

DAB Proposed For DC, MA

by Benn Kobb

Washington DC A Louisiana-based radio broadcasting consultant has requested FCC permission to experiment with digital audio broadcasting (DAB) using television spectrum in Boston and Washington, DC.

Strother Communications Inc., formed by Ronald Strother just for this experimental venture, filed 23 May for use of channel 14 in Washington and channel 32 in Boston.

In Washington, he proposes a power level of 1 kW nondirectional at 200 meters HAAT. The channel is assigned

to WTMW, a station that holds a CP but has not completed construction. In Boston, the company proposes a 2 kW transmission at a height of 166 meters HAAT.

The emission would use Coded Orthogonal Frequency Division Multiplex, the system used in the European Eureka DAB technology, in a 4 MHz-wide channel with 2 MHz of guardbands for the full 6 MHz TV channel. The experiments would take at least one year.

In its application, SCI said it does not

approach DAB "only in the narrow confines of traditional radio broadcasting . . . The large channel capacity of DAB should enable DAB to function as a 'wireless audio cable' service to provide the public with highly specialized, community specific broadcasts."

These would include local government and sports channels, programming for the blind, commuter channels and call-in classified and employment advertising.

(continued on page 9)

Stations Scramble to Meet NRSC Deadline

by Charles Taylor

Washington DC With the deadline for the FCC's noise-reducing NRSC emission standard just days away, manufacturers of compliance equipment are experiencing a boon in last-minute orders.

But, say some of the vendors, at least a portion of the nation's 5000 AM stations, for which the standard was designed, are telling manufacturers that they intend to hold back on the expense until they see that the Commission is serious about enforcement.

Installation of NRSC equipment will

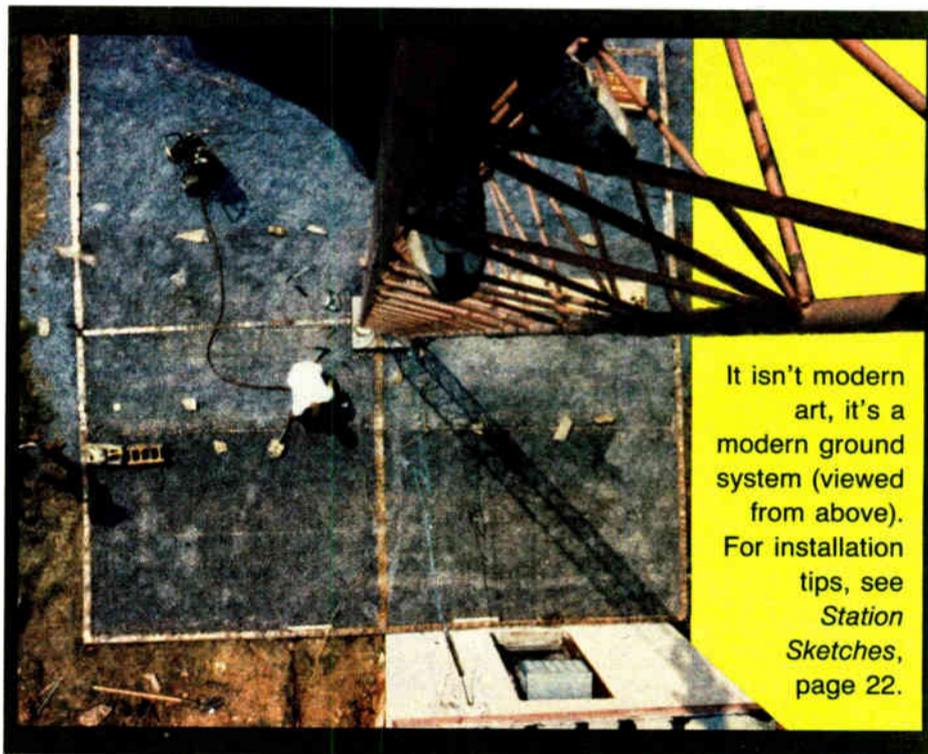
cost most AMs between \$500 and \$1000, according to the NAB.

William Hassinger, the FCC's assistant engineering Mass Media Bureau chief, made clear he has little patience for those hesitant to comply.

Mutual support

"This standard is designed to help existing stations so that they don't cause interference to each other. It's mutual support for the service," Hassinger said. "If they're not willing to do this, I don't know what it says about their commitment to broadcasting."

(continued on page 3)



It isn't modern art, it's a modern ground system (viewed from above). For installation tips, see Station Sketches, page 22.

NAB Pressed on DAB

by Alan Carter

Washington DC Some leading group engineers have put pressure on NAB to make a move toward helping terrestrial FM compete in the digital domain.

The *ad hoc* group, called The Advanced Radio Committee, has been waiting for a position statement from the NAB, expected after the board was to meet in mid-June.

NAB Executive Operations VP John Abel said one recommendation would be the establishment of a task force to evaluate the situation with digital audio broadcasting (DAB) and direct broadcast satellite delivery (DBS). He expected members could include the companies the engineers represent.

Abel also suggested he did not believe NAB could support satellite applications for radio delivery, and he questioned the

ramifications of digital broadcasting.

"I don't see how the association could be very much in support of a satellite application," Abel said. "I think that violates our basic reason for existing. To the extent that NAB is interested in this at all, it has to be done pretty much the way we see broadcasting done now, in terms of having local stations serve local interests."

With digital, he noted that questions have to be settled concerning spectrum allocation, terrestrial components and receiver development, just to name several areas. "It's not going to happen overnight. It's going to take a long time to implement such a system."

While the engineers who have been discussing digital applications for FM—a process that began at NAB '90—are giving NAB an opportunity to participate,

(continued on page 7)

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FCC Fees Rankle NAB, IBS

by John Gatski

Washington DC New FCC fees levied on permits for station personnel operating equipment and status of ownership reports, have been criticized as unnecessary and a monetary hardship.

The two fees were singled out by separate groups: the NAB and the Intercollegiate Broadcasting System (IBS).

The IBS has filed a petition with the FCC to waive a new \$35 fee for permits required for

station personnel to operate transmission equipment (i.e. DJs, etc.). The exemption would cover those who work for non-commercial stations and educational broadcast stations. National Public Radio and the National Federation of Community Broadcasters also support the proposed exemption.

Not in best interest

According to the IBS, the fee will adversely affect most announcers at the nation's 1400 mostly non-commercial FM col-

IBS said it believes the way that Congress mandated the fee increases to the FCC was unfair.

lege stations who usually operate the equipment.

"The fee will discourage students from participating in college radio... and will discourage newcomers from volunteering at community radio stations," IBS President Jeff

Tellis said.

"It's a real burden on our stations trying to recruit students. Most of them depend on volunteers and now the FCC is asking

them to fork over \$35," he added.

The new operator permit fee, classified as a restricted radiotelephone operator permit, and other new and increased FCC fees were the result of a congressional mandate last year to reduce the federal deficit.

IBS, however, said it believes the way that Congress mandated the fee increases to the FCC was unfair.

"The budget process by Congress that was imposed on the FCC had no chance for input," Tellis said.

Ask for help

IBS has asked its members to notify their congressmen or senators to ask them to support the new exemption.

The NAB has objected to another \$35 fee levied on broadcast stations that have to file an ownership status, which is required even if no change has been made.

Under the new fee schedule, stations must pay \$35 to file a one sentence letter stating there has been no change in ownership.

The fee also is required if there has been a change, but the NAB does not oppose that charge because of the extra paperwork required.

As for paying \$35 for a one sentence filing, "broadcasters object to it on principle," the NAB said in a recent statement.

The NAB said the fee would result in the FCC "unjustifiably" collecting \$300,000 from stations each year.

The NAB has asked the FCC for a transition period of at least six months that waives new fees and penalties for non-compliance until stations become familiar with the new fee structure.

The FCC declined to comment on the IBS and NAB requests because they are under consideration.

FCC News Media Chief Steve Svab did acknowledge there was a "significant increase" in filings made under the old fee schedule prior to the 21 May changeover.

For more information about FCC fees, contact the fees office, 202-632-FEES.

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NRSC Deadline's Eleventh Hour

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Hassinger added that the FCC does not plan any special enforcement action to check up on stations' implementation of NRSC. But, he warned:

"I don't know if people realize the magnitude of how much we find out about from letters and phone calls. Besides, this is one situation where a station that doesn't do it will clearly stand out."

Take heed or pay the price

The FCC, meanwhile, has made clear that it expects all stations to take heed of its rule making. In a May public notice, the Commission wrote that it plans no extension of its 30 June implementation date and noted fines of \$25,000 per willful violation.

"We believe that compliance with the NRSC standards is very important to alleviating adjacent channel interference in the AM broadcast band and to improving the quality of the AM broadcast service," the FCC said. "Therefore, any delay in conforming AM stations to the NRSC standards would not serve the public interest."

The mandate requiring NRSC was approved more than a year ago, in April 1989, under a two-step plan. NRSC-2, required under the 30 June deadline, defines a station's transmission parameters and reduces occupied bandwidth from 15 kHz to 10 kHz.

But if a station implements an NRSC-

1 preemphasis audio standard that reduces occupied bandwidth to 10 kHz with processing filters, the Commission will acknowledge compliance of NRSC-2 until 30 June 1994.

Resistance to meet the standard

Still, manufacturers are meeting resistance from some in the marketplace who refuse to put in place compliance equipment, despite the Commission's order.

"I think it's just human nature that no one wants to be told what to do," said Inovonics Marketing Manager Jim Wood. "There are no negatives to the NRSC standard. It's not like they're taking anyone's power away, so I think most of them will come around. Besides, those that don't will stick out like a sore thumb."

Added Bill Ammons, TV and radio products manager for CRL, "There are those who say they're going to see if the FCC really comes out and enforces this."

One vendor who asked not to be named said that a few stations have said they will not implement NRSC until they are made to do so by the Commission.

"With that mentality, the broadcaster is really cutting his nose off to spite his face," the vendor said. "Why would the broadcaster not do something that not only will benefit himself but the band in general? And the band needs a lot of help right now."

From the broad perspective, however,

it appears that the majority of AMs are making moves toward implementing either NRSC-2 or NRSC-1. As of the beginning of June, more than 2000 stations had acknowledged compliance with the standard, according to Stan Salek, an engineer with NAB's Science & Technology division.

"We've talked to a number of manufacturers and haven't heard any word of any shortages of equipment due to incredi-

CRL's Ammons.

"We expect June orders to be ungodly," he added. "A lot of these people seem to figure that if they have something on order, even if it's not delivered until September, that they're still in compliance."

So far, CRL has equipped about 1650 stations with NRSC equipment, Ammons said. He estimated that by the end of June, another 200 to 300 orders will have been placed.

Wood at Inovonics said that his company would have trouble meeting the 30 June deadline with orders placed after the first week of the month.

"We've had 200 orders in the last cou-

"... this is one situation where a station that doesn't do it will clearly stand out."

ble backlogs, so we have no reason to expect anything but full compliance by (30 June)," he said.

According to dealers and manufacturers contacted by *Radio World*, however, late orders could push a number of stations' implementation months behind the deadline.

Still haven't ordered

"There's one guy I talked to in December about getting the equipment. He said he's going to order in the next day or two. Another we talked to a year ago and they still haven't ordered," said

ple weeks," he said. "Everybody and his brother is coming out of the woodwork and ordering NRSC processors."

Allied National Sales Manager Dave Burns said that over the last couple months, sales of the equipment have increased for them about 10% a week.

"I doubt we're going to be able to supply the units by the deadline," Burns said. "A lot of people are waiting until the last minute."

For information, contact the FCC Mass Media Bureau at 202-632-6460; CRL at 602-438-0888; Inovonics at 408-458-0552; and Allied at 800-622-0022.

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A Deadline To Do AM Proud

by Judith Gross

Falls Church VA It finally got here. Yeah, summer, but I'm actually referring to the NRSC deadline. Just a few days from now.

I remember back a few years to when it was nothing more than a vague desire to help AM. Controversies and verbal battles about what the problem was, exactly, and how it might be remedied raged, and compromises were forged until here we are, with an FCC rule and some impressive cooperation from the industry.

Manufacturers, stations and the EIA and NAB have all made it possible and ought to feel proud of the effort. But I've



heard through the usual grapevine that some stations, especially in smaller markets, are putting off the move to NRSC unless forced to do it by a visit from the FCC.

Now, I know it's an out-of-pocket expense—no walk in the park for a struggling AM. And I'm not insensitive to that, some complaints from small market broadcasters I've received to the contrary (thanks for the feedback from the small AM owner who wanted me to get a real job. What do ya call this, chopped liver?)

But since no fairy godmother is waiting in the wings to help AM survive these

highly competitive times, it comes right down to AMers helping themselves.

It's never a good idea to thumb your nose at an FCC rule anyway (deregulation notwithstanding), but this time you are not just hurting yourselves. Stations who don't go NRSC are fouling up the band for their neighbors, too. And don't be too sure that one of them won't be on the phone to the field office to let them know.

Bill Hassinger over at the Mass Media Bureau tells us that the Commission will not be kind to stations who flout the rule. 'Nuff said.

☆☆☆

On the subject of new, improved NRSC receivers for AM, Philips has joined Denon in bringing out a model. The company had one at the summer CES in Chicago.

To both companies let's say, "Thank you, thank you, thank you." Just one little thing. As long as you were going for fidelity, why the heck didn't you make 'em stereo?

One new Denon receiver that will have AM stereo is that company's version of—yes, finally—the NAB super radio.

Denon and NAB have an agreement for the radio's manufacture. This comes just under two years since the gold lamé cover was first pulled off the non-working model at Radio '88.

But Denon is interested in pursuing the high tech design which featured improvements for both AM (noise blanking, NRSC, stereo) and FM (FMX). Be interesting to see how many features the company incorporates. Stay tuned, we'll tell you more next time.

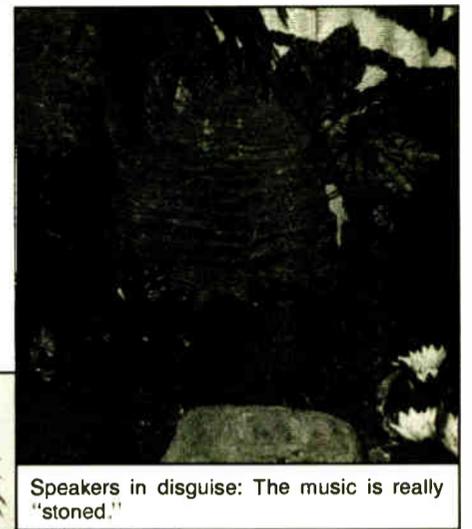
☆☆☆

The latest from the digital front has a third company filing with the Commis-

sion. This one wants to experiment with DAB using two TV channels (see story this issue).

Also, Canada is into a test-demo of the European system in several cities. And by the time you read this, the NAB may have formulated some definite policy about digital broadcasting and its impact on US radio stations.

The only thing certain right now is that it can't be ignored.



Speakers in disguise: The music is really "stoned."

Don't look now, but the stones are spouting music. No, not the Rolling Stones, but the StereoStones™. They're those cute little rocks I mentioned some time ago which have stereo speakers inside them.

They showed up at the summer CES, some complete with waterfalls. The StereoStone company makes them in three different shapes of stone (they all look alike to me) and a choice of four colors: black lava, grey granite, brown sandstone and burnt rust (what, no mauve?).

Imagine, your favorite tunes pouring out of a mere rock on your front lawn! Those rocks can really rock. You might have guessed the StereoStone folks are based out of Hollywood, CA (where else?).

From Kevin Fitzgerald at WKGB-FM in Susquehanna, PA near Binghamton, my old stomping grounds came a blast

from the past from the FCC showing a filing fee for a Class A FM at a mere \$100.

They got you on the license fee, though, which cost \$900 for the same Class A. Thanks, Kev, but does Gorbachev know about your call letters?

Debbie Storz at Econco wanted me to pass on the fact that the company has a booklet called *Tube Topics*. It's a guide for engineers who need to know all about vacuum tubes. Call Econco at 800-532-6626 for a copy.

And from the *Wall Street Journal* comes word of a poll for Robert Half International Inc., Menlo Park, CA. Conclusion: Engineers have ethics.

Some 34% of executives surveyed cited engineers as being the most ethical type of professional. They beat out CPAs (24%) and investment bankers (1%). Gee, I don't suppose politicians or lawyers were even included on the survey. As for newspaper columnists . . . forget it.

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Digital problems

Dear RW,

Steve Crowley has been writing about the Eureka 147 digital audio broadcasting system in glowing terms. However all is not rosy.

While I am very enthusiastic about digital audio—I love compact discs, R-DAT and the DAT-32 digital satellite audio system used by the major radio networks—not all digital systems are good!

Those of us who are critical listeners, "golden ears," who wish to hear audio reproduction become better than what was available with past technology, balk at data compression schemes that claim to be able to reduce audio data by taking into account psychoacoustic effects. Every nuance is important to critical listeners. Removing and not restoring any portion of an audio signal will ultimately be audible. So data compression will work only if the process permits full restoration at the receiver.

The LP has survived until now because its analog technology has been able to faithfully capture and reproduce everything caught by the microphone. True, the medium wears with every playing and only the more exotic turn-

tables, arms, cartridges and preamplifiers can do it justice, but CDs suffer similar, though less obvious, reproduction problems.

Digital audio technology is getting better yearly. The analog to digital processing and the digital to analog processing is improving. Greater attention is being given to the performance of the analog amplifiers at both ends. Though the difference between lower cost and high performance CD players or R-DATs is not nearly as great as LP equipment, it is audible.

Almost every entertainment technology has limitations on performance based upon economic and other constraints. At a time of greatly accelerated technological advancement this leaves the door open to rapid obsolescence. For the CD and R-DAT it is the 16 bit sample which some experts feel is too low. I, for one, can hear the difference between 15 and 16 bits. I've not had the opportunity to compare higher quantizing rates.

AM radio is limited now, thanks to NRSC-1, to 10 kHz bandwidth. Just think how wonderful AM could have been if frequency allocations permitted a channel width of 20 kHz. That would have allowed full 15 kHz modulation with a 5 kHz guard band. FM stereo audio bandwidth without splatter!

FM is also not without constraints. When I was a kid growing up in New York City I discovered the FM band a couple of years before stations went stereo. I purchased a "Lafayette Radio" vacuum tube tuner with early stereo multiplex circuitry. One had to manually switch it to stereo.

As a result, in monaural it was widebanded, no 15 kHz low pass filters. So were my ears in those youthful days! Those pre-stereo FMs had wonderful audio—a lot of high frequency material above 15 kHz. Whenever a station installed a stereo generator but was not ready to turn on its pilot, I always noticed a very obvious loss of high end.

CDs sample at 44.1 kHz permitting a 20 kHz bandwidth. Therefore no FM stereo station can faithfully reproduce a CD. Unlike AM frequency allocations, FM allocations do have the bandwidth to not compromise the music.

What went wrong was the adoption of a stereo standard that would permit the continuation of SCAs. Had the FCC permitted SCAs to be discontinued, or allowed for future SCA technology at 92 kHz as practiced today, a stereo system with a 44 kHz subcarrier rather than 88 kHz would have been possible. FM would have not so severely degraded its audio future.

Coming soon to a telephone subscriber loop near you is ISDN. This wideband telephone technology will eventually, through optical fiber, support almost limitless bandwidth. Audio data compression will not be important with this communications medium. And the medium is flexible enough to be able to deliver any present or future audio data rate or format to the end user.

With the deadline for implementation of the NRSC standard only days away, it's gratifying to see the vast numbers of AM stations who have already made the conversion.

Not only have these stations expended time and money to bring their listeners a quality signal, they have also accepted new limits on their occupied bandwidth in order to clean up the band overall.

This shows them to be responsible license holders as well as good neighbors.

In addition, those stations which have implemented the transmission standard (NRSC-2) by installing new processing (NRSC-1) can enjoy the luxury of the FCC's "presumed compliance" until 1994.

But an eleventh-hour scan of the industry shows that there are still a number of stations which have not yet converted to the standard and some which may be dragging their heels in doing so.

It's Now The Law

Aside from the fines which will result if the FCC discovers non-compliance, these stations should be concerned about the harm they are inflicting on adjacent stations and on the ailing AM band.

While the modifications necessary for NRSC conversion do carry

an initial expense, the benefits to all AM stations of reduced interference are great enough to warrant the sacrifice.

Quick acceptance of NRSC will also help speed new, higher fidelity radios into the marketplace.

Two companies—Denon and Philips—have already shown prototype NRSC receivers and the rest will hopefully follow suit.

By complying with this new rule and not waiting for the FCC inspector's visit, many AM stations have sent the clear message that they are willing to take the initiative towards improving their predicament.

Those who are still procrastinating should follow suit. It's a rule, it makes sense and it is an opportunity to insure a better future for AM.

—RW

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Next Issue
Radio World
July 11, 1990

Eureka or any other technology that limits its audio data bandwidth and by so doing forfeits its ultimate fidelity will be quickly made obsolete by other unrestricted wideband delivery systems. Do we want to condemn a future broadcasting system to instant obsolescence? I think not.

We require the vision to adopt new broadcast technologies whose formats do not limit the quality of the product or its future enhancements.

Ira A. Wilner, Contract Engineer and Consultant
Wilner Associates
Putney, VT

Simulcasting helps small AMs

Dear RW:

J.G., I agree with you—to some extent—that AM/FM simulcasting may not be the best for the industry ... but only in major markets.

Consider the average *medium* or *small* market simulcaster. Here we are, starving for affordable talent in markets that are already loaded with stations on both bands trying to compete with a wide-ranging format that is pleasing to our audience and delivers enough of them to make the place more appealing to clients.

Stations like ours which simulcast 100% do a great service to our markets: offering the listener the band of his choice with the programming he demands.

I agree that major-markets should not simulcast more than a small fraction of their broadcast day. But then again, we're talking full-service AMs in most cases while smaller market stations are by and large daytimers and need FM simulcast for early morning and late evening service to the city of license.

Besides, simulcasting is a programming decision, best left up to the programming staff of the station, allowing the Commission more time and

resources to keep the legal and technical aspects "up to specs," so to speak.

In other words, J.G., simulcasting service is best for some, an excuse for others. But it's a choice best left to the operators!

Martin M. Bakner, PD

WSKE

Everett, IA

Make AM and FM equal

Dear RW:

Radio World has recently published several stories concerning the future of AM radio. After reading several of these stories and several letters to your readers forum I felt that there should be a few more items to point out.

AM daytimers have been getting the short end of the deal for years. At our radio station we installed the FM to give us a chance to broaden our coverage of the area including local sports, news and other programming. We could never have done this with just the daytime AM.

If the FCC decides to have all simulcasting come to an end, it would put a great financial burden on daytime AMs that have had no choice but to ride along with their sister FM due to the fact that they cannot do battle against each other fairly.

If you want to end the simulcasting, make the weapons of AM and FM equal. Allow all daytimers to broadcast at night. This law is over 50 years old and was designed for the 1930s, so someone please tell the FCC and Congress that we are now in the 1990s!

Otherwise the daytime AMs will never be on the same level of the FMs that they share programming with. I believe that this must take place first, before all other decisions on AM take place.

Richard R. Flacksbarth

KMAV Radio, Inc.

Mayville, ND

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Prestholdt Antenna Test Begins

by John Gatski

College Park MD Signal testing of the NAB's experimental anti-skywave AM antenna was scheduled to begin 10 June and last up to 10 consecutive days.

The antenna, designed by engineer Ogden Prestholdt, theoretically can create a directional skywave null, which could help reduce nighttime interference.

If the antenna works as Prestholdt predicts, a successful null should have as much as 20 dB of suppression, NAB Staff Engineer Kelly Williams explained.

Once compiled and analyzed, the anti-skywave antenna project results will be released at the NAB's Radio Show this fall in Boston.

Monitor from Jersey

The testing will include transmission of a 400 W signal from the transmitter/antenna site located near College Park, MD, from about 9 PM to 3 AM on each test day.

But, already delayed several times due to weather and bureaucratic snags since

1989, the anti-skywave tests could take longer than a week if an intense sunspot cycle does not ease, Williams noted.

The Prestholdt antenna is a 190° based-fed 290' structure (with tower). It's

determined, will be sent to the Pittsburgh area to monitor for any undesirable signal reduction of the useful parts of the skywave.

The Pittsburgh area was chosen based

Other consultants involved in the anti-skywave project include Ron Rackley with du Treil, Lundin & Rackley in Washington, DC, and T.Z. Sawyer Technical Consulting Service, Chevy Chase, MD.

The \$100,000 project is one of several AM antenna projects that are ongoing with the NAB.

A low-profile antenna design project, which was last updated in a progress report at the NAB spring show in Atlanta, is now in the computer modeling stage to determine the best theoretical design, Williams said.

For more information, contact Kelly Williams at the NAB, 202-429-5346.

If the antenna works as Prestholdt predicts, a successful null should have as much as 20 dB of suppression . . .

design is based on a vertical radiator and horizontal radiator linked together through a series of matching networks.

During the testing, Prestholdt will monitor the signal from a site selected 165 miles from the antenna site in Plainville, NJ. The signal will be monitored with a field strength meter and a strip chart.

Both a carrier and some modulated material (FCC call letters ID of the test station and test announcements) will be broadcast on the 1600 kHz test frequency.

Another monitoring team, yet to be

on mathematical calculations of the signal 47° from the antenna, according to Williams.

If the antenna performs as expected, it will allow the null to be steered in any direction, Williams said.

Groundwave testing

The groundwave also will be measured to determine whether the anti-skywave properties of the antenna diminish the desired signal or leave it undisturbed, according to Williams.

Lockett, however, noted that NPR's commitment to the work depends on financial obligations, the official status of the group and the final mission statement.

Network, group interest

At ABC, Radio Satellite Systems GM Bob Donnelly said his interests were digital audio transmission and digital signal processing. "What we want to do is maintain our place in the market."

He stressed that ABC is looking to NAB for guidance on technical expertise.

"We want to see a process, and step one is the NAB's move," Donnelly said. "How are you going to help us? What are you going to do for us?"

Gannett Radio Engineering VP Paul Donahue, acting chairman of the group, has said the committee will wait for NAB action before making another move.

DAB Waits for NAB

(continued from page 1)

some indicate they may move ahead with or without NAB.

"If they're going to do it—good, we want to be a part," said Tony Masiello, CBS technical operations director. "If not, I think we need to do it. We owe it to the industry and ourselves."

CBS's interest is to "explore the technology," and Masiello stressed the "local" aspect of US broadcasting as opposed to satellite delivery.

Staying informed

Susquehanna Radio Senior VP Charlie Morgan also said he wanted to learn more because, "I don't think we can get caught

with our heads stuck in the sand."

Morgan said attention will focus on how NAB approaches the issue of a task force. "You can form a task force to aggressively seek solutions or you can form a task force," he said.

National Public Radio (NPR) Engineering Director Don Lockett explained that one of the first steps the *ad hoc* group has considered is bringing a DAB presentation to Washington for broadcasters and Congress.

The demonstration would be terrestrial with a low-power transmission to show effects on shadowing and multipath. Visibility is the rationale behind the demo, he said.

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NAB Board Eyes Radio in Europe

by Alan Carter

Washington DC Broadcasters in Eastern Europe, who under communist rule had no choice in how they ran the radio stations, now want their US counterparts to help them put together private operations.

And with the deregulation of broadcasting elsewhere in Europe, a new market is opening up.

Opportunities for American broadcasters overseas was an issue expected

... with the deregulation of broadcasting elsewhere in Europe, a new market is opening up.

to be high on the priority list at the NAB board meeting in mid-June, according to NAB Executive Operations VP John Abel.

A new association

Subjects to be discussed included a proposal from one board member that NAB consider forming a parallel inter-

national association and a recommendation that NAB sponsor conferences and seminars on US broadcasting for an international market.

The international arena is much under discussion at NAB with numerous executives having traveled recently to Europe. Abel, President/CEO Eddie Fritts and board Chairman Lowry Mays recently returned from there, along with Research and Planning Senior VP Rick Ducey. Their trip followed that of Science and Technology Senior VP Michael Rau.

Abel, now at the helm of NAB conventions and meetings, said the association is evaluating new international challenges for broadcasters and where they fit into current and future operations.

"We've had people from Poland, Czechoslovakia, Hungary, Romania, the Soviet Union and every major Western European country in here asking about how to do private broadcasting," Abel said. "From Poland, they sent 12 people and wanted us to tell them how to set up a private broadcasting system."

"They want us to come there with consultants and do it."

Finding a format

Abel said NAB is not structured to function in that manner. But he continued that the association is a conduit

for Europeans to learn about US broadcasting through its conventions and meetings.

"They (Europeans) also can interact with American broadcasters, and American broadcasters have lots of opportunities in Europe. It may not be obvious to them at this point," he continued, "but there are lots of opportunities."

In addition to ownership and equity positions, Abel listed programming syndication and consulting.

"They need help in setting up simple things about how advertising works. How do you set up a station? What is a broadcast station? How does private broadcasting work?"

NAB and Europe

As for NAB, Abel said his travels indicate to him that the NAB spring show and the fall radio show, in addition to the existing video exhibitions in Europe, are about all the equipment trade shows the market can handle.

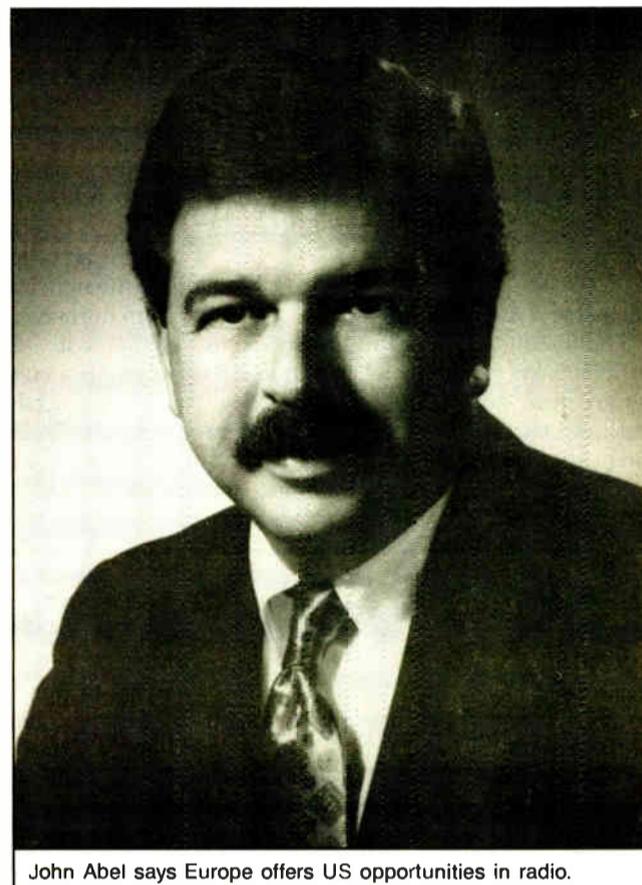
To Europeans, "NAB" means the spring show, he said.

"That is our strength," he said. "We just need to make it better in terms of having the international attendee, doing something for the international attendee when they get here, helping them understand this equipment exhibit."

But Abel continued that the staff would be making recommendations to the board on conferences and symposiums for the international market. He

could not give details, although there is speculation that NAB may have an interest in sponsoring a trade show overseas.

Abel explained that foreign broadcasters cannot be regular members of NAB but can join as associate members. That does not give them a board seat or



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FM Relocation Faces Opposition

by Charles Taylor

Washington DC An Alabama broadcaster's request to relocate his FM to an unserved Georgia suburb continues to meet opposition from those who claim the move is an underhanded attempt to re-establish the station close to the lucrative suburban Atlanta market.

But Emerald Broadcasting in Anniston, AL, which in February filed with the FCC to move its WHMA-FM 90 miles away to Sandy Springs, GA, stands by its premise that the move is permissible under new city-of-license rules and will result in new primary FM service to almost two million people without loss of service to the Anniston community.

"Emerald's proposal to move WHMA from Anniston to Sandy Springs is a sit-

uation where the Commission's rules have worked well," the company said in recently filed reply comments. "The private financial motives behind Emerald's proposal are undeniable, but in the best tradition of market-driven behavior, private motives and the public good march hand in hand."

Meanwhile, Emerald has filed a second petition to move KRWR in Carson City, CA, to Fair Oaks, CA, about 10 miles outside Sacramento. The company said Fair Oaks has no station providing local service, while Carson City has at least six stations.

But broadcasters filing reply comments on the Georgia move raise objections to the concept.

"Emerald's proposal represents nothing more than a thinly veiled effort to subvert Communications Act requirements and relocate a radio station to a much larger market," said the NAB. "In its proposal, Emerald characterized its move as a simple relocation of transmission facilities."

Jacor Broadcasting, the licensee of Atlanta's WGST and WPCH, said that Emerald's proposal "actually undermines the Commission's allotment goals

by robbing the poor to serve the rich."

Capital Cities/ABC echoed the sentiment with the claim that the move would take service from an underserved community and add a 25th service to the Atlanta market: "This is an inappropriate use of the Commission's rules and would violate the policy of providing localized service for small communities."

Responses from Emerald owner Tom Gammon took a cool tone. "The Commission should have no problem recognizing anticompetitive urges under the guise of the public interest," he said.

DAB Tests Proposed

(continued from page 1)

In an interview, Strother said he hopes to have demonstration vans that can be driven to various points in the coverage areas of his experimental stations.

The vans will contain FM and DAB receivers for comparison of the two. He intends to distribute small numbers of receivers to persons outside SCI and will perform market research with focus groups.

SCI expects to receive cooperation from the Eureka DAB consortium after a planning meeting in Germany at the end of June. Strother also told the FCC that he intends to employ two European engineers who are highly experienced in DAB as consultants.

"I see a danger of the US becoming mired in lengthy proceedings to integrate new technologies into the marketplace, as we are experiencing with HDTV," he said. "Of course, finding spectrum for DAB will be a great challenge to the FCC and to the industry. The technical and manufacturing issues may be smaller compared to the spectrum issue."

Strother emphasized that he will only experiment with DAB in the UHF TV band and has not proposed that band as a permanent home for DAB.

FCC Chief Engineer Tom Stanley, at a recent panel on spectrum issues, said that the DAB issues are similar to high definition television; that is, how does a terrestrial network move into the next generation of quality and service?

"It's tough enough for television," he said. "I don't know completely how you do it for AM and FM."

"In the past, a purely digital radio service meant a lot of spectrum," he said. "One possible answer is to find the spectrum in the TV bands. But we're trying to find spectrum there for HDTV . . . DAB has a great deal of appeal, but where do we put it?"

Stanley suggested that his agency may come out with an inquiry into DAB technical issues sometime in the next fiscal year.

For more information, contact SCI in Hammond, LA, at 504-542-9275.

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Coping with the Burnout Factor

by John Cummuta

Downers Grove II You rise through the ranks of engineers at your station, or you climb from small markets to the major leagues—and now you're in charge.

So, how come it's not fun anymore? How come you find enjoyment in the company of fewer and fewer people? Why have all your hobbies and other interests dissolved into the past?

It could be that you're well into burnout. And the further in you go, the longer it takes to get back out.

Vicious circle

The unfair part of this whole subject is that the same characteristics that contribute to success also lead to burnout. The difference can be nothing more than a subtle "Y" in the road or a matter of how hard you push.

The most susceptible people are those of us with driving ambitions—those willing to make the sacrifices necessary for unusual success. In fact, as I sit writing this article, others are out enjoying the Sunday of Memorial Day Weekend.

Am I wrong to be here writing? It's a Catch 22, because if I don't finish this commitment, I'll be out playing but I'll be thinking about this incomplete obligation.

That's the fine line we walk. I will go out camping this afternoon and play for the remainder of this brief holiday, but

I know myself well enough to be sure that having this task undone would haunt me. Does that sound familiar? Then be careful.

Jesus probably said it best: "Count the cost." People can set out to accomplish wonderful things and yet find that when they've reached their goals, they have few loved ones left to share it with. Be sure, as you make your climb, that you are continually evaluating the price you're paying now, as well as the ultimate estimated cost.

The first symptom of burnout is a tricky one: over-enthusiasm. While enthusiasm is critically important to overcoming the natural obstacles in any challenging climb, over-enthusiasm can be a sign that you're lying to others and yourself about your true progress.

Stage two is where some of the physical symptoms can manifest. These can range from simple back and neck pains to flu and colds to serious ulcers. But the potentially more damaging outbreaks can be emotional.

This is where you can begin to question friends and family, to see whether they're "really" on your side. Are they part of the solution . . . or the problem?

Emotional emptiness

Because you begin driving friends and family away in stage two, stage three is where you find yourself feeling emotionally empty, because there is no recharg-

ing from those around you.

These feelings of emptiness are insidious, because they cause many of us to look the wrong way for solutions. This is the first critical "Y" in the road. This is where serious miscalculations can be made.

ENGINEERING MANAGER

Many people reach this stage, sense the waning of their enthusiasm and enjoyment of the climb and look back longingly at the earlier days of the project or career path they're involved in. They remember how hard they were working, and how much they enjoyed it back then, and they mistakenly interpret that to mean that harder work equals more enjoyment.

Their response is to take on even more. They feel that it's the only way to reach their goals, which they sense are slipping away.

However, more work makes for more fatigue and some stage three burnout victims finally see that something's wrong. So they take a vacation or a stress-reduction course.

These efforts can frequently give momentary relief, which is most often misinterpreted as a total cure and the person is back on the burnout track within weeks.

Stage four

Panic can best describe this phase of burnout. You've tried your best and then doubled even that effort . . . and you're still falling backwards. Things are getting worse.

The dangers of stage four are many, because you face them with impaired judgment. Bad decisions are the fruits of stage four burnout. Decisions to divorce a spouse, fake financial records, lie about project progress, take on suicidal debt.

Stage five is where you crash and burn. Now that doesn't mean that you can't recover from your burns, but the healing process can be long and painful.

The problem with this advanced phase of the problem is that there are no quick fixes. It could take a year or more of substantially-reduced tensions to get back to full capability—and some people must completely change careers or geography to get back on top of their lives.

Avoiding burnout

The first and most important fact you must understand and believe is that everyone does not succeed as fast as the people on TV and in magazine articles. These are the rare ones for whom things went the right way.

That's not to say that they didn't face obstacles and opposition, but it was different from yours. And who's to say that they didn't pay a much higher price than you know to be worth it.

Circumstances can definitely make your rate of achievement different from anyone else's and you must learn to accept that as a part of life. Don't let a comparison to someone else's achievements drive you beyond reason.

Don't let arbitrary goals like, "I'm going to be a major market general manager before I'm 35" carry more weight than other factors that may, if considered reasonably, cause you to accept a less strenuous deadline.

The other important strategy, and one that I'm focusing on, is to get back to the fun things you enjoyed before your magnificent obsession. If you fished or golfed a lot before, but don't seem to find time for it anymore—get back to it right away. Make time. Force yourself.

It's good to be goal-driven, but not to the extent that you relinquish control of your life to the goal. Maintain authority over yourself and don't be ashamed to change the schedule for your achievement goals. It's just good business.

■ ■ ■

John Cummuta is president of Advanced Marketing Concepts, Inc. a broadcast management and marketing consulting firm, and a regular RW columnist. He can be reached at 312-969-4400.

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Commercial Radio Takes Off in the UK

by Dee McVicker

London, ENGLAND Second only to an act of nature, nothing brings together continents faster than the building of a new commercial radio station. A case in point is United Kingdom's JAZZ FM.

JAZZ FM is the first in a generation of commercial stations licensed by England's Independent Broadcasting Authority—an FCC equivalent wielding just as much licensing power. This flagship station, whose country's crown jewel of broadcasting is the government-run BBC, went on the air in March with a mixture of domestic and import gear, much of it US-made.

FACILITIES SHOWCASE

According to Andy McHardy, representative for British equipment supply house Ranson Audio, there will be approximately 23 commercial stations to follow by year's end. As for non-commercial stations in Europe, commented McHardy, "that's a thing of the past."

Independent radio, however, is nothing

new to England. Some 50 independent stations are scattered throughout the country and have been operating for some time.

But whereas these first generation independents are established in their markets, the new commercial stations have been licensed to fill in existing franchise areas with new programming. Like any station entering an established market, England's new commercial stations will meet the competition head-on.

UK/US alliance

That's where the country's US alliance promises to come in handy; these new private owners, whose stations are as commercially independent as any for-profit station here in the United States, appear to be keeping more than a watchful eye on our knack for streamlined operation.

As the first, JAZZ FM is relying on American company Media Touch Systems for computer automation during the evening and for computer live-assist during the daylight hours. McHardy, who helped spearhead the project, commented that computerization in the studio environment is virtually unknown to English stations.

"They're more ready to accept com-



JAZZ FM's facility is set up with a Media Touch system for its automated and live-assist programming.

puters in America than they are in the UK," said McHardy from his office in London. Regardless, as of this writing the Media Touch computerized concept will be a part of at least three of the 23 new stations going up in England.

McHardy, who represents the Media Touch line in Europe, attributes this acceptance to Media Touch's use of widely available IBM-type computers and traditional broadcasting source equipment.

In addition, said McHardy, the ability to have touchscreen access to all functions of studio operation is appealing to most. With the commercial burden of traffic control, computerized control of studios, source material and management software makes the most sense, he added.

England swings

JAZZ FM's new facility, which includes one on-air, one production and one talk studio, is situated in a refurbished recording studio near London's notorious Marble Arch. From this traditional English setting, the jazz station set up computer operation with a touchscreen monitor and central processing unit in the on-air studio and a slave Media Touch system in the production studio.

The station's jazz format, which spans decades of vintage recordings, requires some 3000 titles, the majority of which

are rotated from eight Sony CDK 006 60-slot compact disc players off the Media Touch system.

During live assist, when one of the 3000 titles is selected according to title, artist, theme or other criteria, Media Touch automatically locates the cut, adds it to the log and cues the song for airplay.

To rotate the music library, the station brought in computer software offered by another American company, Radio Computing Services (RCS). Completing the streamlined concept of computerization, the station's studio operation was also interfaced to the station's traffic software, which downloads to the Media Touch for commercial scheduling and tracking.

Commercial storage

Commercial load, a relatively new concept to UK broadcasters, is stored on DAMS, a digital mass storage device manufactured by Australian company Southern Broadcasting Systems. DAMS provides JAZZ with audio storage on a 360 megabyte hard diskette drive. "At the moment," commented McHardy, "we're probably running about 30-40% capacity (on the DAMS)."

With the exception of the Sony CD players, which are located in the on-air studio and can be accessed by Media Touch operators in the production stu-

(continued on page 25)

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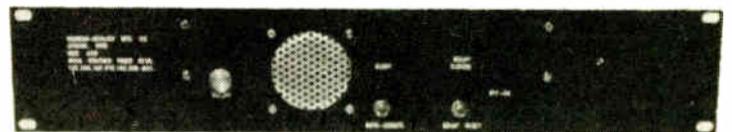
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Dolby SR dramatically reduces noise, increases headroom, and lowers distortion from initial production to final transmission. That means you can deliver your message today with the clarity you've been expecting from the technology of tomorrow.

Canada: "Take AM And FM...Please!"

by Steve Crowley

Washington DC While the FCC has begun an initiative to "rejuvenate and revitalize" the AM band by the year 2000, Canada is working on its elimination. FM, too, would be a thing of the past if a plan to launch digital audio broadcasting is put in effect.

CONSULTANTS CORNER

A lot depends on the results of tests taking place this summer under the auspices of the Canadian Advanced Broadcasting Systems Committee (CABSC), a joint government/industry committee.

Joining in the tests are the Canadian Broadcasting Corporation (CBC—their national public broadcaster), the Cana-

September and includes laboratory and field tests. On-the-air tests and demonstrations will take place in Montreal, Ottawa, Toronto and Vancouver.

The Montreal and Toronto tests will mark the first time the Eureka system has been deployed in a heavily built-up urban area. It will give us a better idea of how well it could work in major US markets.

A 1 kW transmitter will operate from 794.5-801.5 MHz (straddling TV channels 68 and 69) and feed a directional panel antenna. Both mobile and fixed receivers will be used in the tests.

Test goals

The tests have several goals. It's hoped to determine basic parameters required for implementation of DAB, such as power requirements and interference criteria.

The performance of the Eureka system will be evaluated in the presence of noise

Canada wants a quantum leap in audio quality and has decided further effort spent on AM and FM will yield only incremental improvement.

dian Association of Broadcasters (CAB—their NAB), the Department of Communications (DOC—their FCC) and its Communications Research Center.

They're evaluating the Eureka 147 digital audio broadcasting (DAB) system. Developed by a consortium of European government broadcasting agencies and consumer electronic companies, it offers compact disc quality sound with greater spectrum efficiency than FM. It also offers multipath resistance.

Canada is not the United States. (If Quebec secedes, it won't be Canada, either.) Almost half the stations are the CBC's and used for public broadcasting. Canada has an AM-FM competition problem, too and you-know-what is winning.

Overcoming the problems

One way they've tackled the problem is through programming: It is illegal to have a Top 40 format on an FM station.

That's not working so well; listeners would rather change their musical tastes, or listen to recordings, than tolerate music on AM. Yes, there's AM stereo (Motorola—they picked a system), but they have the same problems we do with lack of adoption by stations and lack of stereo receivers. Now the DOC sees AM stereo as simply an interim step to DAB.

Funny thing is, they're down on FM, too. The fact that FM can't deliver compact disc quality sound is a big deal to them. As far as FM's multipath problems go, they observe that the FM service wasn't designed for mobile reception; the Eureka DAB system is.

Canada wants a quantum leap in audio quality and has decided further effort spent on AM and FM will yield only incremental improvement.

The testing program will last through

and interfering signals, such as those from television. Also tested will be its performance in shadow and multipath conditions.

Listening tests will be conducted to compare the Eureka audio quality to that of a compact disc player. The Eureka system achieves part of its spectrum efficiency by reducing by more than 80% the amount of data needed to represent audio. It does this by eliminating audio

(continued on page 27)

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Workstation Dollars and Sense

by Ty Ford

Baltimore MD I have a problem. On the floor of the Atlanta NAB, I saw demo after demo of digital audio recording/editing systems—workstations, as most manufacturers are loath to call them. The lure of any one of these systems is enough to generate enough saliva to float the fleet.

As a producer, after having examined over a dozen systems (check RW, 9 May), I am also beginning to feel the effects of "choice stress." I have been able to identify several problems, all of which combine to produce the malaise I feel.

The first involves the learning curve of any new system. I am quite aware that the demos I have seen have been worked out days in advance and give the illusion that ease of operation is just a few keystrokes away. I am also aware that very few of the demos I have seen account for time spent loading in or backing up the audio.

Then there's the money thing. I believe that any equipment bought should pay



Alpha Audio's DR-2 digital disk recorder.

for itself, as quickly as possible. It doesn't take a rocket scientist to do the arithmetic. You need lots of business to make a system that costs \$100,000 pay for itself.

Video production and post-production companies, networks and large studio complexes lead the list of businesses who currently have that kind of money. Broadcasters who are under the whip of investment-oriented ownerships are more concerned with paying off the note on the station. Digital recording and editing is not high on their list of priorities.

Unless you're really doing the volume of business necessary to pay for the investment, or your operation is funded from the proceeds of another part of the corporation, going for the big systems can be suicide. Sensing this, some dealers are experimenting with leasing agreements in an attempt to get more of the units into the marketplace.

A lot depends on your client base. At Rodel Audio in Washington, DC, Nelson Funk has looked at more than half of the systems currently on the market.

Bradley BROADCAST

Clearance Corner

Those of you who get our Catalog Supplements know that our Clearance Corners are a great way to pick up a few bargains. This month we offer all Radio World readers a chance to save lots of money on a choice selection of overstock and demonstration equipment at prices that have never been lower. Look over the list, find what you need, and call Bradley today before the best is gone. Note the special sale terms below which enable us to offer these rock bottom prices.

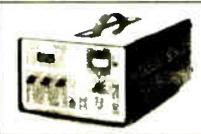
Harrison AP-100 Console

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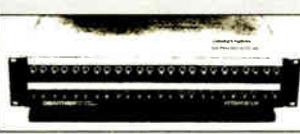
Burk ARC-16

Remote Control, dial-up. NEW
Mfr List: \$2995 SALE: \$2434



Gentner Versapatch

Flexiblock, norms. B/O. NEW
Mfr List: \$899 SALE: \$675



Item	Mfr List	Sale
ATI Emphasizer Mic/Line Processor	New \$1395	\$1047
Burk ARC-16 Remote Control: dual chassis	New 3895	3167
Otari TC50: adds time code to 5050B	New 1695	1353
Tascam M308B Mixer	Demo 2299	1425
Tascam M320B Mixer	Demo 4599	2850
Modulation Science Mod Minder (2 avail)	Demo 2395	1976
Fidelipac CTR-12 Cart Machine	New 1875	1552
Otari 5050BII Tape Recorder	Demo 2995	2379
Studer A807 rack mount w/Anvil Case	Demo 6195	4415
Studer A807 with overbridge & console	Demo 8995	6836
Studer A807-HS with overbridge & console	New 8995	7520
Yamaha EM1600 Powered Mixer	Demo 795	525
Orban 424A Compressor/Limiter	Demo 1095	788
Audio Technica 4462 Remote Mixer	Demo 1350	966
Audio Technica 4071 Shotgun Mic	New 950	676
Zero Hallibuton Elite Briefcase-Silver 3.5"	New 273	167
CRL Dynafex DX-2 noise reduction	New 820	722
Drawmer DS201 Noise Gate	New 745	631
Milab DC-96B Mic w/shock mount	Demo 810	603
Neumann KM145 Mic; cardioid condenser	New 640	502
Toa BA-400 Cassette Deck w/4 transports	New 1329	638
ATI DA2000B-1 Distribution Amp	New 375	263
ATI MLA-400-2 four Channel Line Amp	New 349	269
ATI M1000-2P Dual Mic Preamp w/phantom	New 425	328
Audio Technica AT855 Mic	New 237	144
Gentner EFT-100 Frequency Extender	New 549	439
Henry Synchronstart	New 395	150
Rane SM82 8x2 L Line Mixer	New 599	370

Item	Mfr List	Sale
Tascam 3030 Tape Recorder	New \$2299	\$1425
Toa PC-671S Ceiling Speakers (6 avail)	New 34	17
Stewart PA50B 25w per chan power amp	Demo 279	172
Crown D75 Power Amp	Demo 549	365
Aphex 120 Distribution Amp	Demo 279	205
Tascam 122MKII Cassette Deck	Demo 1099	680
AKG H70 Shock Mount (5 avail)	New 110	80
Audio Technica ATP-2 Cartridge (6 avail)	New 60	26
Audio Technica ATP-2XN Cartridge	New 90	38
Electro Voice 660 Microphone	New 248	100
Fidelipac 457 Cue Tone Test Cart	New 48	37
Granite Tel Push-to-talk handset	New 65	47
Rack Factory 96 Cassette Rack	New 38	26
Stanton SRS245 Headphones	Demo 110	41
Stanton SRS265 Headphones (2 avail)	Demo 135	59
Mid Alt RK-12 21" gray rack (6 avail)	New 118	59
Mid Alt RK-16 28" gray rack (7 avail)	New 125	62
Mid Alt RK-20 35" gray rack (8 avail)	New 138	69
Sennheiser MKE2-R Lav Mic (2 avail)	New 295	194
Whirlwind WD/1 Cable Reel (4 avail)	New 194	82
Whirlwind WD/3 Cable Reel (4 avail)	New 450	192
Anvil small 12" record case	New 184	95
Anvil case for 18"W x 21"D x 6"H mixer	New 299	185
Anvil 6 space rack case; shock mounted	New 517	319
Anvil 6 space rack case; 18" deep	New 375	232
Anvil 8 space rack case; 18" deep	Demo 300	150
INR Custom Storage Cabinet (6 avail)	Demo 667	250
Orban 222A Stereo Enhancer (3 avail)	Demo 995	710

PRODUCER'S FILE

In an attempt to "do the right thing," he is planning to invite his biggest clients to an upcoming DAR demo. After the session, the clients will be asked for their opinions about the system, and how much more per hour they will be willing to pay for its use. While this won't take into consideration the needs of the new client who may call tomorrow, it will focus the harsh light of reality on today's bottom line.

Lower cost options

If you're not prepared to make the big jump into the \$50,000-and-up-arena, there are still a number of options. The lowest price system I saw at the convention was the two-channel 56K from Turtle Beach Softworks (\$2689).

You provide a 286 or 386 IBM computer, a hard drive and an R-DAT. They provide the cards for the IBM. They also can provide a set of optional A/D converters if you don't want to record everything on R-DAT before you load it in to the system.

Another alternative, Alpha Audio's DR-2, most closely resembles a stereo two-track tape machine with time code. At the moment, Alpha Audio is working on a system that will include an edit controller, two DR-2s linkable as a four track and a third DR-2 for wild tracks at a projected cost of \$34,000. At this price, each DR-2 holds 15 minutes of 16 bit 44.1 kHz stereo with timecode.

The edit controller can operate via cable up to 1000 meters away, allowing the DR-2s to be kept in a machine room. In addition to features like N/D (non-destructive) cut and paste editing, instant cue playback, a jog shuttle wheel for indexing and a loop function, you'll also get 256 random access cue locations.

The DR-2 locks to house sync, reads and generates 24, 25, 30 and 30DF SMPTE rates, and theoretically emulates a Sony BVU transport. (Those tests are being performed as you read this article.) According to the company, like a center track time code reel-to-reel machine, it will read whatever time code comes in.

The built-in virtual "synchronizer" can be assigned to any of the timecodes. The DR-2 inherently cleans up incoming timecode when it is translated into the digital domain.

Storage can be increased using larger

(continued on page 18)

Terms of sale:

- All items are offered on a first-come, first-served basis. Unless otherwise noted, all items are one-of-a-kind. Prices on this list are for items that can be immediately shipped from our warehouse, and do not apply to any special order items. Shipping charges are additional.
- Payment is by check, VISA, or MasterCard. Sorry, no COD or open account orders at these one-time prices.
- All new equipment carries the manufacturer's warranty. All demo equipment carries a 90 day limited warranty. Demo gear is in excellent working condition, but may have a few dents and scratches.
- The sale ends on Friday, July 27 at 5 PM Eastern Time. After that time, prices revert to our normal selling prices.
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FROM THE TRENCHES

by Alan Peterson

The Inner Sanctum

Dear JG,

June is getting hot and hummin' along in the Nutmeg State. It has taken a little adjustment getting used to bachelor life "again," but things are falling into place nicely—both at work (promoted already to Production Director) and at home (no ground loops in the MIDI rack).

Now if only my home cooking would improve a little bit. Despite my penchant for experimentation, I refuse to try anything having to do with beef tongue . . . last thing I want is my dinner going "nyah-nyah-nyah" at me after a rough day.

I'm staying fit, too, and I have WLAD/98Q to thank for that; the offices are on the first floor of our building and the studios are on the fourth. Two or three trips a day and I hit target heart rate in no time. It kinda makes me think—if this were any other operation, how many upper-upper-

management types would even consider a trip like this to stop in on the gang in the trenches?

Probably not a lot. Irv has to: He's both

Funny how to most air talents, the studio becomes likened to a teenager's bedroom—knock first and maybe you can come in.

GM and PD here and makes the trip several times a day. Any other GM would just call the PD up to say, "Go into AM and tell Al to quit swinging by his knees from the track lighting."

Inside smaller, less-involved split level facilities of one flight or better, trips such as this are a little more likely. The old

WGGB-AM building in Merrick, NY; the split-level "house" construction of WSPR Springfield and the townhouse-condo approach of WTVR AM/FM, Richmond, VA are just a few such facilities with which I am familiar.

You know, on second thought . . . maybe it's best if some higher-ups didn't stop up too often. While I've never been a GM, I have done nearly everything else, and a few sights I've seen sure have stopped me in my steps. And in all fairness, I'm certain some of my conduct has been a trifle less than exemplary. Maybe just a trifle.

I've occasionally wondered what the higher-ups of Park Communications would've done had they walked by and seen three AEs, two newsmen and the afternoon team all crowded into the studio with me, all learning how to juggle! (Memo to Pacific Recorders & Engineering: Your BMX board is also club-proof . . . I'd be happy to be in your next ad.)

And how about all those posters pinned up in all those studios everywhere for "aesthetics"? Yeah, right. How about looking under them to discover all those fist holes in the sheetrock some weird evening guy put there six months ago?

Thank heavens for a guy like Joe Fennesy, retired GM/VP of Cousin Brucie's one-time station WHMP-FM, Northampton, MA. Because Joe started there as a jock in the '50s, it probably didn't faze him an awful lot to see half my home studio jumper-cabled to the FM console on April Fool's Day, to do the morning show as Darth Vader ("...haven't had a decent movie in five years and the money was good").

That studio had so much loose cable laying around that day, it almost resembled the back of an old Lafayette Quadraphonic tuner/amp.

Funny how to most air talents, the studio becomes likened to a teenager's bedroom—knock first and maybe you can come in. My current situation would be ideal for them. Studios four flights up, being much more than "a walk down the hall," would really give them a secure feeling. Irv being in pretty good shape, he's up and down enough to keep my act in line and he can walk by the studios anytime.

Just as long as he stays out of the utility closet. I'm still putting up the posters to cover juggling accidents.

One more flight to go, huffin' and puffin',
—Al

■ ■ ■

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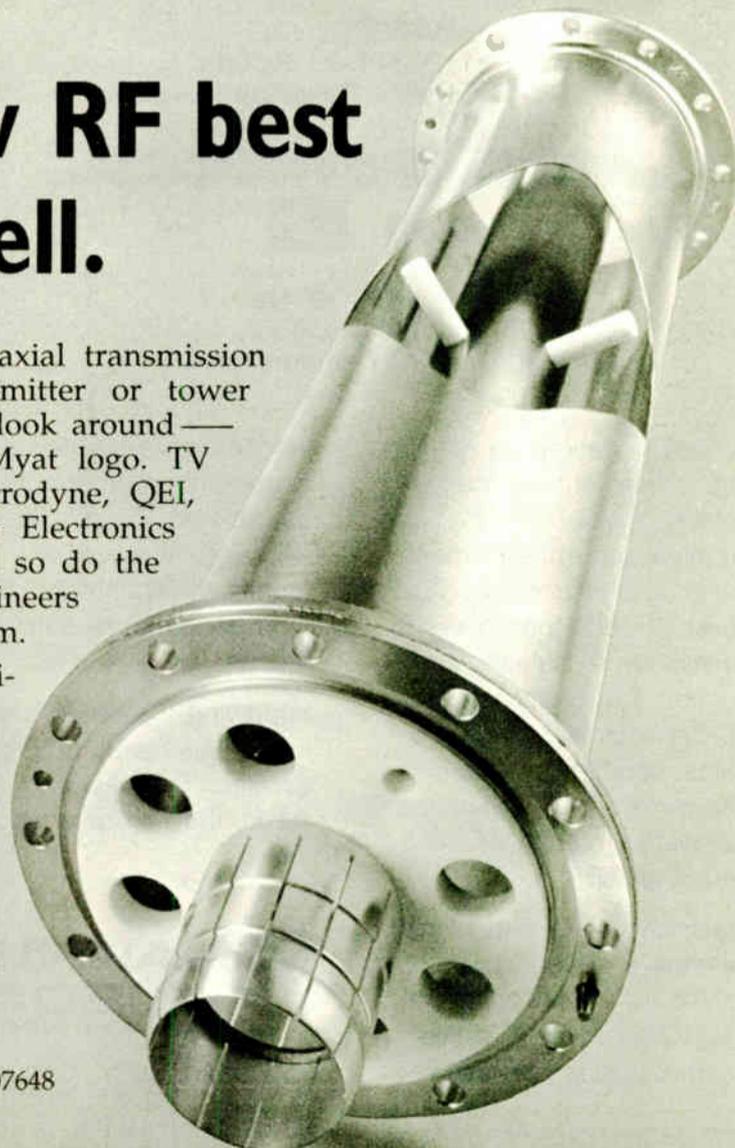


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Workstation Worries

(continued from page 16)

drives for up to eight hours of stereo with the same digital specs. Audio transfer is accomplished through the high speed SCSI ports. The system backs up on an 8 mm tape drive at 1/2 to 3/5 of real time.

AKG & Dyaxis

Because of their multitrack design and editing capability, the two systems that interest me most in the "Sub-\$50K" bracket are AKG's DSE-7000 RAM-based system and the Dyaxis system recently acquired by Studer.

Although at \$37,500 the AKG system

is more expensive than the Dyaxis which starts at \$8000 (without the Mac), the AKG system comes complete with a console and faders.

Another advantage of the AKG system is that it replicates the console and tape machine controls and work surfaces better than any other system I've seen so far. For Dyaxis users, the key is which Mac to use for the front end. The faster the better.

To get around the problem of the physical noise made by the computer fan and hard drives, WBAL's Production Director Jackson Whitt is planning to run longer cables so the CPU and hard

drives can be kept out of the studio. He saves time and storage space by dubbing to analog tape or cart using the Fast Mix feature which doesn't save the mix to its own file.

Recurring problems with noisy D/A converters—like Washington, DC talent/producer Mike Weiner has run into—seem to be the exception rather than the rule for Dyaxis. For voice-over work, Weiner doesn't like the idea that you can't listen to a music track on the Dyaxis while you're recording a voice track—an operation that the AKG system can perform.

Other limitations of both the AKG and the Dyaxis systems are that they only allow for two channels of input at a time. The Dyaxis 2+2, of course, offers 4 in/out starting at \$26,950.

Otari/Digidesign

Another recent entry in the field, the Digidesign/Otari collaboration, may be ready this summer. Otari's Bryan Lanser believes the key to success of the professional digital audio recorder/editor will be the result of putting a system together that minimizes the computer interface.

Like the AKG system, the Otari/Digidesign effort will be housed in a console that takes up about as much space as an Otari MTR-10 reel-to-reel machine. In an effort to reduce the use of computer controls, a dedicated hardware control interface will be used.

One of the priorities is the development of removable magneto-optical disks which need to record and playback at the rate of 12 MB/minute.

Lanser said other planned features in-

clude operation at a variety of sample rates, Otari parallel I/Os for synchronizer control and a Mac IIci with a 19" monochrome monitor. Current projections put 30 minutes of stereo at a cost of \$20,000 to \$25,000.

Hidden time costs

In addition to load-in and back-up time, there remain questions about the amount of time it may take a new operator to get up to speed. The more complex the system, the more regularly a producer needs to work on the system to remain "in touch" with it.

In addition, in a radio station where the airstaff is expected to carry out day-to-day production chores, the resistance to learning any new system can be expected to be high. Not everyone on the air at a radio station has the desire to be a production pro.

I predict that those systems designed with features offering lots of great solutions to nonexistent problems, or that increase the impediment between the operator and the sound, will fail.

I look forward to the next few months, during which I will have the opportunity to see how well these systems work on a practical basis. At the moment, however, if Monty Hall gave me the option of taking the money rather than picking doors number one, two or three, I'd take the money and run.

♦ ♦ ♦

Ty Ford is an independent audio consultant and regular contributor to RW. He is currently writing an advanced production book for Focal Press. Reach him by phone at 301-889-6201 or by MCI mail #347-6635.



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An Explanation of The Digital Display

This is the last in a 12-part series called An Introduction to Digital Electronics. Northern Virginia Community College will offer 1.3 CEUs (continuing education units) to registered students who successfully complete the course and an examination mailed at its conclusion.

Successful completion of the course and the final exam will also earn 1.3 professional credits toward recertification under the maintenance of certification provisions of the SBE Certification Program. Contact Director of Continuing Education, Annandale Campus, 8333 Little River Turnpike, Annandale, VA 22003, or call 703-323-3159. The fee for the course is \$20.

by Ed Montgomery

Part XII of XII

Annandale VA Digital electronics is a method of processing information in a concise manner. When reproducing audio and video signals, digital electronics means the signal can be reproduced more accurately. Each segment or word is assigned a specific digital code that will exactly be reproduced each time the disc or tape is played back.

Regardless of the ability to reproduce signals accurately, digital electronics is still not perfect. Compact discs for au-

diology changes causing different rates of expansion and contraction between the magnetic particles, tape backing and the binder holding them together.

Display evolution

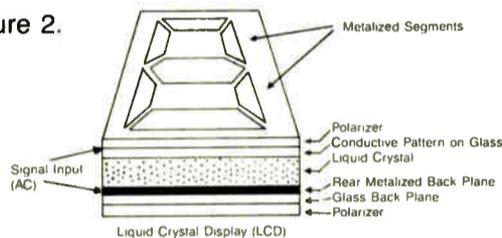
Computers and calculators have always had to display their data for the operator. Originally this was done with a printer and paper.

Computers originally used a typewriter terminal. The operators would type in their commands and, at the same time, have them printed on a piece of paper in front of them. When the program was activated, the answer was printed by the typewriter section of the terminal.

This was replaced with the computer keyboard and a cathode ray tube (CRT) displaying all information. Now only the data required at the end of the computer run needed to be printed.

The keyboard is similar to the typewriter but includes function keys, a

Figure 2.



number pad and various other commands a computer needs to be user friendly.

The pocket calculator introduced a new method of display in the early 1970s. Cathode ray tube displays and paper rolls were too big to make the calculator "pocket size."

Light emitting diodes (LEDs) were used to display information. A seven-segment display was employed to reproduce all the characters necessary to display data. This is illustrated in Figure 1.

The seven-segment display could be made up using lamps, LEDs or as is now the case, liquid crystal display (LCD). Originally LEDs were employed but in recent years they have been replaced by the LCD, which requires much less current.

Liquid crystal display

In contrast with the light-emitting diode, which generates light, the liquid crystal display controls light. The LCD is a solid state device. When an electronic signal energizes a display area on the crystal, it turns the area black.

The liquid crystal contains a nematic fluid located between two glass plates. When an AC signal is applied across this fluid, a magnetic field is produced. This field causes the fluid to transmit light differently than the areas around it (see Figure 2).

In LCD display, a dark image appears surrounded by a light background. Polarizing light filters are used to control

(continued on page 28)

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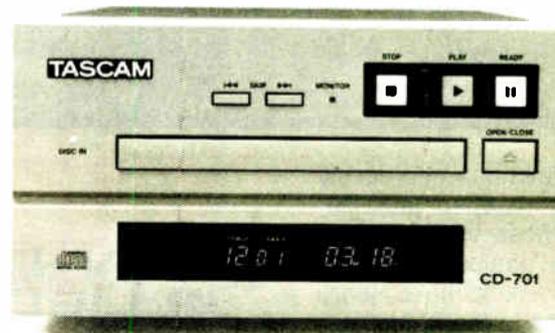
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*Radio Technology Component Grand Prix '88, CD Division, Stereo Sound Component of the Year (1988) & Best Buy (1988)

Road Testing Microsoft Works

by Barry Mishkind

Tucson AZ Pick up any computer magazine at the store. As you thumb through the pages you'll find literally dozens of advertisements for software, the programs that make your computer do those marvelous things.

KEYBOARD CONNECTION

But which one is the best one to get? That's not always an easy question to answer, especially if you are new to computing and are somewhat nervous about computers in the first place.

Of course, it is true that even experienced users have to deal with many factors in choosing a piece of software, not the least of which is the "learning curve."

That's because each software manufacturer uses a different (sometimes very different) command structure to accomplish tasks.

For instance, to delete a line of text in a word processor may require pressing the control key and "Y" at the same time. Or it may be control-end, control-delete, a function key or a series of keystrokes to mark where to start deleting, where to end and then to actually delete.

If you have a mouse, there are more

Computer BBS Update

Since our last look at broadcasting BBSs, a couple of additions and corrections will help bring you up to date.

- The Colorado Springs Broadcasters BBS is finally back up and on line. John Anderson's number is 719-634-5661, 1200/9600 baud HST. John is the moderator of the Broadcast Echo and if your Sysop wants to contact him, his Fido address is 1:128/59.

Stay tuned for the story of the love and good feelings that exist between John and his local telco representatives . . .

- The CRL Customer Service BBS now runs up to 2400 baud.
- Tim Pozar runs the Northern California Frequency Coordinating Committee BBS in San Francisco at 415-391-2657, 300/2400 baud.

The board is centered on part 74 frequency information and coordination. Tim is also reachable through Internet and Usenet.

- Several more local BBSs have been seen on the FidoNet Broadcast Echo. If you stop in at your local computer shop, it is likely that they know at least one local BBS. By dialing in you will quickly find the nearest FidoNet board, often just a local call. Ask the Sysop to get you to the Broadcast Echo.
- We hope to have access to a listing of FidoNet BBSs in the near future. If you know of a BBS that is not on our list that carries the echo, please let me know via Netmail at 1:300/11 or at one of my other numbers below.

- Similarly, a listing of BBSs carrying MediaNet is being put together.
- Having trouble with call waiting tones disrupting you? In most areas, dialing "*70" before the BBS number will block call waiting for the duration of the call. When you hang up, it resets automatically, so you don't have to remember to do it yourself.

RW will be keeping you informed on how and where to stay connected to the pulse of the industry. If you have data or suggestions as to how we can be more informative, please let us know.

choices: mark the text you want to kill, then you can issue the key commands. Or use the mouse to either pull down

a menu from the top of the screen and select delete or find the command along the bottom of the screen.

And that's just *one* action. Saving a file, changing text size or font or changing margins all use different commands from program to program.

Inertia and the learning curve

Inertia tends to make us stay with the same program. As many of us started computing a decade ago, we started with one of only two or three word processors available. The result is that today, while *Word Perfect* and *Microsoft Word* are used by the majority of the public, a poll

of engineers indicates a majority still feel that *Wordstar* is their program of choice.

The software manufacturers understand this, and usually are careful to make any new releases compatible with older versions.

To ease new users into a system, several manufacturers produce a less complex version of their product. Sometimes this is even an "integrated" package, combining several features.

An excellent example of this is *Microsoft Works*, version 2.0. *Microsoft Works* is an "integrated" package. That means it has several features that work together. In addition to the word processor, there is a spreadsheet, a database and a telephone communications package.

These are factors that first time users and veterans can really appreciate, whether they are in sales, programming, or management. Some stations have found it especially helpful when staffers can cut down on secretarial time by entering their letters, orders, etc., and then let the secretary deal with the file rather than transcribe handwritten or taped material.

Basic but powerful

Yet, although basic, *Works* is not trivial. It does a lot. By combining word processing with a database and a spreadsheet, it is easy to transfer material from one to another, creating good presentations.

So, while writing a letter, you can jump to the spreadsheet and pull out some figures, cutting and pasting them into the letter.

Hopping over to the database you can grab the name and address of the recipient, and even have *Works* dial a phone number so you can gather more information.

How's your spelling? *Works* comes complete with a 100,000 word spelling checker. Searching for a special word? There are 30,000 in the thesaurus.

Other features include graphing options, an appointment manager with an alarm that alerts you to important events and a calculator that pops up to do your

(continued on page 25)

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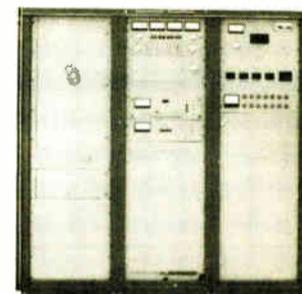
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Installing New Ground Systems

by Thomas Vernon

Harrisburg PA Many small market AM stations that were part of the boon in the '60s are approaching 30 years of age. Those that haven't seen much antenna system maintenance may be experiencing problems with erratic antenna resistance readings, poor efficiency and spotty signal coverage that always improves right after it rains.

These symptoms almost always point to a badly deteriorated ground system. Many small market stations cannot afford to hire a consulting firm to install a new system. Rest assured however,

that savvy small market engineers can do a credible job themselves with proper planning and preparation.

STATION SKETCHES

The first thing to do is find out what sort of ground system is supposed to be in place. Check your station license. Typically it will specify a 23'x23' ground screen with 120 copper radials spaced 3' apart.

The next step is to go out to the trans-

mitter site and see what's there. If the system was installed more than 20 years ago, there may be little left to find. The ravages of time and occasional copper thieves take their toll.

Careful excavation with a shovel and pick axe may reveal deteriorated or broken strapping, a rotted ground screen,

wholesalers, and cut into 2- or 4-inch strapping at a sheet metal shop for less than the normal price of strapping.

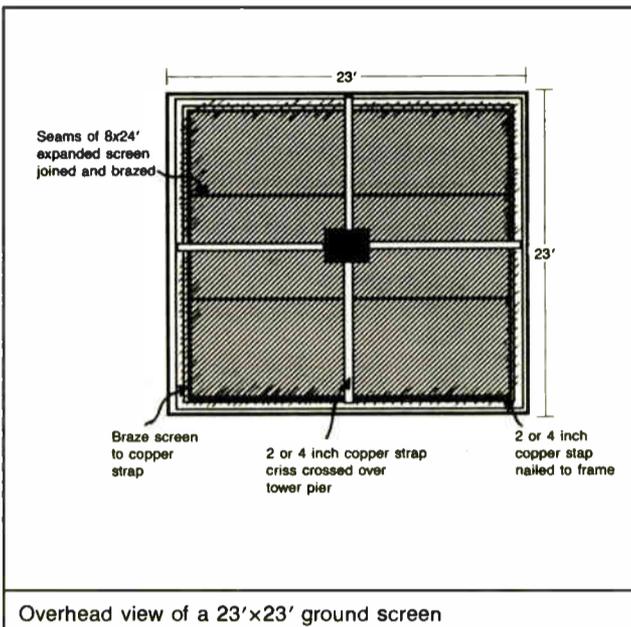
You must make sure however, that the material is 99% copper and not a copper/tin alloy as is sometimes used in roofing.

Although many types of wire have been used in radials, #10 soft drawn copper is the preferred type. Hard drawn wire may break as it is plowed into the ground, particularly in rocky soils.

Traditionally, silver solder has been used on all connections. Cadwelding is now the preferred method, as it makes a better bond and is much more affordable than silver solder.

Copper pop rivets are useful for joining sections of strapping together prior to soldering.

To plow radials into the ground, a tractor with a single sub-soiler will be required. A sub-soiler blade is capable of burying the wire 8 to 10 inches deep. When such a plow is located, it will have to be modified for inserting radials into



Overhead view of a 23'x23' ground screen

or poorly spliced radials. Buried radials may be easily located with a field strength meter and headphones.

There's no way around it: Putting in a ground system the right way is a costly venture. The following suggestions may help in getting the right materials quickly and at a favorable cost.

First, only use the largest broadcast supply distributors. They are able to buy copper at volume discounts and usually offer better prices than smaller operations can. Some materials can be purchased and fabricated locally at considerable savings without compromising quality. Copper can be purchased in 25'x1 3/4' sections from roofing

the ground.

There are two methods of plowing radials into the ground. In the first, the spool of wire is located at the tower and the loose end attached to the plow. In this case, all that is required is that a 1/4-inch hole be drilled through the toe of the blade.

Guard against breakage

If you are working in an extremely rocky area, pulling the wire through the ground in this manner may cause numerous problems with wire breakage. Since the wire is being pulled the entire length of the trench, there is quite a bit of friction. Add a few sharp rocks, and the wire is easily cut or damaged. In this situation, a different approach is required.

The second method involves mounting the spool of wire on the tractor, while the loose end is attached to a secure point near the tower base. Obviously this takes more modifications to the plow, but it also greatly reduces friction and breakage problems. The reel is secured to the plow by means of a length of pipe attached to the plow with "U" bolts.

The devices used to secure weights to the ends of barbells are useful in keeping the reel centered on the pipe. A piece of conduit is welded on to the back of the blade for the wire to pass through, and a pulley may be attached to the frame to reduce friction. Access to welding equipment and some improvisations will go a long way in creating a device that works.

Sweat equity

With all the materials and equipment collected, it's time to begin work. Plan on having two or three able-bodied assistants for the duration of the project. You'll need them.

Measure the length of the radials from the tower and mark out the circumference. One easy way to do this is with a measured length of wire attached near the tower base. With this wire stretched taut, walk around the tower marking the distance with spray paint on the

(continued on page 28)



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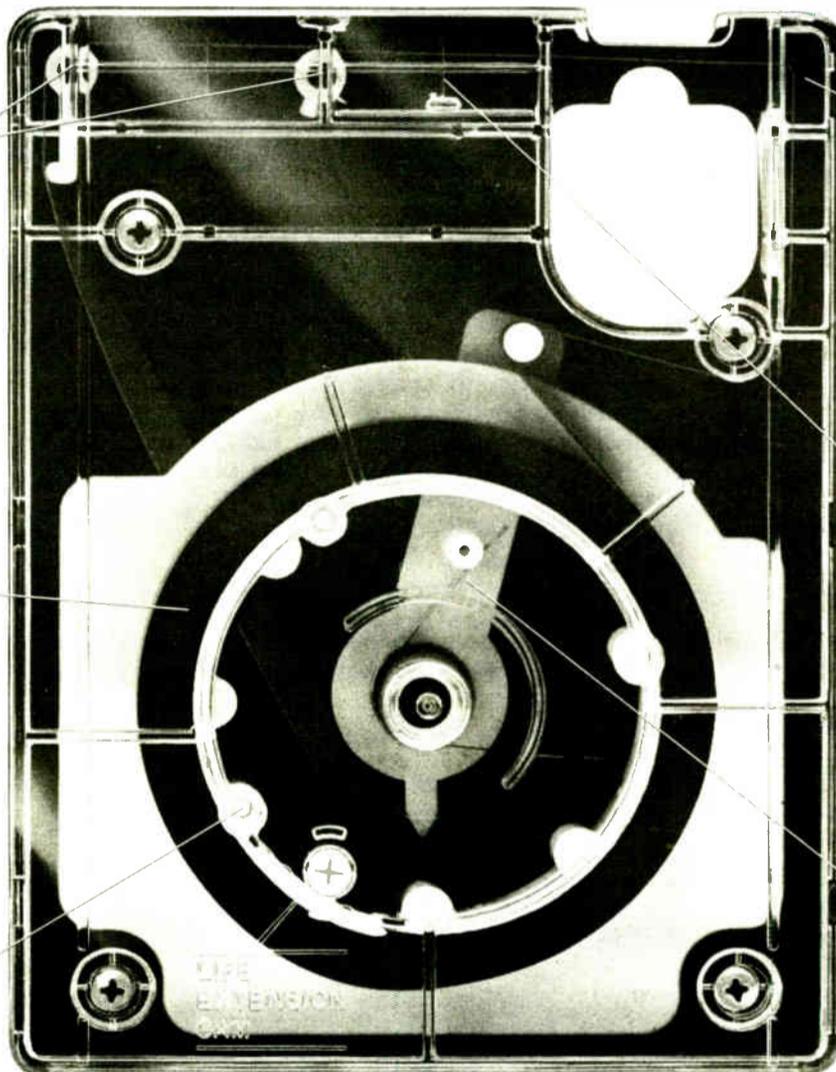
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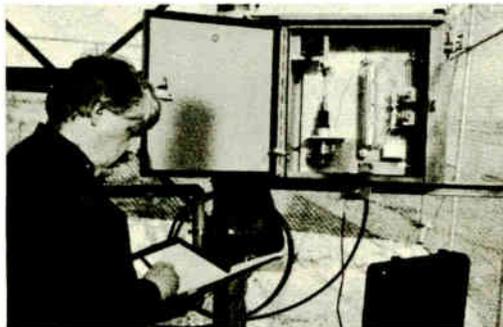
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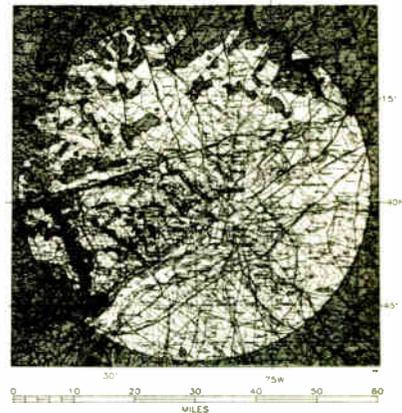
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Put the Works to Work for You

(continued from page 20)

math and paste it in to the application.

Meanwhile, the ability to display graphics characters means that the WYSIWYG ("what you see is what you get") type of screen *Works* provides really allows you to see boldface, italics, or underlining.

Being able to see how the parts fit together before printing saves time and makes it easy to put together good presentations that will help your sales department.

And another key point of interest is that the command structure is essentially compatible with *Microsoft Word*, *Excel*, and the entire *Microsoft Windows* environment.

Capability to upgrade

Why is this important? Well, as your computer knowledge and needs grow, you will likely want to move up to products that can handle larger or different types of projects.

Being able to change to a more powerful program and still use the same com-

mand structure makes this much easier. Quicker. Better.

Of course, if your needs are simple, *Microsoft Works* will fill them for quite a while. *Works* itself operates in a window-type environment.

This means that not only can you share information between the different features of *Works*, but they can be on the screen at the same time, either sharing the screen, or tiled one over another.

For instance, it's really neat to be able to just click the mouse and have the screen jump from the spreadsheet to the word processor or the database.

Many people often get tired of the need

to jump from program to program to find an address or get a number to dial someone. It's cumbersome to close an application and go somewhere, only to have to reverse the process a minute later.

In *Works*, you do not have to keep opening and closing applications as you shift around. *Works* is blessed with pretty good documentation. And there are both help screens and even an "on-line" tutorial facility.

Microsoft Works comes with several disks of drivers so you can customize the program for your own system, printer, modem, etc. An interactive install program asks you for some information and

then makes the installation.

While file conversion from some other programs can be a bit tricky, most programs can talk ASCII (plain text) for text input and output and *Works* can read many spreadsheets automatically.

If you are looking for a good starter program or one that's sophisticated and flexible, yet easily learned and used by everyone in the station, *Microsoft Works* is an excellent package.

Works lists at \$149, although some vendors will sell it for under \$100. And, I've even seen *Works* bundled with an accounting and checkbook program called *Quicken*.

■ ■ ■

Barry Mishkind, aka RW's "Eclectic Engineer," is a consultant and contract engineer in Tucson. He can be reached at 602-296-3797, or on FidoNet 1:300/11.

UK Radio Opens Up

(continued from page 12)

dio, the two studios are identical. Both are equipped with a Soundcraft SAC 2000 console, a popular board manufactured in the United Kingdom that gives station DJs manual access to level control.

Source equipment for each studio includes Studer A-807 recorders, three Broadcast Electronics DuraTrak 90 cart machines, an EMT 938 turntable and two Radio Systems Rs-DAT machines. Denon DN-950FA compact disc players are also available in both the on-air studio and the production studio for music cuts that aren't directly linked to the system.

The use of Radio Systems' DAT machines allows the new commercial station to store and retrieve sound bytes as well as source music not readily available on compact disc.

Cart machines are, McHardy said, "for DJ IDs and things like that." Although the station brings in a satellite news feed from ITN (Independent Television News), this is usually fed directly to air and not stored for future use.

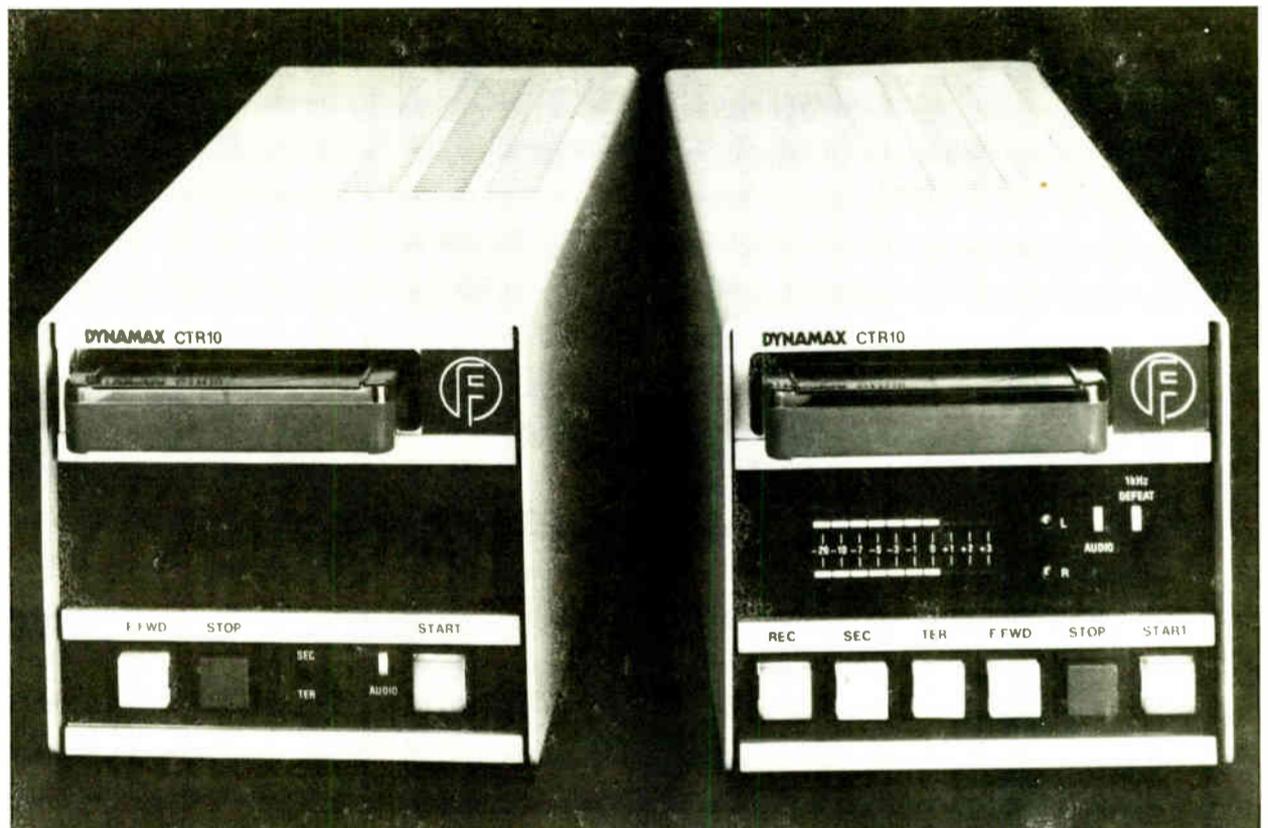
A talk studio, or what McHardy calls the central talk area, is used for "chat shows and very light programming." Several microphone positions are available in the talk studio for this purpose.

Within the next year, McHardy expects to be putting together a full 8-track production studio for the station. "They're planning an even bigger music studio, because they want to do live jazz," he said.

This ambitious plan to expand in the first year of operation is underscored by a recent ratings test that indicates a favorable listening response. According to a survey of listeners, approximately 11% of the London population is tuning into JAZZ FM, making it already third in the area's line-up of stations.

Dee McVicker is a free-lance writer and regular contributor to RW. To inquire about her writing service, call 602-899-8916.

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Circle 106 On Reader Service Card

Sex or Renewal Expectancy?

by Harry Cole

Washington DC What would you rather read about, sex or renewal expectancy? No, seriously, when you're reading a trade magazine or newspaper, which would be more likely to grab your attention big time, sex or renewal expectancy?

My hunch is that sex would normally win, hands down. Apparently, many publishers share that hunch. I say that on the basis of the coverage the trade press gave to a case decided by the US Court of Appeals for the District of Columbia Circuit in April.

That case addressed two separate issues, one involving broadcast obscenity, the other involving renewal expectancy. Not surprisingly, press coverage of the case tended to focus on the obscenity aspect. That, however, may not have been the best focus as far as most of the broadcast industry is concerned.

Mutual exclusivity

The case in question is titled *Monroe Communications Corporation v. FCC*. In the interest of full and candid disclosure, let me state up front that my firm represents the appellant, Monroe Communications Corporation.

Monroe filed an application for a construction permit for a new TV station on Channel 44 in Chicago. That application was mutually exclusive with the pending renewal application of station WSNS-TV, which already operates on that channel in Chicago.

COLE'S LAW

Under the FCC's long-established comparative renewal procedures, the two applications were designated for a "comparative renewal" proceeding designed to determine which of the two applicants would better serve the public interest.

A primary focus of the comparative renewal hearing was the incumbent's programming performance during the immediately preceding license term. As it turns out, the incumbent had begun that term with a mix of programming relatively common for independent UHF stations.

However, over the course of the license term, the station converted to a subscription television service. As a subscription TV station, it provided nothing but feature films, sports events and the like, akin to premium cable TV channels. The station transmitted this programming on its normal frequency, but with the signal coded, so the licensee could then sell or rent decoders to subscribers.

The latter half of the license term was

dedicated increasingly to this subscription service. In fact, by the end of the term the station was, in the words of the FCC administrative law judge who tried the case, "virtually wall-to-wall" subscription programming.

This is important because the incumbent's subscription programming service had two particular features. First, it was almost completely devoid of any non-entertainment (and especially *locally-oriented* non-entertainment) programming.

Second, it included a wide variety of R-rated materials, including such classic films as *Garage Girls*; *The Kinky Ladies of Bourbon Street*; *Fast Cars, Fast Women*; *The Erotic Adventures of Zorro* and—well, you probably get the picture.

FCC true to form

Now over the 40-plus years of the TV industry, the Commission has never taken away a television license on purely comparative grounds. And sure enough, as the Channel 44 case came through, the FCC was true to form: It declined even to consider arguably obscene or indecent R-rated programming.

This was despite the fact that the FCC was, at that very time, initiating its most recent inquiries directed against "shock radio" (which tends to involve little more than innuendo and locker room humor on the radio, as opposed to visual depictions of nudity and a wide variety of sex acts). Having ignored that aspect, the FCC also ignored the clear downward trend in the licensee's locally-oriented, non-entertainment programming.

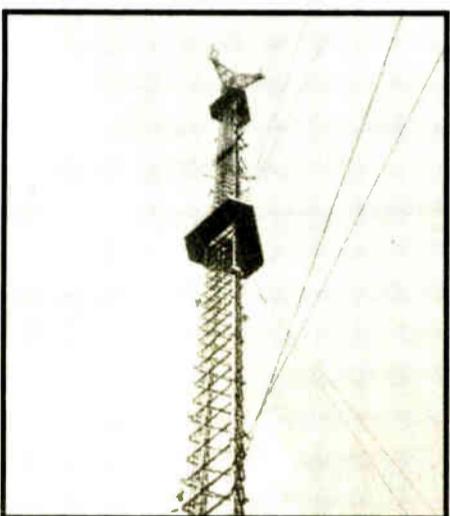
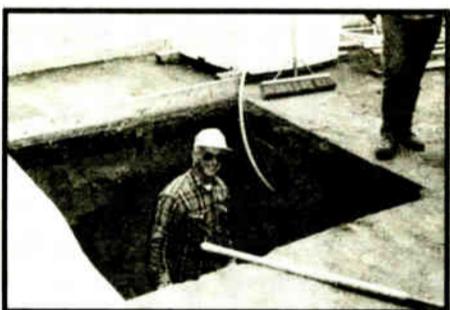
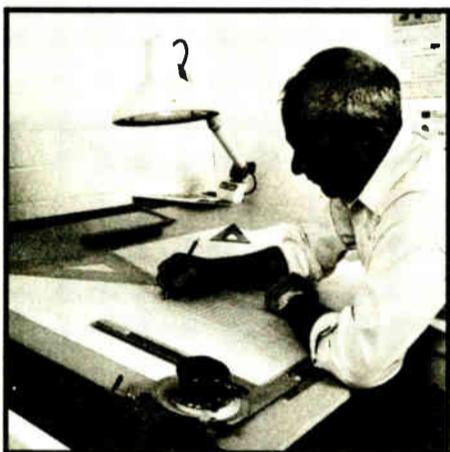
This latter point meant that, despite the apparent shortcomings in the licensee's programming performance (espe-

(continued on next page)

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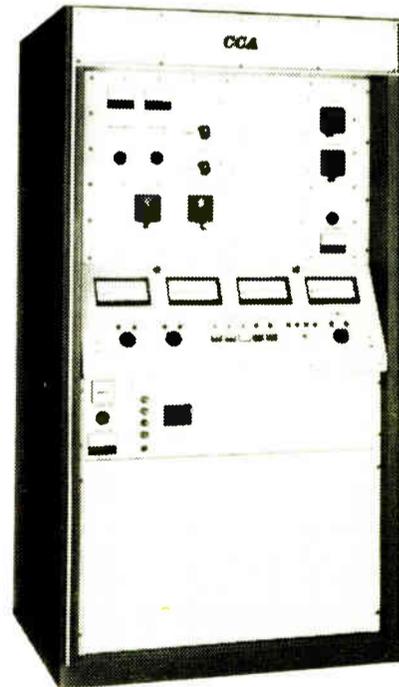
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A Lesson in License Challenge

(continued from previous page)

cially in the latter portion of the license term), the licensee was still entitled to a "renewal expectancy." As a result, the FCC concluded that, while it was a "close" case, the incumbent should win.

Court appeal

On appeal, though, the Court had other ideas. First, the Court found that the FCC had acted arbitrarily in granting a "renewal expectancy" and in thereby essentially ignoring the downturn in the incumbent's performance.

The Court noted that the "renewal expectancy" is supposed to be a predictive device. That is, such an expectancy is to be awarded to those licensees whose past performance indicates likely strong future performance. Here, analysis of the incumbent's past performance revealed a "strong downward trend," suggesting anything but a likely strong future performance.

With respect to the R-rated material, the Court indicated

that, in granting the incumbent's renewal, the Commission could not properly ignore that material. Accordingly, the Court sent the case back to the FCC with instructions to redo the renewal expectancy analysis with particular emphasis on the incumbent's performance at the end of the license term and to consider further the matter of alleged obscenity.

The Court's action sent an important message to broadcasters. However, that message may have been lost as a result

of the not unexpected fascination of the obscenity aspect of the case, which tended to attract more attention than the more mundane renewal expectancy aspect.

The risk

But think about this: How many broadcasters do you know who actually air full frontal nudity and graphic depictions of sex acts? Probably not many, if any at all. By contrast, every broadcast licensee has to file renewal applica-

tions and thus runs the risk of a comparative challenge in which the station's continued operation could hinge totally on the concept of "renewal expectancy."

The primary teaching of the Court's opinion appears that, if a licensee's responsiveness to community needs through non-entertainment programming has decreased, substantially and permanently, over the course of a license term, that licensee may not be entitled to a "renewal expectancy." Without

such an expectancy, it is much more difficult to prevail in a comparative renewal proceeding.

Because all broadcasters are technically subject to potential comparative challenge at renewal time, the Court's treatment of the renewal expectancy could and should have attracted the lion's share of attention. In case you missed this case, you may want to discuss it, and its implications for your own operation, with your communications counsel.

■ ■ ■

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

DAB In Canada

(continued from page 15)

information that can't be heard and by allowing audio noise to rise to just below the point of perception.

Under consideration is the following plan to implement DAB pending successful test results and spectrum availability: It would be introduced sometime between 1995 and 2000. Priority for assigning DAB channels would be given to existing AM and FM stations. Any additional channels would be made available to other applicants.

DAB would be primarily terrestrially based, but direct broadcast satellite service would be available for remote areas and for national programming services to all areas.

DAB would simulcast with the AM and FM stations until there was a high penetration of DAB receivers. Then, AM and FM operation would cease.

DAB is seen as resolving, once and for all, competition problems between AM and FM. If the operations are turned off, I guess it would.

■ ■ ■

Steve Crowley is a registered professional engineer with the consulting firm of du Trail, Lundin & Rackley, Inc., 1019 19th Street, N.W., Third Floor, Washington, DC, 20036. He can be reached at 202-223-6700, Or by FAX at 202-466-2042.

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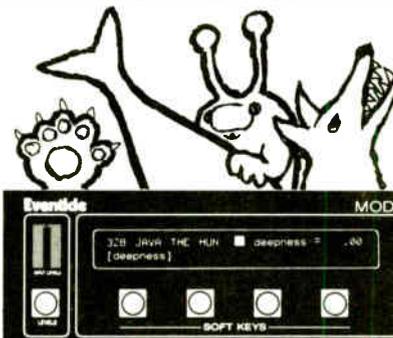


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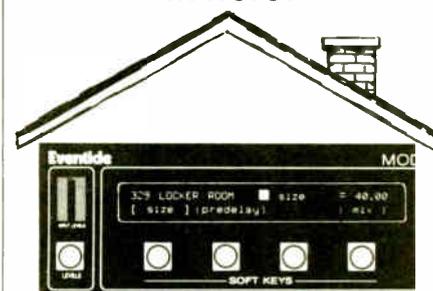


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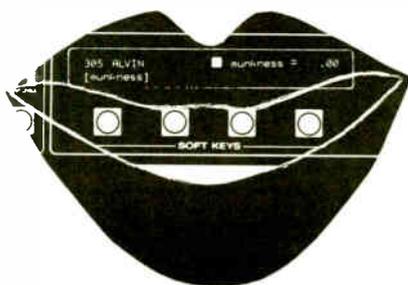


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Your Ground System

(continued from page 22)

ground or with occasional wooden stakes.

Make sure you'll have some sort of temporary ground for the transmitter while the work is being done. Four 8' lightning rods located at the corners of the transmitter building are better than no ground at all.

Next, remove all of the existing ground system. Be as thorough as possible. If any of the old wiring is left in place it can short out the new system resulting in pattern instability and an inefficient system.

Measure the 23x23 area around the tower base and make sure that it's level. Remove any remaining vegetation and thoroughly treat the area with commercial weed killer or large quantities of rock salt. This will prevent the possibility of vegetation growing up through your new screen and damaging it.

Now you're ready to begin plowing radials into the ground. Remember that

you'll have 30 wires coming into each side and they should be spaced 6-to-8 inches apart. The first few radials may be a little rough, but once you develop a system the remainder will go in with relative ease.

One suggestion if you're working in a rocky area: Make a dry run before plowing in a radial. In this way you'll discover rocks and other obstructions in the path and can remove them before the second run when the wire is inserted. This may take a little more time, but will result in fewer broken wires.

Be sure to start each run about two feet within the 23 foot square to insure there will be enough slack.

Building a frame

With all the radials in place, a frame for the ground screen can be constructed. Treated 4x4 lumber is used for the 23 foot frame. Use stakes or what-

ever means are appropriate to secure the frame and prevent twisting.

Fold all the radials out over the frame, leaving about a foot of slack on all wires. Fill the area with 3/4 inch of gravel. Ten tons of gravel is sufficient.

Put the two pieces of strapping that run over the tower base in place. You will have to fold the strap to go over the tower base. Two-inch strap is sufficient for power levels up to 1 kW, while 4-inch strap is used for 5 kW and above.

Attach strapping to the top of the frame. Copper roofing nails are ideal for this if you can find them. For areas where radials intersect the transmitter building, strapping is run around the building with radials attached to either side. All equipment inside the building is grounded to this strap.

Transmitters and equipment racks are attached by soldering a strap to the chassis under the rear door. Remove all paint in the area to be soldered. A welding torch may be necessary to generate enough heat for a good connection.

The radials are now soldered to the strap on top of the frame at 6- to 8-inch

intervals. You may wish to place a piece of scrap metal in the area where you are soldering, so the torch does not set the frame on fire.

Screening comes in 8x24 foot sections, which should be carefully unrolled in place. Wear gloves for this operation, as the edges are razor sharp. Tack the sections in place. Carefully measure and make a cutout for the concrete pier. Overlap sections by 1 1/2 inches. Join the sections together by twisting the overlapped areas together. Solder all of these joints. The screen is now soldered to the frame at 6-inch intervals.

With the ground system in place, a fence must be erected around the outside perimeter. A wooden fence is preferred. Be sure to work with the contractor who installs the fence to be sure that the post holes don't cut through any radials.

By following the steps outlined above, you should be able to install a quality ground system yourself.

■ ■ ■

Tom Vernon, a regular RW columnist, divides his time among broadcast consulting, computers and instructional technology. He can be reached at 717-367-1151.

Digital Displays

(continued from page 19)

the flow of light from the display.

Unlike the LED, LCDs can contain numerous more displays. They are even now used to produce the picture on pocket-sized television sets.

LCDs can also produce white letters on a dark background. This is known as the dynamically scattered LCD. Another type of nematic fluid and no polarizers are used to achieve this display.

Vacuum fluorescent display

Another method of displaying information from small computers is the vacuum fluorescent display. This device operates similarly to the triode vacuum tube. A schematic illustration is found in Figure 3.

Vacuum fluorescent (VF) character displays consist of a single cathode producing electrons. The "plates" or positive voltage levels where electrons are collected are the character elements.

The plates are coated with zinc oxide. This is a fluorescent material and when electrons strike it, a blue-green glow is produced. The grid is used to erase the display from the screen when no longer needed.

Vacuum fluorescent displays are quite popular even though they employ a much older technology. They consume very little power, have a long life and a fast response time. Color displays can also be produced when filters are used.

This concludes the 12-part *Introduction to Digital Electronics* course. A multiple choice test and an answer sheet will be mailed to you by 16 July.

Please mail the answer sheet back no later than August 15th.

■ ■ ■

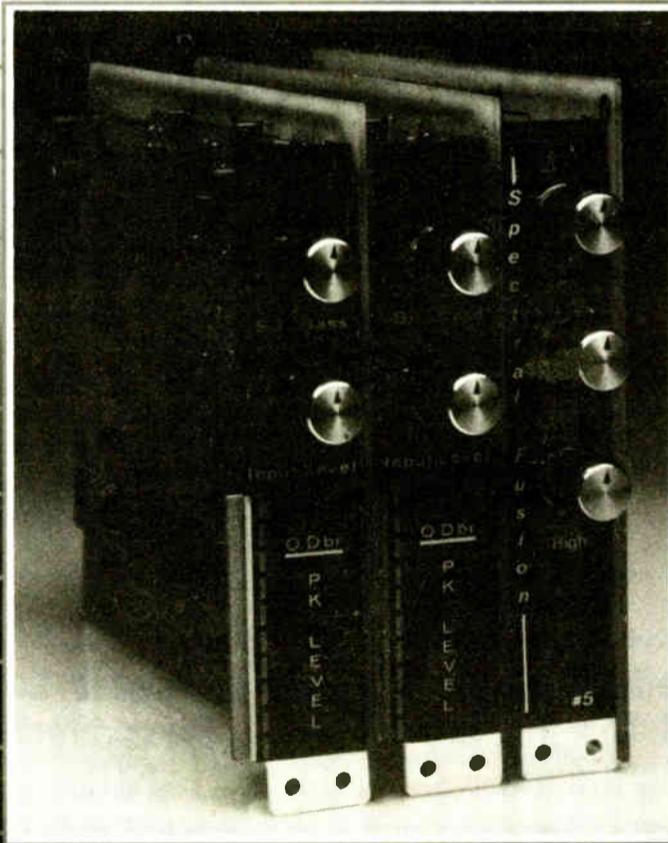
Ed Montgomery currently is an electronics teacher at Thomas A. Edison High School in Fairfax County. He has taught broadcast engineering at Northern Virginia Community College and worked as broadcast engineer for several radio stations.

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BUYERS GUIDE

Program Audio Processing

Symetrix Gives KXRX Punch

by Don Winget, CE
KXRX

Seattle WA At KXRX it seems like our production rooms get more important—and more complex—every day. Rising expectations are forcing us to upgrade, with new effects and signal processors added almost weekly.

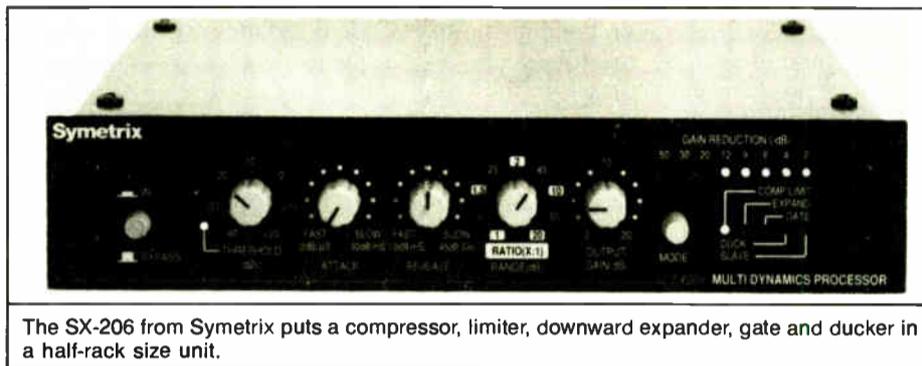
What first got my attention about the Symetrix SX-206 was how compact and complete it is. In just one half-rack size box you get a compressor, a limiter, a downward expander, a gate or a ducker. A pair gives you true stereo in any mode, all in a single rack space!

Simple to use

The SX-206 front panel is very clear and easy to use. LEDs show which mode you're in and how much gain reduction you're getting.

USER REPORT

A push switch on the front panel sets the operating mode to comp/limit, expand, gate, duck or slave. Each push



The SX-206 from Symetrix puts a compressor, limiter, downward expander, gate and ducker in a half-rack size unit.

of the button steps the unit to the next mode. On the back are DIP switches that set the "wake up" mode—the mode the unit comes up in when you turn on the power.

When you want to run stereo, slave mode allows one set of front panel controls to operate two SX-206s. With one control panel running two units, you don't have to go back and forth between channels to get them to sound the same. And they always track perfectly so the stereo image doesn't shift.

That means that in a single rack space you can have two mono units for laying down tracks and later you can use them as a tracking stereo pair for making your final mix.

To record tracks, you must step through to the operating mode you want. At KXRX, when we want the fin-

When you want to run stereo, slave mode allows one set of front panel controls to operate two SX-206s.

ished spot to have more presence without sounding too squashed, we fatten up voice tracks with about 4 dB of compression, at a 2:1 ratio.

For real kickers we'll hard jam the voice around 9 dB, at a ratio of about 5:1. That really punches 'em up. But, it also brings up all the noise in the room.

We get rid of the noise run-up by going from the SX-206 that's in compress mode, to the other SX-206 running in expand mode. Expand means downward expander, which works like a gate, only it's easier to use. For this kind of noise control the attack and release are turned almost as fast as they go and the ratio is set at maximum.

A lot of the sound effects we get were digitally recorded with no limiting at all. They're pretty hard to handle recording to tape, and especially difficult when we put them into the sampler.

We use high ratio peak limiting to get more level into the sampler without running out of headroom. With limiting we get a better signal to noise ratio all the way through and higher levels on the master tape without worrying about overmodulation and distortion.

Some Symetrix tricks

Reading the manual that came with the Symetrix unit, we discovered a couple of clever tricks we've used to really blow the competition away. The manual explains how to use the ducker and the gate with the key input, something we hadn't heard of before.

Symetrix showed us how to "jam fit" a voice-over into a music bed. We use the two units as a stereo ducker for final mixing—one set for slave, the other for duck mode.

The stereo music bed goes through the regular inputs and outputs on the SX-206s. The voice track goes through the console and into the key input on the master SX-206.

With the attack and release controls set maximum fast, and the range set for 3 to 6 dB, the voice-over automatically pulls down the music bed—exactly the right amount—at exactly the right time.

The other secret weapon we get from the SX-206 is triggered sounds. Think what you could do if any one sound could be used to turn on and turn off any other sound. Can you hear a squealing tire that laughs?

With the SX-206 in gate mode you can use one signal at the key input to turn on and off another signal that's going through the normal audio path.

With the aforementioned laugh going

into the audio input and no signal at the key input, there's no signal at the audio output. But, as soon as that squealing tire sound comes on, the SX-206 opens up and lets the laugh out. Presto! Squealing tires laughing!

This kind of stuff leaves the competition wondering what hit them, keeps the clients coming back and keeps the GM happy to boot.

♦ ♦ ♦

Editor's note: For more information on the SX-206, contact Doug Schauer at Symetrix: 206-282-2555, or circle Reader Service 80.

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Loudness Wars: From the Front

by Alex Zavistovich

Falls Church VA With increasing competition from digital audio sources, and the specter of digital broadcasting on the horizon, a new awareness of quality is taking hold in the industry. Engineers are sensitive to the issue, but programming pressures to be the loudest on the dial are still strong.

INDUSTRY ROUNDUP

What precipitated the so-called "loudness wars" in radio, and what can be done to stem the tide?

According to Frank Foti, president of Cutting Edge Technologies, loudness wars were generated as a result of "programming wars." Program directors ask for the loudest possible signal, Foti said, which "may go back to that old thinking that louder means bigger means better."

But in some cases, said Jim Somich, president of Somich Engineering, the pressure on engineers to produce the loudest station in the market can have "disastrous effects. The stations end up sounding horrible because people over-use the processing they have."

Quality is defined differently, depending on who is defining it. Eric Small, VP of engineering for Modulation Sciences, asked, "Who is to say what quality is? Program directors are the ones paid to achieve good ratings for a station so it clearly falls to them to define what is necessary to accomplish this."

Small maintained that "loudness, or more specifically the index of modulation, is a factor in coverage. In an automobile, for example, the station with the greater modulation index is going to grab the receiver sooner.

"PDs are responding to what they see—that the station with the higher modula-

tion index does better," Small said.

Paul Donahue, VP of engineering for Gannett Broadcasting and manufacturer of the DigiMod processing device agreed that "an engineer's job is to help programmers achieve what they (the programmers) want."

But he added that if what the programmers want is loudness, "the job becomes to find a way to be loudest on the dial without driving everyone away."

That search for quality is on the minds of most manufacturers, regardless of how their products may be used in the loudness wars.

Cutting Edge Technologies equipment, for example, has been on forefront of the trend toward aggressive processing with its work at Z-100 in New York and Pirate Radio in LA. Frank Foti, however, stressed, "That is not necessarily our

posture."

"We want to turn out a product that will generate competitive quality audio," he said. He said Cutting Edge products such as the Vigilante allow users to respond to both loudness and quality concerns.

In general, according to Donahue, "manufacturers are trying to put out products that allow for maximum modulation and loudness with minimal artifacts." He noted, however, that "the reason California Digital Systems got into the processing business is that we couldn't find anything else that would do it."

Bob Orban, chief engineer of Orban Associates, a well-established name in processing, maintained that "our design philosophy has always been that the listener should not detect any processing

is occurring, that the processing should be free of overt artifacts."

Still, he noted stations involved in the wars largely "fly the processing by the seat of their pants. I'm not sure if some of these stations are not being listened to in spite of the processing and not because of the processing."

Seeing the light

So is there any light at the end of the loudness tunnel?

Donahue feels that's already happening, with products like his company's DigiMod. He conceded, however, that DigiMod has gone through a number of "evolutionary" stages. "When we first introduced it, it was too clean. Now we have a product that makes a station very loud and very clean."

Somich, as a clipper manufacturer, is not quick to rule out the need for processing. "Without composite clipping you can't compete. Clipping probably contributes the most to producing a loud (continued on page 34)

PL-1 Keeps WMMS's Pilot Clean

by Brian R. Emery, CE
WMMS-FM

Cleveland OH Somich Engineering has created another breakthrough product for the broadcaster who has "gotta have that edge!"

The PL-1 Pilot-Lok is a baseband filter designed to protect the 19 kHz pilot during moderate to heavy composite

USER REPORT

clipping. The use of composite processing for maximum dial impact is a fact of life in the Cleveland market and we have found, through extensive testing, that the PL-1 Pilot-Lok is the most effective way to maintain a clean pilot even under heavy processing conditions.

The PL-1 is worth its weight in gold. At \$395, it is the cost-effective solution to maintaining maximum stereo separation under heavy competitive processing.

Use with any composite processor

The PL-1 operates with any composite processor when connected in the proprietary manner developed by Somich Engineering. This interconnect method is simple and the entire installation will take a small part of one evening for the average broadcast engineer.

There are many advantages to be obtained by using the PL-1 filter, the most important of which is the ability to process heavily while maintaining maximum stereo separation. The filter totally eliminates the tendency of a stereo radio to blend to mono during heavy composite processing.

The PL-1 maintains maximum stereo performance along with maximum dial impact . . . a combination that is hard to beat!

As with any processing tool, the amount of dial impact you can achieve depends on the sonic tradeoffs you are willing to make. The important thing to



The PL-1 is a baseband filter that protects the 19 kHz pilot during moderate to heavy composite clipping.

remember is that you can maintain a real "edge" in your market by protecting your pilot from pollution. This edge can be used as increased dominance or better audio fidelity—the choice is yours!

Hot system

At WMMS, we have discovered the PL-1 Pilot-Lok along with the DBE-1000 Dynamic Baseband Clipper to be a hot system! In a "war zone" this combination works extremely well.

The unit is transparent to the stereo generator with respect to crosstalk, separation and distortion. Noise is less than 80 dB below +4 dBm. The PL-1 is fully compatible with any stereo generator or composite processor.

The PL-1 Pilot-Lok along with the DBE-1000 will give you the "brick wall" you need. The end result will be loud and clean!

Editor's note: Brian Emery is CE of WHK-WMMS Radio, Cleveland OH, and can be contacted at: 216-781-9667.

For additional information on Pilot-Lok PL-1, contact Jim Somich at Somich Engineering: 216-526-4561, or circle Reader Service 29.

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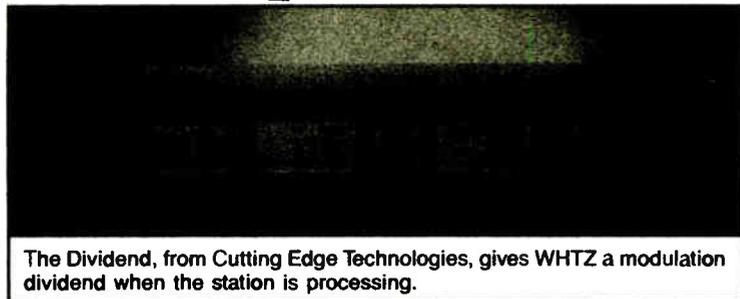
Circle 121 On Reader Service Card

Dividend Pays Off for WHTZ

by David Reaves, CE
WHTZ-FM

Secaucus NJ With the Dividend from Cutting Edge Technologies, you can get a "modulation dividend" by using the product to remove modulation-robbing extraneous out-of-band products from your stereo signal.

The Dividend is a sophisticated multipole low pass filter system, designed to remove anything above 53 kHz, without adding undue phase anomalies. The stuff above 53 kHz is not useful and, particularly in a high-multipath environment, can be detrimental to proper stereo decoding. It also can cause interference to SCAs.



The Dividend, from Cutting Edge Technologies, gives WHTZ a modulation dividend when the station is processing.

ates best.

At this point, your modulation will probably be a little low (if you used the pilot as your modulation reference). This is

the newly cleaned-up signal minus all the out-of-band garbage that the Dividend has removed. As you bring the total modulation back up to your legal limit,

you're adding loudness you didn't have before: the "modulation dividend."

The LED bargraph is used as an indicator of the amount of material above 53 kHz, showing its level anywhere between -45 and -65 below 100%. If you have access to a spectrum analyzer, you'll be amazed at how effective the Dividend is.

The competitive nature of FM broadcasting makes the more aggressive stations look for every possible means to get higher legal modulation. Without the

Dividend, out-of-band artifacts of composite clipping can typically add 5% or more to the modulation (actually, it just means you have to run the programming that much lower in volume).

That 5% may only be half a dB of loudness, but there's more. These artifacts, once removed, leave a clean "hole" for SCAs, make multipath problems less severe and give you that "dividend" of allowing higher modulation of the main channel.

■ ■ ■

Editor's note: For additional information on the Dividend, contact Joe Foti at Cutting Edge: 216-241-3343, or circle Reader Service 93.

USER REPORT

The Dividend is constructed in a sturdy one-rack space chassis, with internal power supply. On the back are two BNC connectors for input and output, a modular RFI shielding line cord connector and a fuse holder. On the front, there's a bypass switch ("filter"), a test port select switch and female BNC test port, an output gain control, a calibration adjustment ("correct") pot and a bargraph LED readout with selector switch and calibration pot.

Internally, there is a beefy power supply on one circuit board, and two circuit boards with all other components. The stability of a filter of this magnitude is critical, so Cutting Edge has encapsulated all components that require thermal tracking.

The Dividend goes in the composite line as the very last thing prior to the exciter. Take the output of either your STL or composite processor, if you use one, and feed it to the input of the Dividend. With the unit in the "bypass" mode, note your modulation level (or, easier, note your exact pilot injection level).

Flip the "bypass" switch to the operating position, and set the Dividend output for exactly the same modulation (or pilot) level. Then adjust the "calibrated" control until you see the pilot level on the modulation monitor just begin to "kick" downward. Back off the control slightly, to where the kicking ceases.

Though the Dividend is not meant to take the place of a composite clipper, there is a very slight amount of overshoot clipping involved in the circuitry. Checking for pilot kick—a slight variation in level—is a good indication that the Dividend is just below clipping of the main signal, where it oper-

An interview with "Orbie," the Orban Dalmatian.

HOME: San Francisco, California

PROFESSION: Orban Products spokes-dog. (Eat your heart out Spuds!)

AGE: 35 (that's 5 in human years).

QUOTE: "Orban has a passion for quality that is exceptional among companies today."

PROFILE: Reliable, versatile and technically outstanding (like Orban products).

ON ORBAN: "Orban maintains the highest technical standards and delivers the most thoughtfully engineered audio processors on the market. Reliable products, purpose-built and backed by great customer service. That's dogged perfection!"

FAVORITE PRODUCTS: "Compressor/Limiters, De-Essers, Stereo Synthesizers, Parametric Equalizers, Spatial Enhancers, Programmable Processors and of course, the OPTIMOD. The entire line is unsurpassed in quality."

FAVORITE SONG: "You Ain't Nothing but a Sound Dog."



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WMMZ's Sound is Tailor-Made

by Reynold Hawk, GM
WMMZ-FM

Ocala FL Moments after making the switch to CD CHR, it became frighteningly obvious to us that after all the surveys, all the preparation and all the hard work to get us to the point of the big moment, we had overlooked one important factor. We couldn't rely on the old audio processing chain any longer.

Thoughts came to me: "The budget is slim, but we need to be more aggressive on the dial to get an edge on the competition. Maybe the format was not enough; I don't want to sound like the rest. What do I do?"

USER REPORT

I wanted to be loud, of course, but I really did not want to sacrifice what the new format was allowing us to do. I wanted to be as clean and open as possible, to make listening to the "Z" a pleasurable experience and not a chore.

Local company to the rescue

Thank goodness I didn't have to look far for my answers. A local manufacturer, Hit Design, was working on a product they said would help us accomplish our goals. It sounded like the right tool—after all, it was named the Tailor Dynamic Equalizer. But could an equalizer really give us what we wanted?

Following the relatively easy installation of the Tailor, I discovered that the unit was more than just an equalizer. With 10 bands of cut and boost on standard ISO octave centers and individual frequency limiters, the Tailor lived up to its name, allowing us "tailor" our sound to our taste.

The limiting in each frequency band gave us that consistency and apparent loudness we were searching for.

At first the Tailor looked complicated and overwhelming. The front panel has a set of individual left and right input and output level controls and a bypass/operate switch. In the bypass mode, the audio bypasses the unit while still showing the action of the Tailor on its fluorescent display.

The display doubles as a 10 band peak program meter and an EQ position indicator. As an EQ indicator, the display shows both the amount of cut/boost and the amount of limiting in each band.

Real-time analysis is built into the Tailor. Equalization and limit controls are located to the right of the input/output controls.

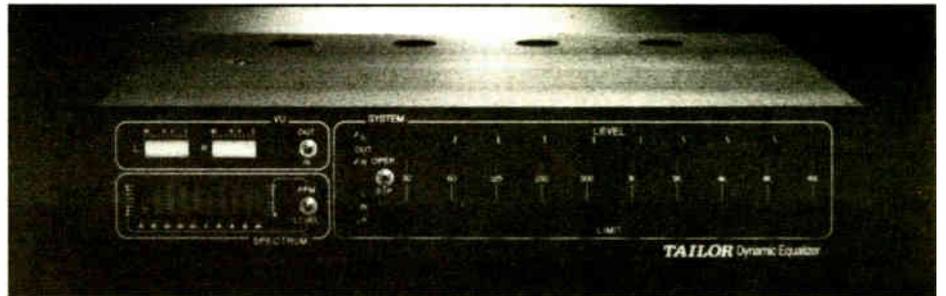
Coming to life

Once the input/output levels were set up, the adjustment process began. The intimidation left in a hurry as following the suggested settings in the manual made things come to life. The audio actually sounded louder, and the limiting action was so subtle, one would have thought that it wasn't in line.

The beauty of this concept lies in the ability to very gently control the dynamics of the program yet maintain the

consistency. That's because the Tailor is a series processor. The frequencies are not split into multibands as in all the other processors on the market. The result: no holes in the audio and no phase shift or errors to compensate for.

Increasing the limit controls on each



Hit Design's Tailor EQ lives up to its name, tailoring the sound at WMMZ.

band definitely made the audio sound compressed. However, when we maintained the adjustments within the recommended settings, the Tailor sounded very smooth. Our sound was certainly giving the competition a run for its money.

As if this wasn't enough to justify spending the extra dollars (and believe me, it was), I decided to try the Tailor in

the production room. We needed help there, too.

Well, that did it. The production that came out of that room was consistent. Everything, from new production to all those agency spots being dubbed, sounded like nationally syndicated material.

I then realized that even if some digital device comes along to replace it as an on-air audio processor, the Tailor won't go directly to the used equipment ware-

house. The Tailor Dynamic Equalizer will always have a home in our production room.

Editor's note: Reynold Hawk can be contacted at WMMZ (Z-93): 904-622-5600.

For more information on the Tailor Dynamic Equalizer by Hit Design, contact Todd Harrington at Broadcasters General Store: 904-822-8058, or circle Reader Service 51.

StereoMaxx Enhances KMOD

by Steve Davis, CE
KMOD/KAKC

Tulsa OK Stereo enhancement can create a unique sonic signature that helps to set a station apart from competitors.

Early stereo enhancement devices did little more than amplify the L-R component in a linear fashion, often adding delay. These units tended to increase multipath distortion, since the difference channel, being a subcarrier, is affected by any signal attenuation before problems become noticeable on the main channel. Also, the effect on mono

sources, as well as mono radios, was often less than desirable.

The Modulation Sciences StereoMaxx has intelligent circuitry designed to eliminate these problems.

Installation and setup

I have installed StereoMaxx units in several Clear Channel Communications radio stations, each with different formats and audio processing chains. Our biggest concern when we installed the first unit was increased multipath distortion.

Adjusting the enhancement to a max-

imum value resulted in some perceived multipath increase. But careful adjustment of the controls resulted in a very satisfying widening of the stereo image without noticeable signal degradation.

USER REPORT

In short, the StereoMaxx delivered what it promised: stereo image enlargement without increased multipath or other artifacts.

Setup of the unit is straightforward. "Width" is adjusted to give the desired enhancement effect. The LED displays on the unit—"Image Width" and "Automatic Width Limiting"—serve as excellent aids to adjustment.

The Automatic Width Limiting feature serves to prevent already fully separated passages (such as some old Beatles tunes) from being enhanced. The stereo enhancement is incrementally disabled as the input signal approaches maximum L-R.

The unit acts most dramatically on recordings with a great deal of indistinct psychoacoustical positioning, serving to move all instruments outward from the perceived "center stage."

Third dimension

The "Depth" control adds a third dimension to the signal by feeding a small amount of delay into the enhancement channel. This delay is fed out of phase, so it is inaudible on monaural receivers.

Also, when mono sources are feeding the unit, the enhancement circuits shut down. Nonetheless, I found that overuse of the "Depth" feature will generate a "doubling" effect on stereo receivers.

The "Right Channel Balance" control

(continued on page 34)

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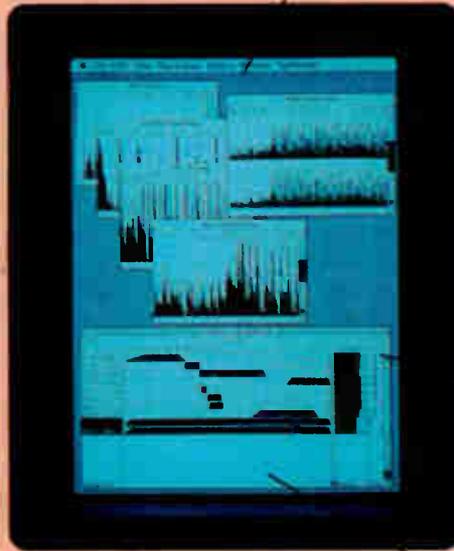
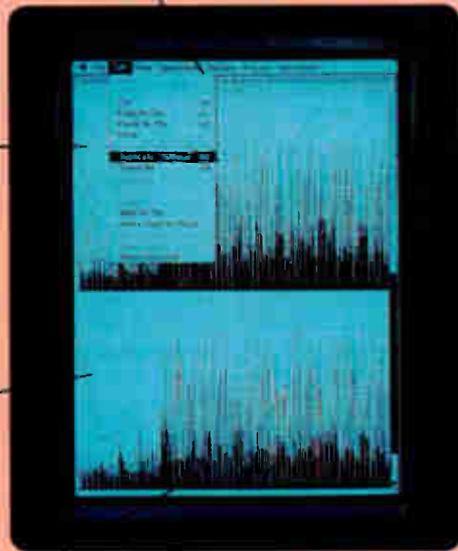
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DigiMod Offers Urban Upgrade

by Paul Donahue, Designer
California Digital Audio Systems

Moorpark CA The DigiMod 2000 and DigiMod XT from California Digital Audio Systems are considered by many programmers and engineers to be the loudness and quality positioning audio processors for the 1990s.

The DigiMod systems were developed by working broadcast engineers as an upgrade to both the Orban Optimod 8100 and Orban Optimod XT audio processing "technology platforms."

DigiMod audio processing circuitry is contained on replacement cards by California Digital for the Optimod internal card frame. This provides for easy integration into the broadcaster's facility.

Engineers and programmers have noticed immediate improvements in loudness, clarity and stereo separation after installing the DigiMod cards.

Taking advantage of maturity

Broadcast technology is in a state of transition from analog to digital technology. Digital recording and playback of

source material is preferred by broadcasters and consumers because of low cost, random access and demonstrably higher sonic quality.

TECHNOLOGY UPDATE

Digital program audio equipment for broadcasters, however, is costly and available equipment designs have not yet demonstrated sonic improvements that would justify increased cost.

In the early 1990s, solid state analog technology has reached a mature technological position. As such, premium grade analog componentry can be designed to outperform digital signal path equipment in headroom, distortion and other performance criteria—at significantly lower costs. Digital circuitry has, however, exhibited many strengths and cost efficiencies in the storage and control of audio.

California Digital Audio systems has carefully analyzed the available technol-

ogy and has chosen a hybrid design approach which consists of premium grade analog signal path componentry with digital control. This approach yields a quality audio processor which competitively positions digital audio sources.

California Digital uses hand graded analog components with ICs meeting the minimum criteria of 18 V/ μ sec slew rate and exhibiting THD of no greater than .003%. One percent metal film resistors and metallized polystyrene capacitors are also used to present the optimum in analog signal path design.

Pulse Duration Integration

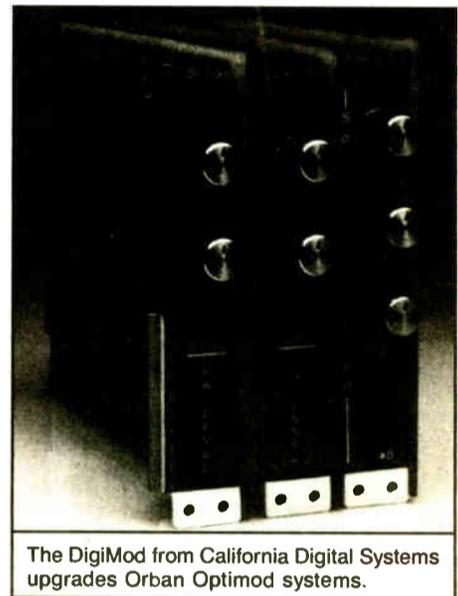
DigiMod digital control circuitry employs a method called Pulse Duration Integration or PDI. The analog audio is first split into three audio bands using 6 dB/octave filtering. The three bands of audio are then sampled by three analog level-to-full wave digital pulse width systems in the control circuitry.

The California Digital method of sampling and delivering the DC pulses is designed to emphasize stereo signals without additional enhancement and also completes an asymmetrical test for voice/music optimization. The resulting variable DC pulse widths are then used to switch DC driven integration networks into the control circuit for lengths of time corresponding to audio frequencies, levels and user settings.

The relative amount of time which the PDI networks are active in the circuit depends on our proprietary "spectral fusion" controls. These controls set the percentage

of time that the DC driven switched integration networks are in the control circuitry and as a result allow the user to tailor the type of sound and amount/type of AGC action in each band.

The range of each spectral fusion control is continuously variable in type and amount of AGC action from slow com-



The DigiMod from California Digital Systems upgrades Orban Optimod systems.

pression through fast limiting and finally clipping. California Digital attributes the power and wide range of these spectral fusion controls to our product's success with major market radio stations in formats from Classical to Country to CHR and from AC to Urban.

Editor's note: The DigiMod 2000 and the DigiMod XT are distributed by The Broadcasters General Store. For information, contact Todd Harrington at Broadcasters General: 904-622-9058, or circle Reader Service 73.

MSI Spreads Out Stereo

(continued from page 32)

is important and does not have very great range (only about ± 1 dB). If the StereoMaxx is connected directly to the output of an audio board, the left and right program levels on the board should be closely matched.

Placement in chain

The manufacturer recommends that any multiband audio processors in the air chain be placed downstream of the StereoMaxx so their independent action on the left and right audio channels will not be interpreted as a difference and erroneously enhanced. We found this configuration to be disappointing in actual practice.

I achieved better results placing the multiband processors ahead of the StereoMaxx.

The StereoMaxx also adds a feeling of

brightness, an unexpected bonus.

When switching a car stereo between the StereoMaxx enhanced signal and other stations, the other stations sounded very "centered," almost as though they were broadcasting in mono! The StereoMaxx sounded full and wide—a much bigger, fatter sound.

Pressing the "bypass" button on the unit itself is a good test, as the StereoMaxx has unity gain so loudness does not change. The music just seems to "spread out" into a wide aural panorama encompassing the listener, retracting again into a separated but unexcitingly small stage when the "bypass" button is engaged.

Editor's note: For more information on the StereoMaxx, contact Bob Ross at Modulation Sciences: 718-625-7333, or circle Reader Service 30.

The Latest on Loudness

(continued from page 30)

signal in a market. Without it there's no way to compete with people who use it."

Small thinks solutions to the processing wars require a new perspective on the issue. "Do we have to do the current levels of processing in order to achieve the kinds of loudness that program directors ask for? Not if we remove the incentive for processing, namely, the need to keep a watchful eye on the modulation monitor and be loud at the same time.

"What we have been doing is processing so it looks good on the mod monitor and not so it sounds good to our ears." Small noted that products such as his ModMinder help reverse that trend by removing the incentive to process heavily. He added, "Processing and its attendant distortion will only be reduced once that incentive is removed."

In the final analysis, there may be no

end to the loudness wars. If there is any hope, said Foti, it would be to develop a dialogue—assembling a group of programmers, engineers and processing manufacturers to try to come up with a reason why the escalation is taking place.

Other possibilities

Somich added the wars will end "only when responsibility for the sound of the station gets out of the hands of programmers. They have total control; the engineer really has no choice except to go along with them."

On the bright side, perhaps a slowdown to such competition might be coming. "Given the state of the art in processing," noted Orban, "nobody's going to be able to blow a hole in the dial anymore. The most you're going to get will be modest loudness changes from station to station."

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H-3000B a Multi-Faceted Tool

by Herb Bogard, Owner
Power Ads, Inc.

Vincennes IN Radio stations today have several tools of the trade to aid them in producing creative quality state of the art commercials. I'd like to share with you what I consider to be the one essential piece of audio gear designed with that goal in mind, the Eventide H-3000B Ultra Harmonizer.

This user friendly digital effects audio processor puts it all together when it comes to producing. What I like most about the H-3000B is I don't need a PhD

in electronics to operate it. The unit's large character LCD readout displays numerous factory presets that can be utilized immediately, without programming the sounds you need.

Input and output levels are shown on the main display and both left and right can be changed in dB. This is handy if you need to boost or tone down a vocal to blend in with a music mix or vice versa.

The H-3000B puts all this in one digital audio production box: full stereo pitch changer, fourteen algorithms, eighty factory presets, on-board sound effects, function generator, a digital

reverb, plus time squeeze. The 14 algorithms deliver a multitude of dynamic digital sound effects like the popular stutter effect with sweeps and vocal pitch control.

Helpful hints

For station IDs, lay down your vocals and run them through the H-3000B stutter program and it will stutter automatically. Or, control the stutters and sweeps

USER REPORT

manually with the front panel soft key triggers. The machine works in real time without the need for a sampler/digital delay. The variations are almost unlimited.

For broadcasting, the time squeeze algorithm is very beneficial in promos and commercials that must be exactly 30 or 60 seconds. Time squeeze works with variable speed frequency controlled tape machines only, speeding up or slowing down prerecorded material without altering the pitch.

Utilizing time squeeze is easy. Enter the current commercial length, how long you want it to be and the machine automatically makes the necessary calculations and controls the reel-to-reel or cart machine's speed.

If you're into programming sound effects, definitely spend some time with patch factory. The factory presets—

thunder, jet, jettison and stereo copter are examples of what kind of effects can be created if you understand the algorithm concept and workability.

Responds to needs

The specifications of the unit include full 16 bit resolution at 44.1 kHz sampling rate, differential balanced inputs and outputs and pro +4dBm operating levels (jumper blocks can be switched to accept -10 dBm levels), pitch variation one octave up, two octaves down, up to 1.5 seconds of delay, frequency response 5 Hz to 20 kHz and full MIDI implementation. In short it's designed with the needs, wants and desires of professionals in mind.

I admire Eventide's philosophy of designing a unit that isn't going to be obsolete a month after you've purchased it. The H-3000B allows one to add new functions and features to the unit with software/hardware updates, rather than encompassing a whole new expense for tomorrow's technology.

By looking at the unit's back panel, several expansion ports indicate future development to expand the horizon of H-3000 owners' production capabilities. Original H-3000 owners may install upgrade kits to obtain the H-3000SE, H-3000B, and H-3000S features—to conquer the demand for creative production in the 1990s.

■ ■ ■

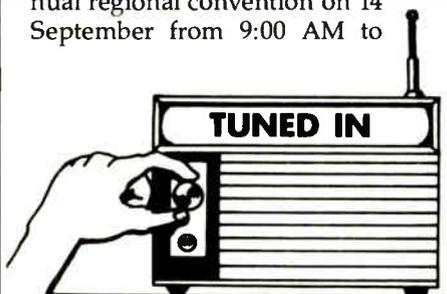
Editor's note: Herb Bogard has been involved in radio production for 10 years. His studio, Power Ads, Inc., creates radio IDs, sweepers, promos and commercials. Contact him at 812-882-6786.

For more information on the Ultra Harmonizer, contact Gil Griffith at Eventide: 201-641-1200, or circle Reader Service 10.

People . . . Sony Professional Audio Division announces the appointments of Clayton Blick as marketing manager and Gary Rosen as national sales manager. Blick left his position at Sony's Burbank, CA office to assume his new role. Rosen recently rejoined Sony to accept his new position.

Lexicon, Inc. has named Daniel Roberts VP of its sales and marketing operations. Roberts will direct the company's marketing and sales activities of professional and consumer products in domestic and international markets.

Events . . . The Society of Broadcast Engineers (SBE) will hold its 18th annual regional convention on 14 September from 9:00 AM to



5:00 PM, at the Sheraton Inn Convention Center in Liverpool, NY. For information, call John Soergel at 315-437-5805.

Increased sales . . . Microwave Filter Co. reported an overall increase

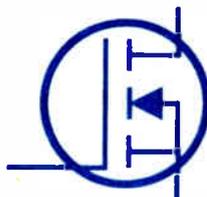
in net income and net sales for both its second quarter and first six months, compared to last year's figures. Net sales increased 28% during the second quarter ended 31 March 1990, and 13.6% during the six months ended 31 March 1990. Net income increased 279% during the second quarter of fiscal 1990, and 6.5% during the six months ended 31 March 1990.

Contracts . . . Scientific Atlanta, Inc. announced the receipt of a contract awarded by Samart Telecoms Co., Ltd., of Bangkok valued at \$8.0 million. The contract is for a new VSAT (Very Small Aperture Terminal) satellite network for Thailand. The network was installed by Scientific-Atlanta and is operated by Samart. It consists of a 10-meter master hub earth station, three 6-meter mini-hubs, and more than 400 remote terminals. The VSAT network will support telephone and data communications throughout Thailand.

New companies, new names . . . Nigel Branwell announces the formation of Soundings-Electrotec, a company specializing in representation and implementation of leading edge audio technology and techniques in the Seattle area. For information, contact Nigel Branwell at Soundings-Electrotec: 206-842-7128.

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Hnat Hinde a Hit with WJAZ

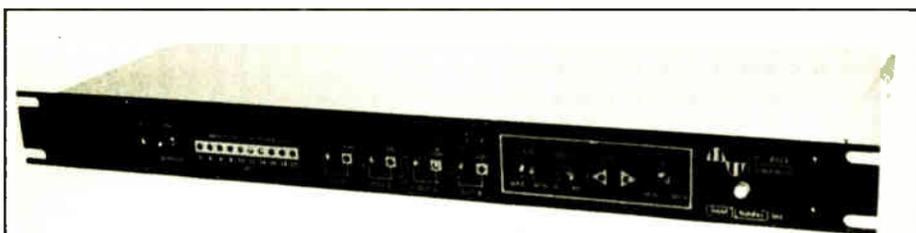
by Chris Tobin, CE
WSTC/WJAZ

Stamford CT WJAZ was looking for a way to develop its own market identity with sound. Our jazz listeners are very particular about how we process the music. With this in mind, the search was on for an audio processor to fit the bill.

We at WJAZ have been researching what our listeners are looking for from the station and where and when they lis-

Since putting the CP-2013 on the air several months ago, the response from listeners and our clients has been positive. WJAZ has developed an extremely loud and clean competitive sound which has made even some of our neighboring New York City and Long Island radio stations take notice.

The CP-2013 is an amazing processor for the money because it is a compressor as well as a clipper. The compressor front end is capable of 35 dB of compres-



WJAZ gets a larger than life sound from the CP-2013 composite processor from Hnat Hinde.

ten. Surprisingly, we have found that more than 50% percent of our listeners enjoy the music of WJAZ in their car, on the beach, in the park and while working on home improvement tasks.

It was obvious that we needed processing that could deliver the necessary loudness for these environments and preserve the quality of our music. The CP-2013 composite processor by Hnat Hinde was our choice.

Larger than life

The CP-2013 not only delivered the composite peak control required, it also created an apparent larger-than-life sound to our music.

sion and expansion control, which prevents wash-up of the baseband at high levels of compression.

Baseband loudness clipping can be determined very precisely by the on-board clipper. This clipper does not generate the high levels of second harmonic products, which tend to clutter the sound of your baseband and wreak havoc with your audio and peak modulation.

Some might say that a jazz format is no place for testing aggressive processing. If you could hear how WJAZ sounds against my competition, however, you might change your mind.

With the CP-2013 in place, I began some tests with aggressive processing.

The compression levels we began with were about 15-20 dB per channel, with clipping on each and the CP-2013 set at 12 dB compression and clipping at 1 dB.

USER REPORT

The results were very impressive: We were able to maintain equal loudness with our crosstown rivals, yet we sounded less harsh than they did. This is by no means the only comparison one may make, but for a jazz station to keep pace with the competition of pop formats, this will do fine.

We also found that our stereo separation was not degraded at the high levels of processing. We maintained 50 dB easily at 12 kHz. The CP-2013 maintains the pilot's phase, amplitude and protection of the pilot to the letter.

The CP-2013 has some nice features, such as two composite outputs with independent level controls, remote bypass of

the unit for A/B comparisons, downstream SCA inputs and most of all, an incredible loudness and larger than life sound.

Best on transmitter side

I have found that the CP-2013 works best at the transmitter side of your audio chain. If you're concerned about setting up the CP-2013, don't be; it is very straightforward.

One word of caution. I did find a large disparity between the pilot phase of several stereo generators we have in house for evaluation purposes. If you're inclined to put the CP-2013 on line without first checking the pilot phase, you may notice a lack of dynamic range and think that the CP-2013 is faulty; it's not.

WJAZ chose the CP-2013 for its ability to control audio in a precise manner. I recommend you don't get caught competing against it.

■ ■ ■

Editor's note: Chris Tobin has been CE of WSTC/WJAZ for over five years. He chairs New York's SBE Chapter 15, and is a member of the New York Metro Area Frequency Coordinating Committee. He can be reached at 203-327-1400.

For more information on the CP-2013, contact Bonnie Hnat at Hnat Hinde: 203-935-9066, or circle Reader Service 105.

KBUN Gains Greater Clarity with Phoenix

by Tim McCartney, Contract Eng.

Bemidji MN A company named "Paul Bunyan Broadcasting" must uphold a certain image. The sound of its station should rival the tradition of that larger-than-life fictional character.

When Lou Buron and Mary Campbell bought the company in 1989, they sought to improve the audio clarity and coverage of their 1000 W KBUN-AM signal. They selected Gentner Electronics Corp.'s Phoenix NRSC-compliant audio processor.

Processor design

For AM broadcast, Gentner feeds its Audio Prism output to its AM Modulation Controller, thus creating in one box the "Phoenix" audio processor. It is designed to achieve high apparent loudness while producing few processing artifacts.

The audio spectrum is divided into low, mid, presence and high bands for processing by four digitally controlled circuits. The input and output signals of each board are level-detected, coupled with reference voltages and considered by the CMOS digital logic. It is the CMOS comparator which decides whether to expand, compress or remain at the present gain level.

Gentner argues that digital control does not confine the processor to expansion under default conditions. Rather, default can maintain present gain. Thus, listener fatigue should decrease from the greatly reduced number of AGC voltage reversals.

The four separate signals are summed together for the spectral mix. At installation time, a real-time analyzer is ideal for setting the multiband spectral mix levels, but proper setup is also possible by using an AC voltmeter.

A broadband sample combining the four signals is provided for analyzer use.

Otherwise, an internal pink noise generator feeding each board produces front-panel AC voltage measurements.

At KBUN, the STL receiver feeds the Phoenix, which in turn is connected to the transmitter audio input. It is not advisable to insert any device between the Phoenix and the transmitter, such as a phone line or STL. Degraded performance is likely because the unit produces output waveforms with closely controlled amplitude and phase parameters for maximum modulation.

USER REPORT

The integral clipper on KBUN's Harris MW-1A transmitter is disabled with a bypass of the modulation enhancer function.

A preferable arrangement is removal of all other audio processing in the chain. However, since the STL transmitter requires level protection from incoming audio, the existing compressor/limiter is retained at the studio.

The actions of all four audio processors are displayed by separate bar graphs each made up of 10 LEDs. Since a processor has a range of 20 dB from maximum expand to compress, one LED represents about two dB of gain change.

In addition, each band has five status indicators: reporting signal level, expansion, compression, peak indication, etc. LEDs also indicate the amount of instantaneous gain reduction.

The VCA drive control determines this trade-off between modulation density and signal quality, thus establishing a station's air-sound character. Lower settings produce moderate density with maximum quality, while higher settings result in greater signal penetration with

(continued on page 42)

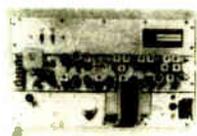
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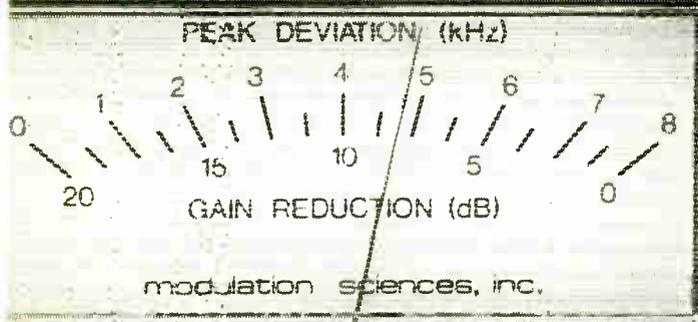
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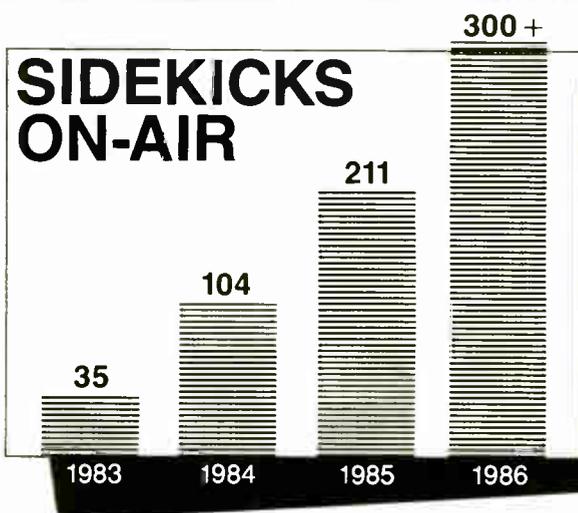
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CRL Audio Signature

by Chuck Adams, Eng Mgr
CRL

Tempe AZ It's a rare station that has only one processor on line these days. Some stations are experimenting with day-parting their processing; others connect together multiple processors from different manufacturers to create a unique sound image.

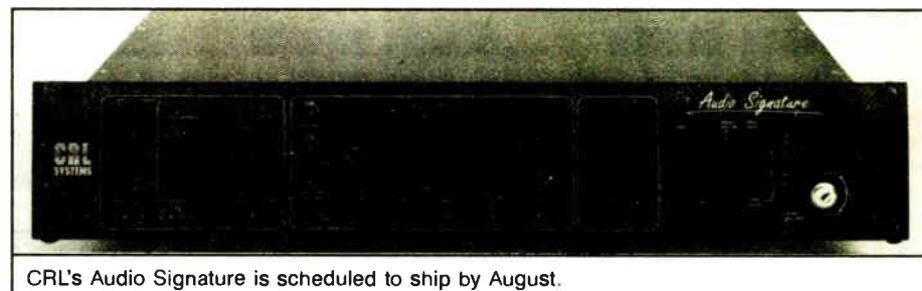
The Audio Signature was designed to dramatically increase the range of processing available in one unit. It allows audio control in a range from extremely gentle to vigorous. Processing artifacts can be either emphasized or suppressed

to match a particular format.

The Audio Signature incorporates as much digital technology as possible to simplify the control structure and to improve linear specifications throughout the unit.

Multiplying D-to-A converters are used to control processing parameters, equalization and user defined levels throughout the Audio Signature. This, combined with a relatively new VCA, has resulted in a tenfold improvement in distortion and signal-to-noise ratio.

We chose analog for the critical processing sections in the Audio Signature because the analog VCA is capable



CRL's Audio Signature is scheduled to ship by August.

of 110 dB or greater dynamic range. This is more than is available with a true 18-bit digital system.

System delay was also a major consideration. Even a 1 μ s delay has proven to be objectionable, as notable processors in the past have shown us. The nature

of digital is such that delays can be as high as 5 μ s—inadequate for the aggressive, flexible processing intended for the Audio Signature.

In our final analysis, we felt that performance was the most critical factor in how successfully stations would utilize the Audio Signature. We elected to use digital parts to increase performance in as many circuit areas as possible. Using this hybrid analog/digital approach, we feel we have created a product with the virtues of both digital and analog.

TECHNOLOGY UPDATE

From all indications it appears that the new Audio Signature will enable stations to tailor their sound without a hodge-podge of processing units.

During the on-air testing of the Audio Signature, station personnel commented on the extreme smoothness of the processor's sound, even when operated aggressively. Little or no instruction was required for the station engineers to begin tailoring the sound of their station.

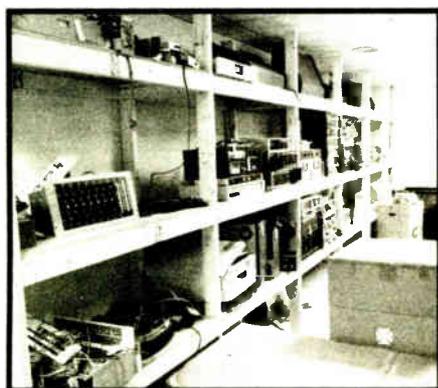
After installation, for instance, users start with the stock factory ROM settings closest to the sound desired. The sound can then be fine tuned either from the front panel or, using a PC and a modem, from the comfort of their own living room or office.

Front panel controls include input/output, process range and density, equalization, operation and memory control. Four complete front panel settings can be saved in internal memory; an unlimited number can be saved to computer diskette. All front panel controls plus many other options are available when using the included PC software.

Tests on select stations will continue through July and shipping of production units is scheduled for August.

Editor's note: For information on the Audio Signature, contact Chuck Adams at CRL: 602-438-0888, or circle Reader Service 58.

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WALT DISNEY Imagineering

KICD Puts dbx 163X to New Use

by Joe Schloss, CE
KICD-AM/FM

Spencer IA With the Performer Series 163X compressor/limiter, dbx has produced a low cost, good quality compressor that is versatile, easy to work on and has many uses. The unit doesn't have all the glitz and glitter of the digital whiz-bang-a-roo boxes, but what it does have it uses to the fullest.

I had spent most of one morning going through all of the distributor catalogs and calling a few places for prices, all the while getting pretty darn frustrated that I could not find a mic-to-line amp that was low cost and high quality.

USER REPORT

Then a friend of mine clued me in on the 163X, and how to rig it to do what I needed.

Specs check out

We wanted to use it as a compressor for the weather room. The guys have a tendency to really hit some words hard, to the point where the processing has to clip.

When the unit arrived, we tested it. The distortion was a very reasonable .15%, better than the specs in the book. Frequency response was about 1.3 dB. The noise was down lower than our distortion meter can see, so it had to be better than -75 dB.

The dbx 163X has 30 dB of gain with input levels from -30 to +10. Attack and release times are program dependent, to the extent that the more compression you use the faster the release/attack time.

As a compressor, the unit performs quite well, even though I don't think it was designed for pro use. If it were, they would have used XLR connectors and the like, instead of quarter inch phone plugs and RCAs. We have not had to do any maintenance to the unit, but with the simplicity of the box, I can't imagine it being too difficult.

A new use

Now, let's get to the application for which we bought the compressor ... a mic-to-line amp. With a little time and a modification kit, you can make the dbx 163X into a very good amp.

All that is involved is the replacement of one chip, removal and replacement of one pot and replacement of three other resistors. Then you have a mic-to-line amplifier with a built-in compressor that has good noise figures, low distortion and comes in a small package.

One point that does need to be



The dbx 163X serves not only as a compressor, but a mic-to-line amp as well for KICD.

made is that the unit does not have "smarts" in it, so it does take a little brains on the part of the operator. Don't just set the compressor control to full. The more compression, the less dynamic range. Use as little as you can, or

can get by with.

A feature of the unit that I like is the "over-easy" compression. It's more like a sponge, rather than a brick wall when the unit is in heavy compression.

The unit has quite a large

number of potential applications in a broadcast operation. We plan to put an additional unit in the newsroom, to allow us to have a more constant level presented to the recorders, because the newspeople tend not to watch their levels very well.

Other areas where it may find some applications could be in front of a Marti or cellular telephone, or control room microphone for some addi-

tional punch.

Overall, the 163X has a lot of value packed in a little box, not only as it was designed as a compressor, but with a few modifications, as a mic-to-line amplifier with built-in compressor.

Editor's note: Joe Schloss is Chief Engineer at KICD AM/FM in Spencer, IA. Previously he was CE at KIOA/KMGK in Des Moines, IA and KHAK-AM/FM in Cedar Rapids, IA.

For more information on the 163x, contact David Roudebush at dbx: 415-957-1067, or circle Reader Service 128.

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"FM radio has become a ratings war in which we are the casualties by being subjected to a poor excuse for clean, accurate music."

Thomas J. Koch, *The Audiophile-File*

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Dominator Does Job at WNWS

by Albert R. Byers, Engineer, and Robert Walton, Xmtr Supervisor WNWS/WLYF

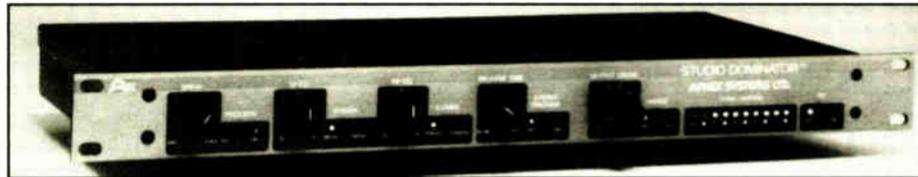
Miami FL WNWS is a News/Talk AMer operating under a high power STA due to Cuban co-channel interference. Add to the co-channel problem a high power first adjacent and you have the makings of an audio disaster. Maximizing the problem was the inconsistent and low density audio problem of an all-talk format.

To gain control of the adjacent channel problem we have employed the Kahn

test the Aphex Studio Dominator.

My first impression was that the Process switch was defective. With average

of brightness and spectral balance. It wasn't until I hung a Dorrrough loudness meter on both the input and output that



The Aphex Studio Dominator gives WNWS greater brightness and clarity, with a denser sound.

limiting action of 6 dB there was no apparent effect of switching the limiter in and out.

By apparent, I mean the expected loss

I really began to appreciate the capabilities of the Dominator.

As opposed to other multiband processors with their myriad controls,

the Dominator puts only the essential subjective controls on the front panel. A major part of the transparency of this limiter can be attributed to the program dependent control circuits that change operating parameters as needed.

Setup is remarkably simple. The principle controls are the Drive and the Output Ceiling control. The ceiling control is a switch set for the desired output level, the drive control for the desired amount of limiting from normal program. Overall "loudness" and density are then adjusted by the Release Time control.

There are no time markings other than Slow to Fast on the release control, as release time is one of the program dependent adjustments. The EQ controls allow you ± 6 dB of control to tailor your

(continued on page 42)

USER REPORT

POWERSide system. Our audio processor was found to give us the desired multiband AGC we needed for control of the audio program.

Overshoot problems

However, driving the limiter hard enough to achieve the required density was causing overshoot problems that could only be cured by severe clipping in the stereo generator. This was determined to be an unacceptable solution.

After trying several other limiters and upon review of literature and discussions with other users, it was decided to

by Leslie Tyler, President THAT Corporation

Natick MA The THAT/dbx 321 compander (compressor/expander) system reduces noise in audio transmission channels such as satellite broadcast links, closed-circuit cable links, terrestrial microwave links and digital audio transmission systems.

The system delivers in excess of 90 dB dynamic range from a channel with less than 45 dB of unexpanded dynamic range. The THAT/dbx 321 compander can often improve a marginal channel to

THAT/dbx 321 Compander Card

TECHNOLOGY UPDATE

CD-like quality without the expense of a digital system.

Companding algorithm

The 321 system operates by first compressing the dynamic range of the applied audio before transmission or digitization, and then expanding the dynamic range upon reception or D/A conversion. The compressor senses the level of its own output via an RMS-level detector.

The RMS detector controls a voltage controlled amplifier (VCA) to vary gain inversely with signal level: Increasing signal levels cause a proportionate decrease in gain, while decreasing signal levels cause an increase in gain. The system is adjusted so that for every 3 dB of increase in input level, the output level increases by precisely 1 dB.

Additional signal conditioning measures include sharp filtering (four poles at 15 kHz) to prevent out-of-band information from reaching the compressor, and substantial (20 dB) preemphasis in both the signal path and in the detector loop. By using two preemphasis networks in tailored relationship to each other, the response to swept sine waves remains flat, unlike traditional preemphasized compander designs.

The expander senses the level of its input signal via an identical RMS level detector to that in the compressor. In the expander, the detector controls gain through an identical VCA, but in this case gain is directly, not inversely, proportional to signal level.

Expander includes filtering

As in the compressor, the expander includes filtering (three poles at 15 kHz) to prevent out-of-band information from reaching the expander. It also provides complementary deemphasis for the signal path and identical preemphasis for the detector path, compared to the corresponding networks in the compressor.

The system reduces noise by exploiting the principle of masking: a sufficiently loud sound in the foreground will cover over—mask—soft background noise.

During compression, the audio signal is squeezed into a relatively small dy-

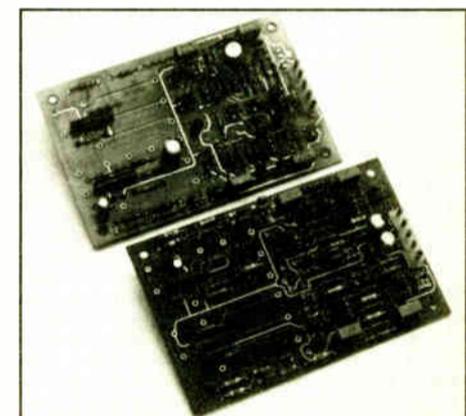
amic range. This allows it to be transmitted at a level consistently higher than the noise floor of the transmission channel. After broadcast over the channel, the squeezed signal is expanded again to its original dynamic range.

The 321 system provides "extra-strength" noise reduction, well-suited to channels with poor inherent dynamic range. The combination of strong preemphasis (20 dB) and high companding ratio (3:1) act to keep compander artifacts low under all but the poorest of channels.

Strong noise reduction with little artifact was the reason that National Public Radio selected the original 321 system for its satellite distribution network.

New units

In September 1990, THAT Corporation announced new versions of its highest-spec 321 designs, the 321CS compressor and 321ES expander. These products



THAT Corp.'s Model 321ES expander (top) and 321CS compressor (bottom)

feature greater use of integrated circuits for lower component count, greater reliability, and lower cost.

The 321CS compressor is the only compressor in the line. It provides the extremely tight frequency response required at a transmitter location, ± 0.05 dB.

Three choices of expander are offered to provide flexibility in configuring receivers. The 321ES is recommended for ultimate-quality applications. The 321EM is recommended where cost is important but slightly relaxed performance is acceptable. The 321EL is the product of choice for highly cost-conscious applications.

■ ■ ■

Editor's note: For information on the dbx 321 card, contact Leslie Tyler at THAT Corp.: 508-653-6335, or circle Reader Service 100.

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WNWS Picks Aphex

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sound.

Aphex is probably best known as one of the gurus of psychoacoustic processing. The Dominator has not been left short in this field with the inclusion of the TEC (Transient Enhancement Circuit) feature.

All limiters by definition modify transient peaks in audio, which contribute to the "live" effect. The TEC regenerates these fast term transients offering a more open, non-processed sound.

Specs stand up to claims

Placing the Dominator on the bench verifies the claimed specifications. Even with relatively high limiting the distortion figures were below the limit of audibility; in quiescent mode the noise figures match anything available.

Although relatively simple in design, the crossover filters are exceptionally smooth with minimal group delay between bands. Actual gain control is achieved through VCA technology. The components and construction employed are of the highest quality.

On air use has demonstrated the same high level of performance. We've in-

serted the Dominator in the insert point of the stereo generator. We are now running our audio processor with minimal limiting action and have disabled the clippers in the stereo generator.

The Dominator has given us a significantly improved sound with greater brightness, higher clarity, denser (louder) modulation with no overshoot problem and full control of peak modulation.

Constructive criticism

In the way of suggestions, I'd like to see a total bypass switch. The Process switch only disables the limiting action and makes for a difficult proof of performance.

Another caveat is that this is just a limiter, albeit an excellent one. You're going to need something in front of it as a gain rider.

The other major problem is not the fault of Aphex. The Dominator is so clean that it will show up deficiencies in other parts of the transmission chain. If you want the best audio chain possible, the Dominator will be in it.

Editor's note: For more information on the Dominator, contact Paula Lintz at Aphex: 818-767-2929, or circle Reader Service 53.

Paul Bunyan's Phoenix

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some sacrifice in fidelity.

Other external controls include switches for the pink noise generator and bypass mode, as well as adjustments for input gain, bypass gain, output gain, mix levels, density, and gating.

Stereo use

By strapping the AGC to another Phoenix unit, a stereo configuration is established in which the gain of each band can track with the gain of the same band in the other channel.

Gentner does not typically recommend such use, because strapping

decreases desired spatial dimension. The firm says that extensive on-air use shows the independent action to produce no negative effects such as platform motion.

As a result of the Phoenix installation alone, KBUN has achieved significant improvements in audio clarity, loudness and coverage while becoming NRSC-compliant.

Editor's Note: Tim McCartney is a contract engineer in Bemidji, MN. He can be reached at 218-751-1680.

For more information on the Phoenix, contact Gary Crowder at Gentner: 801-975-7200, or circle Reader Service 92.

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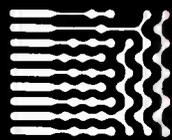
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