting of the rate rotary switch can be of use in certain cases. Even though there are usually no audible artifacts, and never a pitch change, there is a tempo change when the unit is operating.

The ear is much less sensitive to this than it is to pitch, so it usually doesn't matter. However, in the case where you're trying to remove one second from a long spot, you are not taxing the BD980's capabilities.

At the faster settings, it will succeed in removing the second within the first 8 seconds. When it's finished, there will be an audible tempo change.

If you slow down the BD980 so that it takes the better part of the minute to remove the one second, you do two things: you make it easier for the BD to select good splice points or pauses, and you assure, when finished that the tempo change isn't as radical, and will probably be unnoticeable.

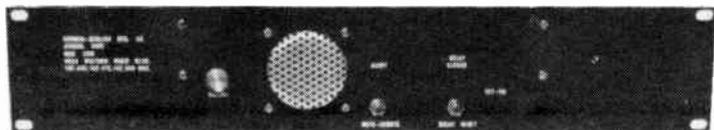
Although I've dealt almost exclusively with the Timesqueeze applications of the BD980 broadcast delay line, Timesqueeze is only one of its ancillary purposes. It was designed to be an improvement in every way over its predecessor, the BD955.

Major differences include better frequency response (20 kHz bandwidth, 50 kHz sampling), 16-bit linear PCM, more delay, full stereo in one box, additional "get into and out of the show" modes and far more sophisticated catch-up (and catch-down) modes.

Editor's note: For more information on the BD980, contact Gil Griffith at Eventide: 201-641-1200.

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JBL Amp Transparent

(continued from page 26)

amp with excellent performance under the most demanding dynamic input and load conditions.

Evidencing the emphasis on dynamic, rather than steady-state, distortion mechanisms, transient intermodulation distortion measures less than 0.03% by the DIN 100 test method.

Reliable operation of the 6215 amplifier is ensured by a conservative design.

Output current is limited under improper load or drive conditions.

An output relay protects the speaker load under conditions of DC offset or large low-frequency transients. The relay, with front panel STANDBY indicator, also provides power-up, power-down and "burn-out" muting to protect loudspeakers from power transients generated anywhere in the signal path.

Finally, critical components are monitored for overtemperature operation with the relay activating if necessary to protect the amplifier and/or speakers.

The amp is serviced by removal of the top cover. Glass epoxy circuit boards are well marked for component identification. A complete schematic is included in the instruction manual.

Editor's note: For more information on the 6215, contact Mark Gander at JBL: (818) 893-8411.

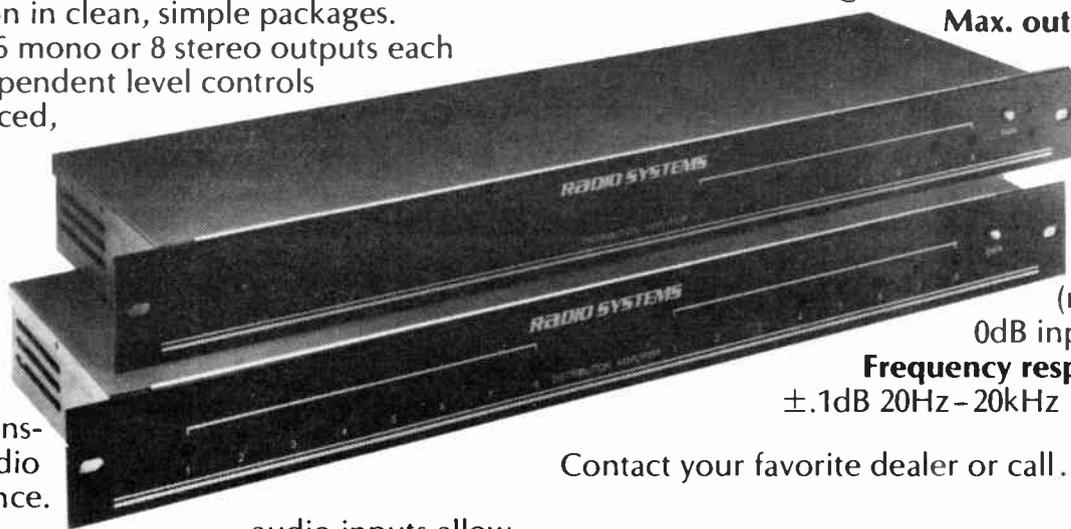
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Buyers Briefs

Shure Brothers

As part of Shure Brothers' FP (field production) line, the FP42 stereo audio mixer features two outputs (one for each stereo channel) and four balanced inputs—each one switchable for line or mic level operation.

Each input channel also has a low-frequency rolloff switch and a center-detented stereo pan pot for stereo mixing convenience. The Shure FP42 also has a concentric clutched master level control and a pull-pot cueing feature that permits cueing or checking of each input via headphones.

Mini and 1/4" stereo headphone jacks, with level control, are included. In addition, dual VU meters may be calibrated for +4 dBm and +8 dBm with a range switch.

Other features include built-in stereo

peak limiters, phantom power for condenser microphone operation, a tone oscillator for line tests and level checks, direct mix bus for stacking units and a choice of battery or AC operation.

For more information, contact John Phelan at Shure: 312-866-2527.

Klark-Teknik Electronics

Klark-Teknik's DN780 digital reverbator/processor is a compact, 3 1/2" high, 19" rackmount unit equipped with a small remote control unit.

With a software-based design, the DN780 can be updated as new computer programs are developed. Software updates are free to the buyer for up to two years after the date of purchase. The system uses a 16-bit linear A/D, D/A converter that is followed by a proprietary 32-bit arithmetic processor, which gives

the DN780 quality digital reverberation at a relatively modest price.

The DN780 presently has 28 of the possible 39 factory preset locations allocated. These presets are concert halls (1-5), plates (6-10), chambers (11-15) and rooms (16-20). Programs 26, 27 and 28 are the Gated Decay Programs, known respectively as alive, nonlinear and reverse decay.

Programs 30 to 35 are effects pro-

grams, and include delay, automatic double tracking and multitap echo among others.

The DN780's main control parameters are pre-delay, pattern (or density of early reflections), level (of early reflections relative to the level of reverberation), decay time, low and high frequency (boost and cut) and room size.

For more information, contact Jack Kelly at Klark-Teknik: 516-249-3660.

ESL V Aces Field Tests

(continued from page 28)

Hall effect splice sensor. The Hall effect sensor replaces the old coil detector found in the earlier ESL-IV version.

The Hall effect sensor system provided error-free splice detection. Even tapping on the unit while splice detecting would not cause a false splice detect. This system is also adjustment-free, which was another big surprise.

Servicing is made via a removable top cover. This top cover only partially covers the cartridge, which allows viewing the cart while erasing and splice locating.

Only a few components are mounted external to the PC card. Assemblies are concentrated into two major modules which can be easily moved away from the chassis, making servicing possible.

A manual included with the unit is

loaded with pictorials.

The ESL V eraser/splice locator is a much improved version of the reliable ESL-IV model. WCUC's announcers and news people couldn't break it, and it passed all of my performance tests.

Our sister station WCKY in Cincinnati also received a prototype ESL V machine from ITC. They too reported no problems with their unit, and conducted similar tests with the same results. The staff at both stations loved the prototypes so much that we have since purchased and received ESL V eraser/splice locators at both stations.

Editor's note: For more information, contact Bill Parfitt at ITC: 309-828-1381. Readers may contact the author at 616-451-2551.

EMT 258 Design New

(continued from page 29)

ses the higher-order harmonics properly and is not fooled by the dropoff in lower-order harmonic energy.

The low pass filter in the audio signal path has an attenuation of 12 dB per octave and a cutoff frequency that varies from 1 kHz to 20 kHz.

The expander section of the unit acts as noise reduction for lower level signal components below 1 kHz. The circuitry uses feed-forward control to ensure operating stability.

Expanders with an especially wide operating range can usually only be used with great caution due to unavoidable background noise modulation. There is no such restriction here, since the expander is located ahead of the filter and is effective only in conjunction with it.

The noise pumping effect, particularly for minimally masked signals, is eliminated by the closing of the subsequent filter.

The EMT 258 dynamic noise filter is available as a vertical cassette for 24 V

powering in consoles or in a horizontal rack mount configuration with 120 V.

The meter is switchable to a monitor filter frequency position or to expander gain. The filter control knob sets the level sensitivity over a 40 dB range.

Filter release time is variable, between 0.05-2 sec. The expander section may be switched on or off, and has a variable threshold setting.

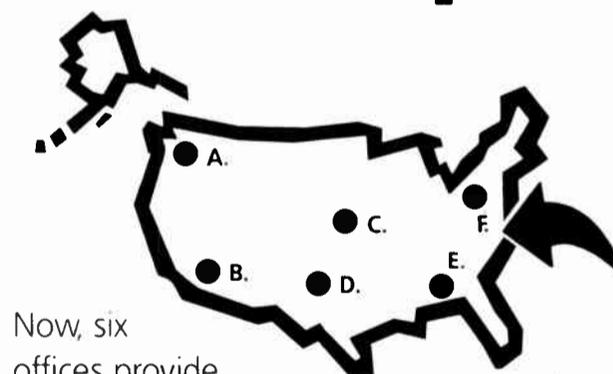
Input/output levels are screwdriver adjustable from the front panel. The unit operates at line level with a unity gain, and has balanced, floating inputs and outputs.

Tomorrow, when someone shows up at your station with a poor quality cassette dub of a hissy recording or some noisy videotape tracks, this easy-to-use device will solve your problem.

Editor's note: EMT-Franz is represented in the US by Gotham Audio Corp. Call Jerry Graham at Gotham for more information: 212-741-7411.

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